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Chemical Recipes Book

First Edition

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GUIDANCE NOTES

1. CONVERSIONS

1 ml = 1 millilitre = $1 \text{ cm}^3 = \frac{1}{1000}$ th litre

1 litre = $1 \text{ dm}^3 = 1000 \text{ ml}$

1M = $1 \text{ mol dm}^{-3} = 1 \text{ mol l}^{-1} = 1 \text{ mole per litre}$

2. WATER

Where water is indicated in the recipes for use, this should be distilled water unless otherwise specified. Tap water is not suitable for making up solutions because it contains a number of impurities.

3. MAKING UP SALT SOLUTIONS

Recipes are generally given in the form “x”g of salt made up to “y”ml with water, etc. To make up the solutions, dissolve the salt in the minimum volume of liquid necessary. When the salt is completely dissolved, dilute to the final volume. If very accurate solutions are required, a volumetric flask should be used for the final dilution. Generally, this is not necessary for reagents to be used up to GCSE level.

4. HAZARDS

You should always use recognised published texts to carry out risk assessments when using any chemical, e.g. CLEAPSS Hazcards and SSERC Hazardous Chemicals. The user should always check the recommended safety procedures for handling any of the chemicals shown. Local rules may dictate different procedures to those outlined in this book.

Hazard information is shown in italics for information only. Inclusion of a chemical in this book does not imply that it is safe or legal to store or handle the chemical on school premises.

5. GENERAL INFORMATION

Where a figure is shown beneath the name of a chemical, this is the Relative Molecular Mass (R.M.M.) of the chemical.

Alternative names are given in brackets.

Bench solutions are given for historic information. It is often sensible to use a more dilute solution in school work in order to reduce hazards. You should always provide the most dilute solution practicable for any experiment.

Laboratory and manufacturing uses of some chemicals are shown for information only.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
acetaldehyde		see - ETHANAL
acetamide		see - ETHANAMIDE
acetanilide		see - <i>N</i> -PHENYL ETHANAMIDE
acetic acid		see - ETHANOIC ACID
acetic alcohol		see - ETHANOIC ALCOHOL
acetic anhydride		see - ETHANOIC ANHYDRIDE
acetoacetic ester		see - ETHYL 3-OXOBUTANOATE
aceto carmine		<i>CORROSIVE</i> - wear eye protection and gloves
Boil 0.4g carmine with 55ml water. Add 45ml glacial ethanoic acid (<i>CORROSIVE</i>). Boil again, cool and filter.		
aceto orcein		see - ORCEIN ACETIC
acetone		see - PROPAN-2-ONE
<i>di</i> -acetone alcohol		see - 4-HYDROXY-4-METHYLPENTAN-2-ONE
acetonitrile		see - METHYL CYANIDE
acetophenone		see - PHENYLETHANONE
acetyl chloride		see - ETHANOYL CHLORIDE
<i>O</i> -acetylcholine chloride		A neurotransmitter
acetylene tetrachloride		see - 1,1,2,2-TETRACHLOROETHANE
acetyl salicylic acid		see - 2-ETHANOYLOXYBENZOIC ACID
acid blue 40		Used as a dye
acid fuchsin		see - FUCHSIN, ACID
acidified salts		see under name of salt
acridine orange		Used as a dye
acrylic cement		see - TRICHLOROETHENE
adenine		
135.13		a nucleic acid base used in chromatography
adenosine triphosphate		see - ADENOSINE-5-TRIPHOSPHORIC ACID
adenosine-5-triphosphoric acid disodium dihydrogen salt (ATP)		
623.31		a biological energy transmitter
adipic acid		see - HEXANEDIOIC ACID
adipoyl chloride		see - HEXANEDIOYL CHLORIDE
<i>l</i> -adrenaline	<i>TOXIC</i>	a biological hormone
agar agar		Used as a base for solid culture media
To prepare solid media before autoclaving - add 12g agar per litre of medium		
agar, blackened		for growing <i>Nicotiana</i> seedlings
30g agar and 6 teaspoonfuls carbon black made up to 1000ml with water. Heat, stirring continuously, prior to autoclaving.		
agar, blood base		for bacterial cultures
Make up from supplier's tablets. 2 tablets to 10ml water. Soak for 15 minutes prior to autoclaving.		
agar, China blue lactose		for culture of dairy products' bacteria
Make up from supplier's tablets. 2 tablets to 10ml water. Soak for 15 minutes prior to autoclaving.		
agar, cornmeal		
Boil 30g maize meal with 1000ml water for 15 minutes while stirring. Remove from heat and allow to settle, then decant the clear liquid into a clean container. Add 2g agar for each 100ml liquid. Autoclave.		
OR, 17g supplier's cornmeal agar and 1g yeast extract made up to 1000ml with water. Autoclave.		
agar, egg yolk		
Autoclave 10ml egg yolk emulsion. Add aseptically to 100ml autoclaved nutrient agar.		
agar, frozen pea		
Blend 160g thawed peas in a liquidizer. Add 1000ml water and 20g agar. Boil, stirring continuously prior to autoclaving.		
agar, glucose-1-phosphate		
4g agar and 1g glucose-1-phosphate to 200ml water. Boil, stirring continuously, then pour into petri dishes.		
agar, housefly		
100g dried milk, 100g dried yeast and 20g agar to 1000ml boiling water. Store in a refrigerator until used.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
agar, MacConkey		for culture of coliform bacteria pH 7.4
Make up from supplier's tablets. 2 tablets to 10ml		water. Soak for 15 minutes prior to autoclaving.
agar, malt		for yeast culture
15g agar and 20g malt extract made up to 1000ml with water prior to autoclaving.		
Or, make up from supplier's tablets. 2 tablets to 10ml water. Soak for 15 minutes prior to autoclaving.		
agar, malt extract		for bacterial cultures pH 5.4
Make up from supplier's tablets. 2 tablets to 10ml water. Soak for 15 minutes prior to autoclaving.		
agar, mannitol yeast extract		to culture <i>Rhizobium spp.</i> from root nodules
Heat 10g agar with 1000ml water. Add 0.5g di potassium hydrogen phosphate, 0.2g magnesium sulphate -7-water, 0.2g sodium chloride, 0.2g calcium chloride-6-water, 0.01g iron(III)chloride-6-water, 10g mannitol and 0.4g yeast extract powder. Autoclave.		
agar, milk		
20g dried skimmed milk to 100ml water. Autoclave. Add to autoclaved nutrient agar (see - AGAR, NUTRIENT) made with 900ml water instead of 1000ml water, aseptically at 45 - 50°C.		
agar, nutrient		for bacteriological culture
10g yeast extract, 10g peptone, 15g bacto-agar and 5g sodium chloride made up to 1000ml with water. Autoclave.		
Or: dissolve 28g supplier's nutrient agar powder per 1000ml water. Soak for 15 minutes. Autoclave.		
agar, oatmeal		
Heat 50g oats with 500ml water on a water bath at 58°C until the oats are softened. Add 500ml water and 20g agar. Filter through muslin prior to autoclaving.		
agar, potato		
Grate 500g peeled potatoes and stand for 6 hours in 500ml water. Filter and add 20g agar dissolved in 500ml water to the filtered solution. Steam for 30 minutes prior to autoclaving.		
agar, potato dextrose		for culture of fungi
15g agar, 200g boiled potatoes and 20g dextrose made up to 1000ml with water. Autoclave.		
agar, rye meal		
Grind 60g rye grain for 10 minutes, then stand in 1000ml warm water for 1 hour, stirring occasionally. Filter through muslin. Autoclave.		
agar, sabouraud maltose		for isolation of fungi
Make up from supplier's tablets. 2 tablets to 10ml water. Soak for 15 minutes prior to autoclaving.		
agar, seed germination		
3 - 4g agar to 100ml water. Bring to the boil, stirring continuously and pour into petri dishes.		
agar, starch		for work with amylases
2g agar to 100ml 1% starch suspension. After 10 minutes, warm to boiling point, stirring continuously. Alternatively, autoclave the starch agar. Finally, pour into petri dishes.		
agar, starch nutrient		
Boil 15g nutrient agar in 100ml water. Heat 40g starch in 100ml water. Mix together and autoclave.		
agar, tributyrin		
Add 10g tributyrin to 1000ml nutrient agar (see - AGAR, NUTRIENT). Autoclave.		
L-alanine		(2-aminopropanoic acid)
88.09		an amino acid
Albert's iodine		see - IODINE
Albert's stain		Used as a biological stain
Dissolve 0.15g toluidine blue and 0.2g malavhite green in 2ml IMS (<i>FLAMMABLE, HARMFUL</i>). Add 1ml ethanoic acid (<i>CORROSIVE</i>) to 100ml water. Mix the two solutions together and allow to stand for 24 hours. Filter.		
albumen, egg		
The liquid white of eggs.		
albustix		
Commercially available strips used to test for proteins in solution		
alcohol		see - ETHANOL
alcohol		see also - INDUSTRIAL METHYLATED SPIRIT

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
alcoholic potassium hydroxide	<i>FLAMMABLE, CORROSIVE, HARMFUL</i>	
<i>Wear eye protection.</i>		
Reflux 10g potassium hydroxide pellets (<i>CORROSIVE</i>) with 100ml ethanol (<i>FLAMMABLE, HARMFUL</i>) for 30 minutes. Cool. Filter through glass wool.		
alizarin		(1,2-dihydroxyanthraquinone)
240.22		Used as a dye.
Soluble in ethanol.		
alizarin red S		Used as a dye.
<i>Wear eye protection. Wear gloves when handling solid alizarin red S.</i>		
1 litre dye solution (<i>IRRITANT</i>) - Dilute 10g potassium hydroxide to 1000ml with water, then dissolve 0.1g alizarin red S in this solution.		
almond oil		
alum		see - ALUMINIUM (III) POTASSIUM (I) SULPHATE (VI)
alumina		see - ALUMINIUM OXIDE
aluminium, metal		
26.98		
<i>Dust and powder are FLAMMABLE, HARMFUL. Handle carefully to avoid raising dust.</i>		
Also available as foil, sheet and turnings		
aluminium acetate		see - ALUMINIUM ETHANOATE
aluminium ammonium sulphate-12-water		(ammonium alum)
453.32		
1 litre 0.1M - 45.3g aluminium ammonium sulphate-12-water made up to 1000ml with water.		
aluminium chloride, anhydrous	<i>CORROSIVE, water-reactive</i>	
133.34		Used to demonstrate sublimation.
<i>Wear eye protection and gloves. Pressure may build up in stored containers. Use a fume cupboard.</i>		
aluminium chloride-6-water		
241.43		
100ml aluminium chloride reagent (<i>wear eye protection</i>) -		
65.0g aluminium chloride and 0.5g decolourising charcoal made up to 100ml with water. Filter. Adjust to pH1.5 with 1% aqueous sodium hydroxide (1g sodium hydroxide (<i>CORROSIVE</i>) made up to 100ml with water).		
aluminium ethanoate		(aluminium acetate)
204.12		Used as an astringent and antiseptic
Soluble in water.		
aluminium lithium hydride		see - LITHIUM TETRAHYDRIDOALUMINATE(III)
aluminium ore		see - BAUXITE
		and - ALUMINIUM OXIDE, CORUNDUM
aluminium oxide		(alumina)
101.96		
TEST FOR SULPHATES - Boil 1.0g aluminium oxide-3-water with 50ml water and 1ml 1M hydrochloric acid. Cool and filter. Add 1ml 0.2M barium chloride. No cloudiness is seen when this solution is mixed with a sulphate.		
aluminium oxide, corundum		aluminium ore
		Used as a very hard abrasive powder.
aluminium(III)potassium(I)sulphate(VI)-12-water		
474.38		(potash alum, potassium alum, potassium aluminium sulphate)
100ml saturated solution (for growing crystals) (<i>wear eye protection</i>) -		
Dissolve 30g aluminium(III)potassium(I)sulphate(VI)-12-water (alum) in 100ml of water at 50 degrees Celsius. Allow to cool. For crystal growing, seed the solution with a small alum crystal.		
aluminium sulphate-16-water		
630.38		
1 litre 0.1M - 63.0g aluminium sulphate-16-water made up to 1000ml with water.		
50ml reagent for heavy metals - dissolve 2g aluminium sulphate-16-water in 50ml water. Add 1ml 1M ethanoic acid. <i>In a fume cupboard</i> , pass hydrogen sulphide gas through the solution for a few seconds.		
aluminon		see - tri-AMMONIUM AURINE TRICARBOXYLATE
Amann's medium		see - ANILINE BLUE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
amidol		see - 2,4-DIAMINOPHENOL DIHYDROCHLORIDE
aminoacetic acid		see - AMINOETHANOIC ACID
aminobenzene		see - PHENYLAMINE
2-aminobenzenecarboxylic acid 137.14		(2-aminobenzoic acid, anthranilic acid)
4-aminobenzenecarboxylic acid 137.14		(4-aminobenzoic acid)
3-aminobenzene-1,2-dicarboxylic hydrazide		see - <i>nn</i> -3-AMINOPHTHALOYLHYDRAZINE
4-aminobenzenesulphonic acid-2-water 209.22	HARMFUL	(sulphanilic acid)
Sparingly soluble in water.		
2-aminobenzoic acid		see - 2-AMINOBENZENECARBOXYLIC ACID
4-aminobenzoic acid		see - 4-AMINOBENZENECARBOXYLIC ACID
p-aminobenzoic acid		see - 4-AMINOBENZENECARBOXYLIC ACID
aminoethanoic acid 75.1		(glycine, aminoacetic acid) an amino acid
2-aminoethanol 61.08	IRRITANT	(ethanolamine) Used in detergents and cosmetics.
2-amino-2-(hydroxymethyl)propane-1,3-diol		(tris-(hydroxymethyl)methylamine) Used in buffered biological reagents.
4-amino-4'-methoxydiphenylamine hydrochloride		see - VARIAMINE BLUE
3-aminophthalhydrazide		see - <i>nn</i> -3-AMINOPHTHALOYLHYDRAZINE
<i>nn</i>-3-aminophthaloylhydrazine 177.16		for chemiluminescence (luminol, 3-aminobenzene-1,2-dicarboxylic hydrazide) see also - CHEMILUMINESCENCE
aminosulphonic acid 97.09	TOXIC, CORROSIVE	(sulphamic acid)
ammonia gas preparation	TOXIC	
<i>Wear eye protection and gloves. Work in a fume cupboard.</i>		
1) Gently heat 0.880 ammonia solution, collect the gas (not over water!) and dry with soda-lime.		
2) Gently heat a mixture of 20g calcium hydroxide with 10g ammonium chloride, collect the gas and dry with soda lime.		
ammonia solution, 0.880 (35%) 17.03	CORROSIVE, HARMFUL	bench solution = 2M (2N)
<i>Wear eye protection and gloves, and use a fume cupboard. Pressure may build up in containers.</i>		
0.880 (35%) ammonia solution is 18.1M. 0.991 (25%) ammonia solution is 14.6M.		
To make up dilute solutions, add ammonia to water:		
1 litre 0.1M ammonia (IRRITANT)		add 6ml s.g. 0.880 ammonia to 994ml water (to nearest ml.)
1 litre 0.5M ammonia (IRRITANT)		add 28ml s.g. 0.880 ammonia to 972ml water (to nearest ml.)
1 litre 1M ammonia (IRRITANT)		add 55ml s.g. 0.880 ammonia to 945ml water (to nearest 5ml.)
1 litre 2M ammonia (IRRITANT)		add 115ml s.g. 0.880 ammonia to 885ml water (to nearest 5ml.)
1 litre 4M ammonia (IRRITANT)		add 230ml s.g. 0.880 ammonia to 770ml water (to nearest 5ml.)
1 litre 5M ammonia (IRRITANT)		add 285ml s.g. 0.880 ammonia to 715ml water (to nearest 5ml.)
1 litre 6M ammonia (CORROSIVE)		add 340ml s.g. 0.880 ammonia to 660ml water (to nearest 5ml.)
1 litre 10M ammonia (CORROSIVE)		add 570ml s.g. 0.880 ammonia to 430ml water (to nearest 5ml.)
1 litre 20% ammonia (CORROSIVE)		add 570ml s.g. 0.880 ammonia to 430ml water (to nearest 5ml.)
ammonia-ammonium chloride solution		
Dissolve 5.4g ammonium chloride in 70ml 5M ammonia solution (IRRITANT). Add to 30ml water.		
ammoniacal magnesium sulphate solution		
Dissolve 10g magnesium sulphate and 20g ammonium chloride (HARMFUL) in 80ml water. Add 42ml 5M ammonia solution (IRRITANT). Leave in a sealed container for a few days. Decant and filter before use.		
ammoniacal silver nitrate solution		see - TOLLEN'S REAGENT
ammonium acetate		see - AMMONIUM ETHANOATE
ammonium alum		see - ALUMINIUM AMMONIUM SULPHATE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
tri-ammonium aurine tricarboxylate 473.44		(aluminon) aluminium reagent, forms a red colour with aluminium.
For aluminium reagent, 1g tri-ammonium aurine-tricarboxylate made up to 1000ml with water.		
ammonium benzoate 139.16		
ammonium bromide 97.94		
1 litre 1M - 97.9g ammonium bromide made up to 1000ml with water.		
ammonium carbonate 157.13		used in tests for magnesium and calcium salts bench solution = 2M (4N)
<i>Wear eye protection when making up solutions. Virtually insoluble in water.</i>		
1 litre 1M (<i>IRRITANT</i>) - add 140ml 880 ammonia solution(<i>CORROSIVE</i>) to 860ml water. Dissolve 157g ammonium carbonate in this solution.		
ammonium ceric sulphate		see - AMMONIUM CERIUM(IV)SULPHATE
ammonium cerium(IV)sulphate 1 litre standard solution - gently heat 66g ammonium cerium(IV)sulphate in a mixture of 30ml 1M sulphuric acid and 500ml water. Cool, filter and dilute to 1000ml with water.		(ammonium ceric sulphate)
ammonium chloride 53.49	<i>HARMFUL</i>	used in tests for aluminium salts bench solution = 1M (1N)
<i>Wear eye protection.</i>		
used in tests for aluminium salts, and in dry cells and Leclanche cells.		
1 litre 0.5M - 26.7g ammonium chloride made up to 1000ml with water.		
1 litre 1M - 53.5g ammonium chloride made up to 1000ml with water.		
1 litre saturated solution - 372g ammonium chloride made up to 1000ml with hot water. Store with excess solid in the bottle.		
tri-ammonium citrate 243.22		
1 litre standard solution - 500g citric acid (2-hydroxypropane-1,2,3-tricarboxylic acid) to a mixture of 200ml 0.880 ammonia solution (<i>CORROSIVE</i>) in 200ml water, in an ice bath. Filter and dilute to 1000ml with water.		
di-ammonium copper(II)sulphate-6-water (ammonium cupric sulphate) 399.83		
ammonium cupric sulphate		see - di-AMMONIUM COPPER(II)SULPHATE-6-water
ammonium dichromate(VI) 252.07	<i>EXPLOSIVE, CORROSIVE, TOXIC</i>	bench solution = 1M (6N) Used in volcano experiment
<i>May cause cancer by inhalation (category 2 carcinogen). Wear gloves and eye protection. Use a fume cupboard.</i>		
1 litre 1M (<i>VERY TOXIC</i>) - 252g ammonium dichromate(VI) made up to 1000ml with water.		
ammonium dihydrogen orthophosphate 115.03		
ammonium ethanedioate 142.11	<i>HARMFUL</i>	(ammonium oxalate) bench solution = 0.5M (1N) Used in tests for calcium salts
1 litre 0.5M (<i>HARMFUL</i>) - 71g ammonium ethanedioate-1-water (ammonium oxalate) to 1 litre water.		
ammonium ethanoate 77.08		(ammonium acetate) bench solution = 1M (1N) Used as a preservative and in the preparation of dyes.
1 litre 1M - 77.1g ammonium ethanoate made up to 1000ml with water.		
ammonium ferric sulphate		see - IRON(III)AMMONIUM SULPHATE
ammonium ferrous sulphate		see - AMMONIUM IRON (II) SULPHATE
di-ammonium hydrogen orthophosphate 132.06		
ammonium hydrogen sulphate 115.11	<i>CORROSIVE</i>	
<i>wear eye protection and gloves</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
ammonium hydroxide		see - AMMONIA solution
ammonium iodide 144.94		
1 litre 1M - 144.9g ammonium iodide made up to 1000ml with water.		
ammonium iron(III)sulphate-12-water		see - IRON(III)AMMONIUM SULPHATE
di-ammonium iron(II)sulphate(VI)-6-water 392.13		bench solution = 0.5M (0.5N)
1 litre 0.1M - add 250ml 0.1M sulphuric acid to 750ml water. Add 39.2g ammonium iron(II)sulphate-6-water.		
1 litre 0.5M - add 250ml 1M sulphuric acid to 750ml water. Add 196.1g ammonium iron(II)sulphate-6-water.		
ammonium mercuri-thiocyanate solution		used in tests for zinc salts
2 recipes are shown below: <i>TOXIC</i> (mercuric ammonium thiocyanate solution)		
1) strong solution - 8g mercury(II)chloride and 9g ammonium thiocyanate to 100ml water.		
2) weak solution - 2.7g mercury(II)chloride and 3g ammonium thiocyanate to 100ml water.		
ammonium molybdate <i>CORROSIVE, HARMFUL</i>		(ammonium polytetraoxomolybdate(VI))
1235.86		Used in tests for phosphates.
100ml 10% - 10g ammonium molybdate to 100ml water.		
ammonium molybdate - preparation of solution from molybdenum trioxide		
<i>Wear eye protection.</i>		
Add 70ml 880 ammonia solution (<i>CORROSIVE</i>) to 140ml water. Dissolve 40g molybdenum trioxide in this.		
Add 250ml concentrated nitric acid (<i>CORROSIVE</i>) to 500ml water. Add the first solution slowly to this, stirring continuously. Dilute to 1000ml with water. Allow to stand for 48 hours before decanting the clear solution.		
ammonium molybdate solution for phosphate test <i>CORROSIVE</i>		
4g ammonium molybdate to a mixture of 4ml 0.880 ammonia (<i>CORROSIVE</i>) and 6ml water. Add 12g ammonium nitrate (<i>EXPLOSIVE</i>). Dilute to 100ml with water. Just before use, add a few drops of 1M nitric acid (<i>CORROSIVE</i>) to 2ml of the solution.		
di-ammonium nickel(II)sulphate-6-water <i>HARMFUL</i> 394.97		
ammonium nitrate(V)	<i>EXPLOSIVE, OXIDIZING AGENT</i>	
80.04		bench solution = 1M (1N)
<i>wear eye protection</i>		
1 litre 1M - 80g ammonium nitrate(V) made up to 1000ml with water.		
tri-ammonium orthophosphate 203.13		
ammonium oxalate		see - AMMONIUM ETHANEDIOATE
ammonium peroxodisulphate(VI) <i>OXIDIZING AGENT, HARMFUL</i> 228.19		(ammonium persulphate) bench solution = 1M (2N)
<i>Wear eye protection. Pressure may build up in stored bottles. Short safe shelf life.</i>		
1 litre 1M - 228g ammonium peroxodisulphate(VI) made up to 1000ml with water.		
ammonium persulphate		see - AMMONIUM PEROXODISULPHATE(VI)
ammonium phosphate tribasic		see - tri-AMMONIUM ORTHOPHOSPHATE
ammonium polysulphide		see - AMMONIUM SULPHIDE
ammonium polytetraoxomolybdate(VI)		see - AMMONIUM MOLYBDATE
ammonium sodium hydrogen orthophosphate		see - AMMONIUM SODIUM HYDROGEN PHOSPH...
ammonium sodium hydrogen phosphate(V)-4-water (microcosmic salt) 209.09		Used as a flux.
ammonium sulphate(VI) 132.14		Used as a fertiliser.
1 litre saturated solution - 750g ammonium sulphate(VI) to 1000ml warm water. Stir until dissolved.		
4 litres fertiliser solution - 20g ammonium sulphate(VI) to 4 litres tap water. Apply to 1 square metre of soil.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
ammonium sulphide		<i>CORROSIVE, HARMFUL</i>
<i>Use a fume cupboard. Wear gloves and eye protection. (ammonium polysulphide)</i>		
1 litre ammonium sulphide solution - Mix 285 ml 880 ammonia solution (<i>CORROSIVE</i>) with 715 ml water, to make 1 litre of 5M ammonia (<i>IRRITANT</i>). Saturate 500ml with hydrogen sulphide gas (<i>VERY TOXIC, EXTREMELY FLAMMABLE</i>), then add to the other 500ml. This solution does not keep well.		
AMMONIUM POLYSULPHIDE SOLUTION - add sulphur ppt. to ammonium sulphide solution until a deep orange colour forms.		
ammonium sulphocyanate		see - AMMONIUM THIOCYANATE
ammonium tartrate		
184.15		
ammonium thiocyanate	<i>HARMFUL</i>	(ammonium sulphocyanate)
76.12		bench solution = 1M (1N) Used in tests for iron(III)salts and as a herbicide.
1 litre 0.2M - 15.2g ammonium thiocyanate made up to 1000ml with water		
1 litre 1M - 76.1g ammonium thiocyanate made up to 1000ml with water		
1 litre 10% (w/v) - 100g ammonium thiocyanate made up to 1000ml with water		
amyl acetate		see - 3-METHYLBUTYLETHANOATE
iso-amyl alcohol		see - 3-METHYLBUTAN-1-OL
n-amyl alcohol		see - PENTAN-1-OL
amylase		see - DIASTASE
amylose		see - STARCH
n-amyl iodide		see 1-IODOPENTANE
anhydrite		see - CALCIUM SULPHATE, anhydrous
anhydrous acid		
<i>Use a fume cupboard for preparation</i>		
Add 10ml ethanoic anhydride to 100ml glacial ethanoic acid the day before it is required.		
Stopper the bottle securely. <i>DO NOT STORE.</i>		
aniline		see - PHENYLAMINE
aniline blue	<i>TOXIC</i>	general stain, (Amann's medium, cotton blue)
<i>Use alternatives wherever possible.</i>		
0.5g water-soluble aniline blue to 99.5ml lactophenol, or: 1g aniline blue to 100ml IMS (<i>FLAMMABLE</i>).		
aniline hydrochloride		see - PHENYLAMMONIUM CHLORIDE
aniline sulphate		see - PHENYLAMMONIUM SULPHATE
anisaldehyde		(4-methoxybenzaldehyde) Used in the preparation of perfumes.
100ml solution - mix 0.5ml anisaldehyde, 10ml glacial ethanoic acid (<i>CORROSIVE</i>), 85ml methanol (<i>TOXIC FLAMMABLE</i>) and 5ml 1M sulphuric acid.		
p-anisidine		see - 4-METHOXYPHENYLAMINE
anthracite		see - COAL
anthranilic acid		see - 2-AMINOBENZENECARBOXYLIC ACID
anti bumping granules		
For use when heating liquids to prevent "bumping". Pieces of broken porcelain can be used as an alternative.		
antimony		<i>HARMFUL/TOXIC</i>
121.75		
<i>Keep an exhibition sample only</i>		
aqua regia		<i>CORROSIVE</i> for use in analysis of alloys
<i>Wear gloves and eye protection. Work in a fume cupboard. Dissolves gold.</i>		
Mix 1 part concentrated nitric acid (<i>CORROSIVE</i>) to 3 parts concentrated hydrochloric acid (<i>CORROSIVE</i>).		
<i>DO NOT STORE</i>		
aqueous ammonia		see - AMMONIA solution
arabinose		(pectinose) Used in bacterial culture media.
150.13		
aragonite		see - CALCIUM CARBONATE
L-arginine		(2-amino-5-guanidopentanoic acid) an essential amino acid
174.2		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
arsenic	<i>TOXIC, IRRITANT</i>	
<i>Keep an exhibition sample only</i>		
L-ascorbic acid		(Vitamin C)
176.13		bench solution = 0.1%
100ml 0.1% solution prepared from vitamin C tablets - 2 x 50mg tablets to 100ml water. Crush the tablets in a mortar. Filter the solution to remove the chalk base.		
L-asparagine		an amino acid
132.1		
L-aspartic acid		an amino acid
133.1		
ATP		see - ADENOSINE-5-TRIPHOSPHORIC ACID
azolitin		
		indicator for pH 5.0 - 8.0, colour change red to blue
		see - POTASSIUM MANGANATE(VII)
Baeyer's test		
Barfeod's reagent		
13g copper(II)ethanoate (copper(II)acetate) made up to 200ml with 1% ethanoic acid (acetic acid).		
barium, metal		<i>HIGHLY FLAMMABLE, CORROSIVE, water-reactive</i>
137.33		
<i>Wear eye protection. Use forceps. Store in airtight bottle with liquid paraffin.</i>		
barium carbonate		<i>HARMFUL/TOXIC</i>
197.35		Used in rat poisons.
<i>Wear gloves when handling the solid.</i>		
Virtually insoluble in water.		
barium chloride-2-water		<i>TOXIC</i>
244.28		used in tests for sulphates & soil pH
		bench solution = 0.2M (0.4N)
<i>wear gloves when handling the solid</i>		
1 litre 0.1M (<i>HARMFUL</i>) - 24.4g barium chloride-2-water made up to 1000ml with water.		
1 litre 0.2M (<i>TOXIC</i> , reagent for test for sulphates) - 48.8g barium chloride-2-water made up to 1000ml with water.		
1 litre 1M (<i>TOXIC</i>) - 244.3g barium chloride-2-water made up to 1000ml with water.		
1 litre 10% (<i>TOXIC</i>) - 100g barium chloride-2-water made up to 1000ml with water.		
barium hydroxide-8-water		<i>HARMFUL, CORROSIVE</i> (caustic baryta)
315.48		used in tests for carbon dioxide
<i>wear gloves when handling the solid</i>		
1 litre 3% (<i>HARMFUL</i>) - 30g barium hydroxide-8-water made up to 1000ml with water.		
1 litre 0.1M (<i>HARMFUL</i>) - 31.5g barium hydroxide-8-water made up to 1000ml with water.		
1 litre saturated solution (<i>HARMFUL</i> , reagent for test for carbon dioxide) - 40g barium hydroxide-8-water made up to 1000ml with water.		
barium nitrate		<i>HARMFUL, OXIDIZING AGENT</i>
261.35		bench solution = 0.5M
<i>wear gloves when handling the solid</i>		
Used in tests for sulphates.		
1 litre 0.2M (<i>HARMFUL</i>) - 52.3g barium nitrate made up to 1000ml with water.		
1 litre 0.5M (<i>HARMFUL</i>) - 130.5g barium nitrate (V) made up to 1000ml with water.		
barium peroxide		<i>HARMFUL, OXIDIZING AGENT</i>
169.34		Used in thermit reaction starter mixture.
<i>Wear eye protection and gloves when handling the solid. Barium peroxide has a short shelf life.</i>		
Virtually insoluble in water.		
barium sulphate		Used as a pigment.
233.40		
<i>Avoid raising dust. Virtually insoluble in water.</i>		
baryta water		<i>HARMFUL, IRRITANT</i>
32g barium hydroxide made up to 1000ml with water. Siphon off the clear water and store in a bottle fitted with a soda lime guard tube.		
basalt		an igneous rock
Basalt is very difficult to break into smaller pieces for testing, so be careful to buy basalt as small lumps.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
basic fuchsin		see - FUCHSIN, BASIC
battery acid		see - SULPHURIC ACID
bauxite		an aluminium ore
Mostly consists of aluminium hydroxides.		
bee's wax		Used in polishes and ointments, etc.
Melting point is 63-65°C.		
Benedict's reagent, qualitative		Used in test for glucose - yellow/red colour with glucose.
<i>Wear eye protection.</i>		
Dissolve 170g tri-sodium citrate and 100g anhydrous sodium carbonate (or 250g sodium carbonate decahydrate) in 850ml water. Add 17.4g copper (II) sulphate-5-water and dilute to 1000ml with water. Filter if necessary.		
Benedict's reagent, quantitative		for titrations
<i>Wear eye protection.</i>		
Dissolve 200g tri-sodium citrate, 125g potassium thiocyanate, and 75g anhydrous sodium carbonate (or 200g sodium carbonate decahydrate) in 600ml water.		
Dissolve 18g copper(II)sulphate in 100ml water. Pour this slowly into the first solution and rinse any residue. Add 0.25g potassium hexacyanoferrate(II), then dilute to 1000ml with water.		
bentonite		a clay used for adsorption
Bentonite has similar properties to Fuller's earth.		
benzaldehyde		see - BENZENE CARBALDEHYDE
benzamide		see - BENZENECARBOXAMIDE
benzene carbaldehyde	<i>FLAMMABLE, HARMFUL</i>	(oil of bitter almonds, benzaldehyde)
106.12		Used in Cannizzaro's reaction, and as a solvent and flavouring agent.
Soluble in ethanol. Slightly miscible with water.		
benzenecarbonyl chloride	<i>CORROSIVE, water-reactive</i>	(benzoyl chloride)
140.57		Used in Schotten-Baumann reaction.
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
benzenecarboxamide		(benzamide)
121.14		
<i>Avoid raising dust.</i>		
benzenecarboxylic acid		see - BENZOIC ACID
benzene-1,3-diamine		see - 1,3-DIAMINOBENZENE
benzene-1,4-diamine	<i>TOXIC</i>	(p-phenylenediamine)
108.14		
benzene-1,4-diammonium chloride	<i>TOXIC</i>	(p-phenylenediamine dihydrochloride)
benzene-1,2-dicarboxylic acid		(iso-phthalic acid)
166.13		
<i>Wear eye protection and gloves.</i>		
Soluble in water and ethanol.		
benzene-1,2-dicarboxylic anhydride	<i>IRRITANT</i>	(phthalic anhydride)
148.12		Used in preparation of resins.
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
benzene-1,2-diol	<i>CORROSIVE, HARMFUL</i>	(catechol, pyrocatechol)
110.11		Used in photography.
<i>Wear eye protection and gloves.</i>		
100ml 10% (w/v) - 10g benzene-1,2-diol to 100ml water. Does not store well.		
benzene-1,3-diol	<i>CORROSIVE, HARMFUL</i>	(resorcinol)
110.11		Used in tests for pentose (Bial's test), nitrites and sugars
<i>Wear eye protection and gloves.</i>		
0.05g benzene-1,3-diol (resorcinol) to a mixture of 30ml concentrated hydrochloric acid and 70ml water.		
benzene-1,4-diol	<i>CORROSIVE, HARMFUL</i>	(quinol, hydroquinone)
110.11		
<i>Wear eye protection and gloves.</i>		
Used as a reducing agent and as photography developer.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
benzene-1,2,3-triol 126.11	<i>CORROSIVE, HARMFUL</i> (pyrogallol)	Used for oxygen absorption in gas analysis. <i>Wear eye protection and gloves. Soak in citric acid solution to remove stains.</i> Soluble in water.
benzene-1,3,5-triol 162.14	<i>CORROSIVE, HARMFUL</i> (phloroglucinol)	Used as a stain for lignin when acidified. As a stain for lignin: 5g benzene-1,3,5-triol to 100ml 70% ethanol. To use, stain for 4 minutes and then add one drop of concentrated hydrochloric acid. Colours lignified cell walls bright red.
benzoic acid 122.12		Used in crystallisation experiments and as a preservative.
benzonitrile 103.12	<i>HARMFUL</i> (cyanobenzene)	Used in organic synthesis and as a safer alternative to methyl cyanide.
benzophenone 182.22		(diphenylmethanone)
Soluble in ethanol.		
1,4-benzoquinone		see - CYCLOHEXADIENE-1,4-DIONE
p-benzoquinone		see - CYCLOHEXADIENE-1,4-DIONE
benzoyl chloride		see - BENZENECARBONYL CHLORIDE
benzyl alcohol		see - PHENYLMETHANOL
benzylamine		see - (PHENYLMETHYL)AMINE
benzyl chloride		see - (CHLOROMETHYL)BENZENE
bergamot oil	<i>IRRITANT</i>	Used in the preparation of perfumes
beryllium 9.01	<i>VERY TOXIC</i>	
<i>May cause cancer by inhalation (category 2 carcinogen). Keep an exhibition sample only.</i>		
Best's differentiator		A biological slide fixative. Mix together 8ml IMS (<i>FLAMMABLE, HARMFUL</i>), 4ml methanol (<i>FLAMMABLE, TOXIC</i>) and 10ml water.
bicarbonate indicator		Mix 0.2g thymol blue and 0.1g cresol red with 20ml ethanol. Mix 0.84g ANALAR grade sodium hydrogen carbonate (sodium bicarbonate) with 200ml water. Add the first solution to the second solution and dilute to 1000ml with water. Dilute 1:9 with water when required for use. Solution should be a deep cherry red colour.
biphenyl 154.21	<i>HARMFUL/TOXIC</i> (diphenyl, phenylbenzene)	Used in organic synthesis and in the preparation of dyes.
Soluble in ethanol.		
bis bis (carboxymethyl)amino ethane		see - ETHYLENEDIAMINETETRAACETIC ACID
bismarck brown Y		Used as a brown dye and as a stain for plant tissue, e.g. cellulose. Dissolve 0.3g bismarck brown Y in 100ml water or 100ml IMS (<i>FLAMMABLE, HARMFUL</i>).
bismuth, metal 208.98		
bismuth(III)chloride 315.34	<i>IRRITANT</i> (bismuth trichloride)	bench solution = 0.16M
<i>Wear eye protection. Avoid raising dust.</i>		
1 litre 0.16M - 53g bismuth(III)chloride to 1000ml 2M hydrochloric acid.		
bismuth(III)nitrate(V)-5-water 485.07	<i>OXIDIZING AGENT, IRRITANT</i>	bench solution = 0.08M
<i>Wear eye protection. Avoid raising dust.</i>		
1 litre 0.8M (<i>CORROSIVE</i>) - 39g bismuth(III)nitrate(V)-5-water to 1000ml 3M nitric acid (<i>CORROSIVE</i>).		
bismuth sulphide 514.15		
<i>Wear eye protection. Avoid raising dust.</i>		
bismuth trichloride		see - BISMUTH(III)CHLORIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
Biuret's reagent, qualitative, copper sulphate solution (Solution B)		
0.02M copper(II)sulphate - 5g copper(II)sulphate made up to 1000ml with water		
Biuret's reagent, qualitative, sodium hydroxide solution (Solution A)		
<i>Wear eye protection and gloves.</i>		
2M sodium hydroxide (<i>CORROSIVE</i>) - 80g sodium hydroxide made up to 1000ml with water		
Biuret's reagent, qualitative		
<i>Wear eye protection.</i>		
For the test, mix solution A with the test solution in a ratio of 1:1. Add solution B one drop at a time, shaking well after each addition. A purple or pink colour shows the presence of protein.		
Biuret's solution, quantitative		
<i>Wear eye protection and gloves.</i> Mix as required since this solution does not keep.		
Dissolve 1.5g copper(II)sulphate-5-water and 6g potassium sodium tartrate in 500ml water.		
Slowly add 375ml 2M sodium hydroxide (<i>CORROSIVE</i>), stirring continuously.		
If a precipitate appears, add 1g potassium iodide, then dilute to 1000ml with water.		
bleach		see - SODIUM CHLORATE(I)
bleaching powder		see - CALCIUM CHLORATE(I)
blue vitriol		see - COPPER(II)SULPHATE-5-WATER
boracic acid		see - BORIC ACID
borax		see - <i>di</i> -SODIUM TETRABORATE
borax carmine		stain (Grenacher alcoholic)
Dissolve 3g carmine powder in 100ml 4% disodium(I)tetraborate(III)-10-water (borax). Simmer for 30 minutes and allow to cool. Mix with 100ml 70% ethanol (<i>FLAMMABLE, HARMFUL</i>). Filter.		
boric acid	<i>HARMFUL</i> (boracic acid)	
61.83		Used as an antiseptic.
Use the crystalline form to make solutions; it is easier to dissolve		
boron trichloride	<i>TOXIC</i>	
117.17		
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
Brady's reagent		
<i>Wear eye protection and gloves. Work in a well-ventilated area.</i>		
Dissolve 2.7g 2,4-dinitrophenylhydrazine (<i>TOXIC, EXPLOSIVE</i>) in 100ml methanol (<i>TOXIC, FLAMMABLE</i>).		
Add 4ml concentrated sulphuric acid (<i>CORROSIVE</i>) drop by drop. Filter.		
brilliant orange		indicator for pH 10.5 - 12.0, colour change yellow to red
0.1g brilliant orange made up to 50ml with IMS (<i>FLAMMABLE, HARMFUL</i>).		
bromine	<i>CORROSIVE</i>	
159.82		
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
<i>Open ampoules in a fume cupboard & wear gloves. Always have 1M sodium thiosulphate ready for neutralising spills. Store with hydrated sodium carbonate and 500ml 1M sodium thiosulphate.</i>		
Scratch the neck of an ampoule with a glass knife and then snap off		
or use a teat pipette to transfer bromine from a bottle (<i>in a fume cupboard</i>).		
bromine water		
<i>Using a fume cupboard and gloves</i> , add bromine a few drops at a time to water, shaking after each addition.		
weak solution (<i>HARMFUL, IRRITANT</i>) - use about 1 ml bromine for each 1000ml bromine water.		
strong solution (<i>TOXIC, CORROSIVE</i>) - use about 8ml bromine for each 1000ml bromine water		
bromine in tetrachloroethene solution	<i>TOXIC, IRRITANT</i>	
<i>Open ampoules in a fume cupboard & wear gloves. Always have 1M sodium thiosulphate ready for neutralising spills.</i>		
Add 1ml bromine (<i>CORROSIVE</i>) to 100ml tetrachloroethene (<i>HARMFUL</i>). The solution keeps for a few days.		
bromobenzene	<i>FLAMMABLE, HARMFUL</i>	
<i>Wear eye protection.</i>		Used in Grignard reagents.
1-bromobutane	<i>HIGHLY FLAMMABLE, HARMFUL</i>	
137.03		(n-butyl bromide)
<i>Wear eye protection and gloves. Use in a well-ventilated area.</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
2-bromobutane 137.03 <i>Wear eye protection and gloves. Use in a well-ventilated area.</i>	<i>HIGHLY FLAMMABLE, HARMFUL</i>	(sec-butyl bromide)
bromocresol blue		see - BROMOCRESOL GREEN
bromocresol green <i>Wear eye protection.</i>		indicator for pH 3.8 - 5.4, colour change yellow to blue Dissolve 1g bromocresol green in 14.4ml 0.1M sodium hydroxide. Dilute to 1000ml with water.
bromocresol purple <i>Wear eye protection.</i>		indicator for pH 5.2 - 6.8, colour change yellow to violet/blue Dissolve 1g bromocresol purple in 18.6ml 0.1M sodium hydroxide. Dilute to 1000ml with water.
bromoethane <i>Wear eye protection and gloves. Use a fume cupboard. DO NOT STORE.</i>	<i>FLAMMABLE, TOXIC</i>	(ethyl bromide)
bromoform		see - TRIBROMOMETHANE
2-bromo-2-methylpropane 137.03 <i>Wear eye protection and gloves use in a well ventilated area.</i>	<i>HIGHLY FLAMMABLE , HARMFUL</i>	(t-butyl bromide)
bromophenol blue <i>Wear eye protection.</i>		indicator for pH 2.8 - 4.6, colour change yellow - blue Dissolve 1g bromophenol blue in 15ml 0.1M sodium hydroxide (<i>IRRITANT</i>). Dilute to 1000ml with water. or, 2g bromophenol blue made up to 1000ml with IMS (<i>FLAMMABLE, HARMFUL</i>)
bromothymol blue 1g bromothymol blue to 16ml 0.1M sodium hydroxide (<i>IRRITANT</i>). Dilute to 1000ml with water. or, 0.4g bromothymol blue made up to 200ml with IMS (<i>FLAMMABLE</i>). Dilute to 1000ml with water.		indicator for pH 6.0 - 7.6, colour change yellow - blue
broth, cellulose 0.5g ammonium sulphate, 0.5g asparagine, 0.1g calcium chloride, 0.2g magnesium sulphate, 0.5g potassium chloride, 1.0g potassium dihydrogen phosphate, 0.5g yeast extract powder and 10g carboxymethylcellulose made up to 800ml with water. Heat gently, stirring to dissolve.		to culture <i>Trichoderma reesei</i>
broth, glucose nutrient Add 10g glucose to 1000ml nutrient broth (see - BROTH, NUTRIENT). Autoclave.		to culture <i>Saccharomyces cerevisiae</i>
broth, glucose yeast extract 10g peptone, 5g sodium chloride, 3g yeast extract made up to 1000ml with water. Autoclave.		
broth, glucose yeast extract Lemco Add 10g Lemco (meat extract) to 1000ml glucose yeast extract broth (see - BROTH, GLUCOSE YEAST...)		for culture of <i>Streptococcus lactis</i>
broth, malt extract 17g malt extract and 3g peptone made up to 1000ml with water. Add 2M hydrochloric acid (<i>IRRITANT</i>) until the medium reaches pH 5.4. Autoclave.		to culture <i>Saccharomyces cerevisiae</i>
broth, mannitol yeast extract Add 0.5g di potassium hydrogen phosphate, 0.2g magnesium sulphate-7-water, 0.2g sodium chloride, 0.2g calcium chloride-6-water, 0.01g iron(III)chloride-6-water, 10g mannitol and 0.4g yeast extract powder to 1000ml water. Autoclave.		
broth, nutrient 10g yeast extract, 10g bacto-peptone and 5g sodium chloride made up to 1000ml with water. Autoclave. or, add 13g supplier's nutrient broth powder to 1000ml water, then autoclave.		
bubble raft solution		see - DETERGENT BUBBLE RAFT SOLUTION
buffers, phosphate pH 6.5 - add 0.29g disodium hydrogen phosphate-2-water + 0.51g potassium dihydrogen phosphate to 2000ml water. pH 6.8 - 0.57g disodium hydrogen phosphate-2-water + 0.59g potassium dihydrogen phosphate to 2000ml water. 0.1M pH7.0 - 2.27g disodium hydrogen phosphate + 1.52g sodium dihydrogen phosphate to 500ml water. alternative pH7.0 - 0.68g disodium hydrogen phosphate-2-water + 0.48g potassium dihydrogen phosphate to 2000ml water. 0.067M pH7.3 - 0.75g disodium hydrogen phosphate + 0.18g potassium dihydrogen phosphate to 100ml water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
buffer, pH2 21ml 1M hydrochloric acid to 20ml 1M sodium ethanoate (sodium acetate). Dilute to 100ml with water		
buffer, pH3.5 5.0g ammonium ethanoate to 5.5ml 1M hydrochloric acid. Dilute to 20ml with water.		
buffer, pH9.2 38.1g di-sodium tetraborate made up to 1000ml with water.		
buffer, pH10 Dissolve 6.75g ammonium chloride in 57ml 0.880 ammonia (<i>CORROSIVE</i>). Dilute to 100ml with water.		
buffer, pH 11.3 <i>Wear eye protection.</i> Dissolve 0.75g aminoethanoic acid and 0.58g sodium chloride in 100ml water. Add 100ml 0.1M sodium hydroxide (<i>IRRITANT</i>). If necessary adjust the pH with 1M sodium hydroxide (<i>CORROSIVE</i>) to raise the pH or 1M hydrochloric acid to lower the pH.		(aminoacetate buffer slution pH 11.3)
butanal 72.11	<i>HIGHLY FLAMMABLE</i>	(butyraldehyde)
butanedial 118.09		(succinaldehyde) Used in organic synthesis and in the preparation of resins.
butanedioic acid 118.09		(succinic acid) Used in the preparation of dyes, etc.
butanedione dioxime 116.12	<i>HARMFUL</i>	(dimethylglyoxime) Used in tests for palladium and nickel.
1 litre solution - 10g butenedionedioxime made up to 1000ml with IMS (<i>FLAMMABLE</i>).		
butanoic acid 74.12		see - 2-METHYLPROPANOIC ACID
butan-1-ol 74.12	<i>HIGHLY FLAMMABLE, HARMFUL</i>	(n-butanol, n-butyl alcohol) Used as a solvent. <i>Wear eye protection and gloves. Use in a fume cupboard.</i>
butan-2-ol 74.12	<i>HIGHLY FLAMMABLE, HARMFUL</i>	(sec-butanol, sec-butyl alcohol) Used as a solvent. <i>Wear eye protection and gloves. Use in a fume cupboard.</i>
n-butanol		see - BUTAN-1-OL
sec-butanol		see - BUTAN-2-OL
butan-2-one 72.11	<i>HIGHLY FLAMMABLE, IRRITANT</i>	(butanone, ethyl methyl ketone) <i>Wear eye protection. Use in a well-ventilated area.</i> Used as a solvent and in the preparation of plastics.
butanone		see - BUTAN-2-ONE
cis-butene-1,4-dioic acid 116.07	<i>HARMFUL</i>	(maleic acid) Used in the preparation of resins. Soluble in water.
trans-butene-1,4-dioic acid 116.07	<i>IRRITANT</i>	(fumaric acid) Used in the preparation of resins. Soluble in water.
cis-butene-1,4-dioic anhydride	<i>HARMFUL</i>	(maleic anhydride) Used to establish the structure of organic compounds containing conjugated double bonds
iso-butyl acetate		see - 2-METHYLPROPYLETHANOATE
n-butyl acetate		see - BUTYL ETHANOATE
iso-butyl alcohol		see - 2-METHYLPROPAN-1-OL
n-butyl alcohol		see - BUTAN-1-OL
sec-butyl alcohol		see - BUTAN-2-OL
tert-butyl alcohol		see - 2-METHYLPROPAN-2-OL
n-butyl bromide		see - 1-BROMOBUTANE
sec-butyl bromide		see - 2-BROMOBUTANE
t-butyl bromide		see - 2-BROMO-2-METHYL PROPANE
butyl ethanoate 116.16	<i>FLAMMABLE</i>	(n-butyl acetate) Used as a solvent. Soluble in ethanol. Slightly soluble in water.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
<i>n</i>-butyl formate		see - BUTYL METHANOATE
<i>n</i>-butyl iodide		see - 1-IODOBUTANE
<i>sec</i>-butyl iodide		see - 2-IODOBUTANE
<i>iso</i>-butyl methyl ketone		see - 4-METHYLPENTAN-2-ONE
butyraldehyde		see - BUTANAL
butyric acid		see - 2-METHYLPROPANOIC ACID
cadmium 112.40	TOXIC	
<i>Keep an exhibition sample only.</i>		
cadmium chloride-2.5-water 228.34	TOXIC	bench solution = 0.25M
<i>Wear eye protection and gloves. May cause cancer (category 2 carcinogen).</i>		
1 litre 0.25M - 57g cadmium chloride-2.5-water made up to 1000ml with water		
cadmium nitrate(V)-4-water 308.47	TOXIC	bench solution = 0.25M
<i>Wear eye protection and gloves.</i>		
1 litre 0.25M - 77g cadmium nitrate(V)-4-water made up to 1000ml with water.		
cadmium sulphate(VI)-8-water 769.49	TOXIC	bench solution = 0.25M
<i>Wear eye protection and gloves.</i>		
1 litre 0.25M - 64g 3-cadmium sulphate-8-water made up to 1000ml with water		
caesium 132.90	FLAMMABLE, CORROSIVE, water-reactive	
caesium chloride 168.36		Used to prepare density gradients for nucleic acid separations.
calcite		see - CALCIUM CARBONATE, CALCITE
calcium, metal granules 40.08	HIGHLY FLAMMABLE, CORROSIVE, water-reactive	
<i>Wear eye protection. Use forceps to handle solid calcium. Store in an airtight bottle. Surround with ceramic paper when heating</i>		
calcium acetate		see - CALCIUM ETHANOATE
calcium carbide		see - CALCIUM DICARBIDE
calcium carbonate, aragonite		a naturally occurring calcium ore
A crystalline form of calcium carbonate which is prone to revert to calcite over time.		
calcium carbonate, calcite		the most common calcium ore
The principle constituent of limestone and marble.		
calcium carbonate, chalk		
calcium carbonate, limestone		
calcium carbonate, marble chips, small		for rate of reaction experiments
calcium carbonate, marble chips, med.		for rate of reaction experiments
calcium carbonate, marble chips, large		for rate of reaction experiments
calcium carbonate, ppt. 100.09		
Virtually insoluble in water.		
calcium carbonate, talc		(French chalk)
calcium chlorate(I) 126.99	OXIDIZING AGENT, CORROSIVE	
<i>Wear gloves and eye protection. Old stock may become explosive. Short shelf life. Store in a dry, airtight bottle.</i>		
		(bleaching powder)
		Used in tests for chlorine
calcium chloride, anhydrous 110.99	IRRITANT	
Anhydrous calcium chloride granules are used as a drying agent		
<i>Wear eye protection and gloves. Avoid raising dust.</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
calcium chloride-6-water 219.08 1 litre 0.25M - 54.7g calcium chloride-6-water made up to 1000ml with water. 1 litre 2M - 438g calcium chloride-6-water made up to 1000ml with water.	<i>IRRITANT</i>	used in tests for citrates bench solution = 0.25M (0.5N)
calcium dicarbide 64.10 <i>Wear eye protection and gloves. Use alternatives wherever possible.</i>	<i>FLAMMABLE, CORROSIVE, water-reactive</i>	Used in preparation of ethyne.
tri-calcium diorthophosphate 310.18		(bone ash)
calcium ethanoate 158.17		(calcium acetate)
calcium fluoride 78.08	<i>TOXIC</i>	(fluorspar)
calcium hydride 42.10	<i>FLAMMABLE, CORROSIVE, water-reactive</i>	
calcium hydroxide 74.09 <i>Wear gloves when handling solid calcium hydroxide.</i> lime water is about 0.02M calcium hydroxide. To make lime water, shake 5g calcium hydroxide in 2 litres water periodically for a couple of days. Decant after settling.	<i>IRRITANT</i> (lime, slaked lime)	Used to make mortar.
calcium hypochlorite		see - CALCIUM CHLORATE(I)
calcium nitrate(V) 236.15 1 litre 0.25M - 59g calcium nitrate-4-water made up to 1000ml with water.	<i>OXIDIZING</i>	bench solution = 0.25M (1N)
calcium ores		see - CALCIUM CARBONATE, CALCITE and - CALCIUM SULPHATE, GYPSUM
calcium oxide, lump 56.08 <i>Wear eye protection and gloves. Calcium oxide has a short safe shelf life.</i>	<i>CORROSIVE</i> (quicklime)	
calcium oxide, powder 56.08 <i>Wear eye protection and gloves. Calcium oxide has a short safe shelf life.</i>	<i>CORROSIVE</i> (quicklime)	
calcium oxychloride		see - CALCIUM CHLORATE(I)
calcium phosphate		see - <i>tri</i> -CALCIUM DIORTHOPHOSPHATE
calcium sulphate(VI), anhydrous 136.14		(anhydrite)
calcium sulphate(VI)-hemihydrate 145.15		(plaster of paris)
calcium sulphate(VI)-2-water 172.17 Saturated solution - 3g calcium sulphate-2-water made up to 1000ml with water. Leave for a few hours then filter.		saturated solution = 0.016M (0.03N) calcium ore
calcium sulphate-2-water, gypsum		
calcium sulphide 72.14 <i>Use a fume cupboard.</i>	<i>CORROSIVE, HARMFUL</i> (sulphurated lime)	Used in the preparation of phosphorescent paints.
calcium sulphite		Used as a reducing agent
Calgon		see - SODIUM HEXATRIOXOPHOSPHATE
calomel		see - MERCURY(I)CHLORIDE
campden tablets		Used as preserving tablets in yeast fermentation.
D-camphor 152.24	<i>HARMFUL</i>	Used in the preparation of celluloid.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
canada balsam		Used to mount slides (it has a refractive index similar to glass). Dissolve canada balsam resin in 1,2-dimethylbenzene (o-xylene) (<i>HARMFUL</i>) until a viscous solution is obtained.
capryl alcohol		see - OCTAN-2-OL
carbamide		see - CARBONYL DIAMIDE
carbon		see - CHARCOAL
carbon dioxide absorption		see - SODA LIME
carbon dioxide gas	<i>HARMFUL</i>	
44.0		
carbon dioxide gas preparation		
React 2M hydrochloric acid on marble chips.		
carbon dioxide solid	<i>HARMFUL</i>	(dry ice)
<i>Wear eye protection and leather gloves.</i>		
Obtain from a carbon dioxide gas cylinder using the special attachment, or purchase direct from the supplier.		
carbon disulphide		<i>HIGHLY FLAMMABLE, VERY TOXIC</i>
76.14		used in tests for bromides
<i>Use in a fume cupboard. Use alternatives wherever possible.</i>		
carbon monoxide gas preparation		<i>TOXIC, EXTREMELY FLAMMABLE</i>
28.0		
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
Drip a few ml concentrated sulphuric acid (<i>CORROSIVE</i>), drop by drop, onto 0.5g sodium methanoate.		
carbon tetrachloride		see - TETRACHLOROMETHANE
carbonyl diamide		(urea, carbamide)
60.06		
Very soluble in water.		
carborundum		(silicon carbide) an abrasive powder used to introduce viruses into plants.
carboxymethylcellulose		a soluble form of cellulose
Gently warm 1g carboxymethylcellulose in 100ml water while stirring.		
carmine, aceto-		see - ACETO CARMINE
carmine, borax		see - BORAX CARMINE
casein		Used in nutrition experiments
Casein is the main protein constituent of milk.		
castor oil		Used as a fat in cosmetics.
catalase		Used as a catalyst.
Catalase is an enzyme which catalyses the decomposition of hydrogen peroxide.		
catechol		see - BENZENE-1,2-DIOL
caustic potash		see - POTASSIUM HYDROXIDE
caustic soda		see - SODIUM HYDROXIDE
cellulase		Used as an enzyme to break down cellulose.
0.1g cellulase to 100ml water.		
cellosolve		see - 2-ETHOXYETHANOL
cellulose		
Soluble in Schweitzer's reagent (recipe is given in this book).		
cellulose acetate		Used in the preparation of plastics.
cellulose broth		see - BROTH, CELLULOSE
cellulose regeneration solvent		Used in the Friedel-Crafts reaction.
<i>Wear eye protection.</i>		
Dissolve 0.5g copper(II)carbonate in 25ml 10M ammonia (<i>CORROSIVE</i>).		
cerussite		see - LEAD(II)CARBONATE
cetyl alcohol		see - HEXADECAN-1-OL
chalcopyrite		see - COPPER PYRITES
chalk		see - CALCIUM CARBONATE, CHALK

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
charcoal		
Available as activated charcoal (used as an adsorbent), animal charcoal and wood charcoal.		
<i>Avoid raising dust.</i>		
chemiluminescence		(visible light from a chemical reaction)
luminol solution - dissolve 0.2g luminol (aminophthaloyl hydrazine) and 1.0g sodium hydroxide(CORROSIVE) in 1000ml water.		
Drop luminol solution, from a burette, onto domestic bleach in a 100ml beaker in a darkened room.		
china clay		see - KAOLIN
chloral hydrate		see - 2,2,2-TRICHLOROETHANEDIOL
chlorbutol		see - 1,1,1-TRICHLOR-2-METHYLPROPAN-2-OL
chloric(VII) acid		CORROSIVE, OXIDIZING (perchloric acid)
<i>A specially constructed fume cupboard is needed for the safe handling of this chemical. DO NOT STORE.</i>		
100ml 60% (w/v) - 60g chloric(VII)acid made up to 100ml with water		
chlorine gas		TOXIC - DO NOT STORE
70.91		
chlorine gas preparation		TOXIC
<i>Use a fume cupboard. Wear eye protection.</i>		
Drop 5M hydrochloric acid (IRRITANT) from a dropping funnel onto potassium permanganate crystals (OXIDIZING, HARMFUL) covered in water.		
OR, drop 5M hydrochloric acid (IRRITANT) onto calcium chlorate(I) (OXIDIZING, CORROSIVE) covered in water.		
OR, gently heat 5M hydrochloric acid (IRRITANT) with manganese(IV) oxide (HARMFUL, IRRITANT).		
Dry the gas using silica gel, or saturated calcium chloride solution. Avoid using concentrated sulphuric acid.		
chlorine water		see also - CHLORINE GAS PREPARATION.
<i>Use a fume cupboard to prepare. Wear eye protection.</i>		
Bubble chlorine gas (TOXIC) through distilled water until the water is saturated with gas. Store in a dark bottle.		
Or, mix 50ml 2M hydrochloric acid (IRRITANT) with 50ml 1% available chlorine sodium chlorate(I).		
chloroacetic acid		see - CHLOROETHANOIC ACID
chloroauric acid		see - TETRACHLOROAUROIC(III) ACID
chlorobenzene		FLAMMABLE, HARMFUL
112.56		Used as a solvent.
chloroethanoic acid		TOXIC, CORROSIVE (chloroacetic acid)
94.50		
(chloromethyl)benzene		FLAMMABLE, IRRITANT (benzyl chloride)
126.59		
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
chloroform		see - TRICHLOROMETHANE
chlorophyll solvent		FLAMMABLE
80% ethanol (see - INDUSTRIAL METHYLATED SPIRIT) or 80% propanone (see - PROPAN-2-ONE).		
chloroplatinic acid		see - HEXACHLOROPLATINIC(IV) ACID
chlor-zinc-iodine		CORROSIVE (Schultze's solution)
<i>Wear eye protection.</i>		
test for cellulose, stain for lipids		
Dissolve 30g anhydrous zinc(II)chloride (CORROSIVE), 5g potassium iodide and 1g iodine (CORROSIVE, HARMFUL) in 14ml water. Keep in a dark bottle and store for less than 3 weeks if at all.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
chromatography solvents		
<i>Wear eye protection.</i>		
for amino acids - add 150ml butan-1-ol (<i>HIGHLY FLAMMABLE, HARMFUL</i>) and 40ml ethanoic acid (glacial acetic acid) (<i>CORROSIVE</i>) to 60ml water		
for chlorophyll pigments - 30ml propanone (<i>HIGHLY FLAMMABLE</i>) to 220ml 100-120°C petroleum spirit (<i>HIGHLY FLAMMABLE, HARMFUL</i>)		
or, add 10ml propanone (<i>HIGHLY FLAMMABLE</i>) to 90ml 40-60°C petroleum spirit (<i>HIGHLY FLAMMABLE, HARMFUL</i>).		
for DNA bases - add 48ml s.g.1.16 hydrochloric acid (<i>CORROSIVE</i>) and 170ml propan-2-ol (<i>HIGHLY FLAMMABLE, HARMFUL</i>) to 32ml water.		
or, add 42ml s.g. 1.18 hydrochloric acid (<i>CORROSIVE</i>) and 170ml propan-2-ol (<i>HIGHLY FLAMMABLE, HARMFUL</i>) to 38ml water		
chrome alum		see - CHROMIUM(III)POTASSIUM SULPHATE
chromic chloride		see - CHROMIUM(III)CHLORIDE
chromic nitrate		see - CHROMIUM(III)NITRATE(V)
chromic oxide		see - CHROMIUM(III)OXIDE
chromic potassium sulphate		see - CHROMIUM(III)POTASSIUM SULPHATE
chromic sulphate		see - CHROMIUM(III)SULPHATE(VI)
chromium, metal		
51.996		
chromium(III)chloride-6-water	<i>IRRITANT</i>	(chromic chloride)
266.45		bench solution = 0.16M
<i>Wear eye protection and gloves.</i>		
1 litre 0.16M - 42.6g chromium(III)chloride-6-hydrate made up to 1000ml with water		
1 litre 0.5M (<i>IRRITANT</i>) - 133g calcium(III)chloride-6-water made up to 1000ml with water.		
chromium(III)nitrate(V)-9-water		(chromic nitrate)
400.15		bench solution = 0.16M
1 litre 0.16M - 64g chromium(III)nitrate(V)-9-water made up to 1000ml with water.		
chromium(III)oxide		(chromic oxide)
151.99		
chromium(VI)oxide	<i>TOXIC, CORROSIVE, OXIDIZING</i>	(chromium trioxide)
<i>May cause cancer by inhalation (category 1 carcinogen). Wear eye protection and gloves. Use a fume cupboard. Use alternatives wherever possible.</i>		
chromium(III)potassium sulphate-12-water		(chrome alum) <i>IRRITANT</i>
499.39		
1 litre 0.2M - 99.9g chromium(III)potassium sulphate-12-water made up to 1000ml with water.		
1 litre saturated solution (for growing crystals) (<i>IRRITANT</i>) - Dissolve 100g chromium(III)potassium sulphate in 100ml water at 50°C. Do not use water at a higher temperature because crystals will not then form.		
chromium(III)sulphate(VI)-15-water		(chromic sulphate)
662.41		bench solution = 0.16M
1 litre 0.16M - 106g chromium(III)sulphate(VI)-15-water made up to 1000ml with water		
1 litre 0.2M - 132.5g chromium(III)sulphate(VI)-15-water made up to 1000ml with water.		
chromium trioxide		see - CHROMIUM(VI)OXIDE
cinchonine	<i>TOXIC</i>	(an alkaloid)
294.40		
cinnamic acid		see - 3-PHENYLPROPENOIC ACID
citric acid		see - 2-HYDROXYPROPANE-1,2,3-TRICARBOXYLIC ACID
Clarke's fluid		see - ETHANOIC ALCOHOL
clay		(a sedimentary deposit)
clayton yellow		see - TITAN YELLOW
cleaning solutions		
<i>Wear eye protection and gloves.</i>		
Use 2M nitric acid (<i>CORROSIVE</i>) to clean deposits from glassware.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
clinistix		strips used to test for glucose in solution
clove oil		Used in microscopy work.
coal		(anthracite, coke, lignite, etc.)
cobalt, metal		
58.93		
cobalt(II)chloride, anhydrous		(cobaltous chloride)
129.84		
cobalt(II)chloride-6-water	<i>HARMFUL</i>	(cobaltous chloride)
237.93		
1 litre 0.01M - 2.4g cobalt(II)chloride-6-water made up to 1000ml with water.		
1 litre 0.1M - 23.7g cobalt(II)chloride-6-water made up to 1000ml with water.		
cobalt chloride paper		for detecting water vapour
Make a solution of 1g cobalt(II) chloride (cobaltous chloride) in 20ml water.		
Soak strips of filter paper in the solution and allow to dry .		
Dry the paper thoroughly in an oven at 100C before storing with silica gel.		
cobalt(II)nitrate(V)-6-water	<i>IRRITANT</i>	(cobaltous nitrate)
291.03		bench solution = 1M (2N)
1 litre 1M - 291g cobalt(II)nitrate(V)-6-water made up to 1000ml with water		
1 litre 0.25M - 73g cobalt(II)nitrate(V)-6-water made up to 1000ml with water		
cobaltous chloride		see - COBALT(II)CHLORIDE
cobaltous nitrate		see - COBAL(II)NITRATE(V)
cobalt(II)sulphate-7-water	<i>HARMFUL</i>	
281.10		
cobalt(II)thiocyanate	<i>HARMFUL</i>	
175.10		
100ml standard solution - 6.8g cobalt(II)chloride-6-water and 4.3g ammonium thiocyanate to 100ml water.		
cobalt(II)thiocyanate paper	<i>HARMFUL</i>	for detecting humidity changes
Make a solution of 5g cobalt(II)thiocyanate (cobaltous thiocyanate) in 20ml water.		
Soak strips of filter paper in the solution and allow to dry.		
Dry the paper thoroughly in an oven at 100C before storing with silica gel.		
cobalticyanide paper		(Rinmann Green test, hexacyanocobaltate(III))
Make a solution of 4g potassium hexocyanocobaltate(III) (potassium cobalticyanide) and 1g potassium chlorate(VII) (<i>OXIDIZING, HARMFUL</i>) in 100ml water.		
Soak strips of filter paper in the solution and allow to dry overnight in a cool oven.		
coconut oil		
Store in a dark bottle.		
coke		see - COAL
colchicine	<i>VERY TOXIC</i>	Used to treat dividing root tip cells to stop metaphase.
<i>Use 1,4-dichlorobenzene as a safer alternative.</i>		
Cole's modification of Millon's reagent (Solution A) <i>TOXIC, CORROSIVE</i>		
<i>Wear eye protection.</i>		
Add 100ml concentrated sulphuric acid (<i>CORROSIVE</i>) to 800ml water. Dissolve 100g mercury(II)sulphate in this solution. Dilute to 1000ml with water.		
Cole's modification of Millon's reagent (Solution B)		
5g sodium nitrate(III) (sodium nitrite) (<i>TOXIC</i>) made up to 500ml with water.		
Cole's modification of Millon's reagent <i>TOXIC, CORROSIVE</i>		
To use, mix 2ml solution A with 1ml solution B.		
Cole's solution		test for maltose
Mix 10ml propane-1,2,3-triol (glycerol) with 100ml saturated copper(II)sulphate(VI) (cupric sulphate) solution.		
collodion solution		<i>FLAMMABLE, HARMFUL</i> (celulose tetranitrate)
100ml standard solution - dissolve cellulose teranitrate in a mixture of 12.5ml ethoxyethane (<i>EXTREMELY FLAMMABLE, HARMFUL</i>) and 87.5ml ethanol (<i>FLAMMABLE, HARMFUL</i>).		
colophony		see - RESIN

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
coloured water		
add fluorescein to distilled water until a strong fluorescent yellow colour is observed (about 1g per litre).		
compost ingredients		
JOHN INNES BASE - mix horn and hoof meal, superphosphate of lime and sulphate of potash (potassium sulphate) in the ratio 2:2:1		
LIMESTONE - ground limestone or chalk		
LOAM	- sieved and partially sterilised by heating at 100°C for 15 minutes.	
PEAT	- sieved, moist fibrous peat	
SAND	- dry, coarse sand	
SUPERPHOSPHATE OF LIME - a mixture of calcium sulphate and calcium dihydrogen phosphate (calcium hydrogen orthophosphate).		
compost, potting, John Innes No. 1		
Mix loam, peat and sand in a ratio of 7:3:2. Add 450g limestone and 2400g John Innes base per cubic metre.		
compost, potting, John Innes No. 2		
Mix loam, peat and sand in a ratio of 7:3:2. Add 900g limestone and 4700g John Innes base per cubic metre.		
compost, potting, John Innes No. 3		
Mix loam, peat and sand in a ratio of 7:3:2. Add 1350g limestone and 7000g John Innes base per cubic metre.		
compost, seed and cutting		
Mix loam, peat and sand in a ratio of 2:1:1. Add 450g limestone and 900g superphosphate of lime to each m ³ .		
congo red		
		indicator for pH 3.0 - 5.2 colour change violet to red-orange
Dissolve 1g congo red in 1000ml 10% ethanol.(see - INDUSTRIAL METHYLATED SPIRIT).		
copper, metal		
63.55		
Copper metal may be purchased as: clippings, foil, powder, turnings, wool, etc.		
copper(II)acetate		see - COPPER(II)ETHANOATE
copper ammonium chloride solution		
<i>Wear eye protection. Avoid raising dust.</i>		
(HARMFUL) - 110g ammonium chloride and 170g copper(II)chloride-2-water to 100ml hot water.		
copper(II)carbonate		HARMFUL (cupric carbonate)
123.56		
<i>Wear eye protection. Avoid raising dust.</i>		
copper(II)carbonate, basic		see - MALACHITE
copper(I)chloride		HARMFUL (cuprous chloride)
99.00		
<i>Wear eye protection. Avoid raising dust.</i>		
copper(II)chloride-2-water		TOXIC (cupric chloride)
170.48		bench solution = 0.25M
<i>Wear eye protection. Avoid raising dust.</i>		
1 litre 0.25M (HARMFUL) - 42.6g copper(II)chloride-2-water made up to 1000ml with water.		
1 litre 1M (HARMFUL) - 170g copper(II)chloride-2-water made up to 1000ml with water.		
copper(II)chromate(VI)		HARMFUL, IRRITANT, OXIDIZING
<i>Wear eye protection and gloves. Avoid raising dust. May cause cancer.</i>		
Prepare solid copper(II)chromate by adding 50ml saturated copper(II)sulphate solution to 50ml 1M potassium chromate. Do not isolate and dry the solid.		
Make up solutions in 2M hydrochloric acid (IRRITANT).		
copper(II)ethanoate-1-water		HARMFUL (cupric acetate)
199.65		
<i>Wear eye protection. Avoid raising dust.</i>		
copper(I)iodide		HARMFUL (cuprous iodide)
190.44		
<i>Wear eye protection. Avoid raising dust.</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
copper(I)nitrate 125.54 <i>Wear eye protection. Avoid raising dust.</i>		(cuprous nitrate)
copper(II)nitrate(V)-3-water 241.60 <i>Wear eye protection. Avoid raising dust.</i>	<i>OXIDIZING AGENT</i>	(cupric nitrate) bench solution = 0.25M
1 litre 0.1M - 24.2g copper(II)nitrate(V)-3-water made up to 1000ml with water. 1 litre 0.25M - 60.4g copper(II)nitrate-3-water made up to 1000ml with water 1 litre 1M (<i>HARMFUL</i>) - 242g copper(II)nitrate(V)-3-water made up to 1000ml with water		
copper(I)oxide 143.08 <i>Wear eye protection. Avoid raising dust.</i>	<i>HARMFUL</i>	(cuprous oxide)
Virtually insoluble in water.		
copper(II)oxide 79.55 <i>Wear eye protection. Avoid raising dust.</i>	<i>HARMFUL</i>	(cupric oxide)
Virtually insoluble in water.		
copper pyrites Copper pyrites is the most common ore of copper. It consists mostly of the sulphides of copper and iron.		(chalcopyrite, cupriferos pyrites)
copper(II)sulphate(VI), anhydrous 159.6 <i>Wear eye protection. Avoid raising dust.</i>	<i>HARMFUL</i>	(cupric sulphate)
copper(II)sulphate(VI)-5-water 249.68 <i>Wear eye protection. Avoid raising dust.</i>	<i>HARMFUL</i>	(cupric sulphate, blue vitriol) bench solution = 1M
For growing crystals, seed the saturated solution with a tiny crystal of copper(II)sulphate-5-water, and keep at a constant temperature in a covered container. Use copper(II)sulphate-5-water, add a few drops of 1M sulphuric acid (<i>IRRITANT</i>) to solutions before storing		
1 litre 0.02M - 5g copper(II)sulphate-5-water made up to 1000ml with water. 1 litre 0.05M - 12.5g copper(II)sulphate-5-water made up to 1000ml with water. 1 litre 0.1M - 25g copper(II)sulphate-5-water made up to 1000ml with water. 1 litre 0.2M - 49.9g copper(II)sulphate made up to 1000ml with water. 1 litre 0.5M - 124.8g copper(II)sulphate-5-water made up to 1000ml with water. 1 litre 0.1% - 1g copper(II)sulphate-5-water made up to 1000ml with water. 1 litre saturated solution - 207g copper(II)sulphate-5-water to 1000ml hot water. Store with excess solid in the bottle. 120ml copper sulphate with pyridine solution - 4g copper(II)sulphate-5-water to 90ml water. Add 30ml pyridine. Does not store.		
copper(II)sulphide 95.60 <i>Wear eye protection. Avoid raising dust.</i>	<i>HARMFUL</i>	(cupric sulphide)
corundum		see - ALUMINIUM OXIDE
cotton blue		see - ANILINE BLUE
cotton blue lactophenol		see- ANILINE BLUE
m-cresol		see - 3-METHYLPHENOL
o-cresol		see - 2-METHYLPHENOL
p-cresol		see - 4-METHYLPHENOL
cresol red		indicator for pH 7.2 - 8.8, colour change yellow to violet/red indicator for pH 0.2 - 1.8, colour change red to yellow
<i>Wear eye protection and gloves.</i> Dissolve 1g cresol red in 26.2ml 0.1M sodium hydroxide (<i>IRRITANT</i>). Dilute to 1000ml with water. or, dissolve 0.2g cresol red in 200ml IMS (<i>FLAMMABLE</i>). Dilute to 1000ml with water		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
m-cresol purple		indicator for pH 0.5 - 2.5, colour change red to yellow indicator for pH 7.6 - 9.2, colour change yellow to violet
<i>Wear eye protection and gloves.</i>		
Dissolve 0.2g m-cresol purple in 200ml IMS (<i>FLAMMABLE</i>). Dilute to 1000ml with water.		
crude oil substitute		<i>HIGHLY FLAMMABLE</i>
<i>wear gloves and eye protection</i>		
There are a number of recipes, one of which is given below:		
Heat 50g paraffin wax, 50g petroleum jelly, 125ml clean engine oil and 125ml white spirit (<i>FLAMMABLE</i>) over a water bath until fully dissolved, then leave to cool.		
When cool, add 100ml petroleum spirit 40-60°C (<i>HIGHLY FLAMMABLE, HARMFUL</i>), 100ml petroleum spirit 100 - 120°C (<i>HIGHLY FLAMMABLE, HARMFUL</i>) and a spatula of powdered charcoal.		
Distil the first fraction as a demonstration using a heating mantle or water bath (it is <i>HIGHLY FLAMMABLE</i>).		
crystal growing solutions		see - COPPER(II)SULPHATE-5-WATER see also - ALUMINIUM POTASSIUM SULPHATE see - METHYL VIOLET see also - AGARs and BROTHs for the culture of Paramecium spp.
crystal violet		
culture media		
culture media, dried milk		for the culture of Paramecium spp.
Add a pinch of dried milk to 250ml boiled, cooled and filtered pond water.		
culture media, dried yeast		for the culture of Paramecium spp.
Mix 2g dried yeast with 250ml pond water. Allow to stand for five hours before inoculating.		
culture media, <i>Drosophila</i> spp.		
A pinch of Nipagin (or 10ml 0.5% propanoic acid) should be added to each recipe to inhibit the growth of moulds. After autoclaving, <i>Drosophila</i> media can be stored in the refrigerator at 4°C for 6 weeks, or for 6 months in the freezer at -20°C.		
RECIPE A - sufficient for 60 specimen tubes or 10 small bottles		
1) Mix 72g oatmeal with 120ml water.		
2) Mix 35g black treacle with 40ml water.		
3) Boil 6g agar with 400ml water.		
Mix the three solutions together, stirring constantly, and bring to the boil. Simmer for 15 minutes.		
RECIPE B -		
Mix 100g maize meal, 30g agar, 26g dried yeast and 50g brown sugar in 1600ml water.		
Bring to the boil, stirring continuously until the ingredients are evenly distributed.		
culture media, egg yolk		for the culture of ciliates
Mix 0.5g hard-boiled egg yolk with 500ml boiled pond water		
culture solutions, Sach's		see - SACH'S WATER CULTURE SOLUTIONS
cupric acetate		see - COPPER(II)ETHANOATE
cupric carbonate		see - COPPER(II)CARBONATE
cupric chloride		see - COPPER(II)CHLORIDE
cupric chromate, basic		see - COPPER(II)CHROMATE(VI)
cupric ethanoate		see - COPPER(II)ETHANOATE
cupric naphthenate		see - COPPER(II)NAPHTHENATE
cupric nitrate		see - COPPER(II)NITRATE(V)
cupric oxide		see - COPPER(II)OXIDE
cupric sulphate		see - COPPER(II)SULPHATE(VI)
cupric sulphide		see - COPPER(II)SULPHIDE
cupriferous pyrites		see - COPPER PYRITES
cuprite		a common copper ore
Cuprite consists mostly of copper(II)oxide.		
cuprous chloride		see - COPPER(I)CHLORIDE
cuprous iodide		see - COPPER(I)IODIDE
cuprous nitrate		see - COPPER(I)NITRATE
cuprous oxide		see - COPPER(I)OXIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
cyclohexadiene-1,4-dione 108.10	<i>TOXIC, OXIDIZING</i>	(quinone, benzoquinone)
cyclohexane 84.16	<i>FLAMMABLE, IRRITANT</i>	used as a solvent (hexahydrobenzene)
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
cyclohexanol 100.16	<i>HARMFUL</i>	(hexahydrophenol)
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
cyclohexanone 98.15	<i>FLAMMABLE, IRRITANT, HARMFUL</i>	Used as a solvent, especially for cellulose lacquers.
cyclohexene 82.15	<i>HIGHLY FLAMMABLE, IRRITANT</i>	(1,2,3,4-tetrahydrobenzene)
<i>Wear eye protection and gloves. Use in a well-ventilated area. Keep away from sources of ignition. Check for peroxides or replace annually.</i>		
cyclo-1,4-oxabutane	<i>FLAMMABLE, HARMFUL</i>	(tetrahydrofuran, tetramethylene oxide) Used as a solvent. an amino acid
L -cysteine 121.1		an amino acid
L -cystine 240.3		an amino acid
cytosine 111.10		a pyrimidine nucleic acid base
Dawson's alizarin red S		see - ALIZARIN RED
DCPIP		see - 2,6-DICHLOROPHENOLINDOPHENOL
decane 142.29		
decanedioyl chloride	<i>CORROSIVE, water-reactive</i>	(sebacoyl chloride) Used in the preparation of nylon.
<i>Wear eye protection and gloves. Use in a well-ventilated area.</i>		
for use in nylon preparation - dissolve 1.5g decanedioyl chloride (sebacoyl chloride, <i>CORROSIVE</i>) in 50ml cyclohexane (<i>FLAMMABLE</i>).		
Delafield's haematoxylin		see - HAEMATOXYLIN, DELAFIELD'S
detergent bubble raft solution		for illustrating crystal lattices, dislocation, discontinuity 3ml teepol (or washing up liquid) and 25ml propane-1,2,3-triol (glycerol) to 100ml water The bubbles can be made by connecting a hypodermic needle, via connectors and rubber tubing, to a gas tap, and bubbling gas through the solution. Clips can be used to adjust the gas flow.
Devarda's alloy		Used in tests for nitrates. Devarda's alloy powder consists of 45% aluminium, 50% copper and 5% zinc
dextrin		(starch gum) A mixture of polysaccharides obtained by boiling starch.
dextrose		see - D(-) GLUCOSE
diacetone alcohol		see - 4-HYDROXY-4-METHYLPENTAN-2-ONE
1,3-diaminobenzene 108.14	<i>TOXIC</i>	(m-phenylene diamine)
diaminoethanetetra-acetic acid		see - ETHYLENEDIAMINETETRAACETIC ACID disodium...
1,6-diaminohexane 116.21	<i>CORROSIVE, HARMFUL</i>	Used in nylon preparation.
<i>Wear eye protection and gloves. Use in a well-ventilated area.</i>		
For use in nylon preparation, add 2.2g 1,6-diaminohexane (hexamethylene diamine) to 50ml water.		
2,4-diaminophenol dihydrochloride 197.06	<i>TOXIC</i>	(amidol) Used as a photography developer.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
diastase A 1:1 mixture of alpha- and beta- amylases 1g diastase to 100ml water. or, 0.1g bacterial amylase to 100ml water.	(amylase)	for digestion of starch to sugar
diazine green		see -JANUS GREEN B
1,2-dibromoethane 107.96 <i>May cause cancer (category 2 carcinogen). Use alternatives wherever possible.</i>	TOXIC	(ethylene dibromide) Used as a solvent.
4,5-dibromofluorescein		adsorption indicator
dibutyl(benzene-1,2-dicarboxylate) <i>Wear eye protection.</i>		(dibutyl phthalate) Used in the preparation of resins.
iso-di-butyl ketone 142.24	IRRITANT	
dibutyl phthalate		see - DIBUTYL(BENZENE-1,2-DICARBOXYLATE)
dichloroacetic acid		see - DICHLOROETHANOIC ACID
o-dichlorobenzene		see - 1,2-DICHLOROBENZENE
p-dichlorobenzene		see - 1,4-DICHLOROBENZENE
1,2-dichlorobenzene 147.00 <i>Wear eye protection and gloves.</i>	HARMFUL	(o-dichlorobenzene) Used to extract worms and leatherjackets from soil
1,4-dichlorobenzene 147.00 <i>Wear eye protection and gloves. Work in a fume cupboard.</i>	HARMFUL	Used to treat dividing root tip cells to stop metaphase.
500ml ROOT TIP SOLUTION - 5g 1,4-dichlorobenzene to 500ml water at 60°C. Shake, leave for a few hours, filter and cool. To use, bubble air through the solution then use it to soak root tips for 4 - 6 hours. Rinse the root tips before handling.		
1,2-dichloroethane 98.96 <i>May cause cancer (category 2 carcinogen). Use alternatives wherever possible.</i>	FLAMMABLE, TOXIC	(ethylene dichloride) Used as a solvent, and in the preparation of polyvinyl chloride (PVC).
dichloroethanoic acid 128.94	CORROSIVE	(dichloroacetic acid)
dichloromethane 84.9 <i>Wear eye protection and gloves. Use in a well-ventilated area. Use alternatives wherever possible.</i>	FLAMMABLE, IRRITANT	(methylene chloride) category 3 carcinogen Used as paint stripper, as a solvent and to detect lead in water.
2,6-dichlorophenolindophenol Dissolve 1g 2,6-dichlorophenolindophenol in 1000ml water. Keeps for a few weeks in the refrigerator.		(DCPIP) Used in tests for vitamin C.
1,2-dichloropropane 112.99	FLAMMABLE, HARMFUL	Used as a solvent for oils and fats.
di(dodecanoyl)peroxide <i>Wear eye protection and gloves. Use a fume cupboard.</i>	OXIDIZING, IRRITANT	(lauroyl peroxide) Used in polymerisation reactions.
diethane-1,1',2,2'-diamine 86.14		(piperazine) A solution is used to expel intestinal worms!
diethylamine 73.14 <i>Wear eye protection and gloves.</i>	HIGHLY FLAMMABLE, IRRITANT	
diethylene triamine 103.17	CORROSIVE, HARMFUL	
diethyl ether		see - ETHOXYETHANE
diethyl oxalate 146.14	HARMFUL	
2,3-dihydroxybutanedioic acid 150.09	HARMFUL	(tartaric acid) used in tests for potassium salts

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
3,5-dihydroxymethylbenzene-1-water 142.16	<i>CORROSIVE</i>	(orcinol, 5-methyl resorcinol) Used in tests for carbohydrates.
dimethylamine solution 45.08	<i>FLAMMABLE, IRRITANT</i>	Used in organic synthesis and the preparation of dyes.
1,2-dimethylbenzene 106.17	<i>FLAMMABLE, HARMFUL</i>	(o-xylene) <i>Wear eye protection and gloves. Use in a well-ventilated area. Keep away from sources of ignition.</i>
1,3-dimethylbenzene 106.17	<i>FLAMMABLE, HARMFUL</i>	(m-xylene) <i>Wear eye protection and gloves. Use in a well-ventilated area. Keep away from sources of ignition.</i>
1,4-dimethylbenzene 106.17	<i>FLAMMABLE, HARMFUL</i>	(p-xylene) <i>Wear eye protection and gloves. Use in a well-ventilated area. Keep away from sources of ignition.</i>
dimethylbenzene-1,2-dicarboxylate		(dimethyl phthalate) Used as an insect repellent.
dimethyldichlorosilane		see - DICHLORODIMETHYLSILANE
dimethylformamide		see - (N,N)-DIMETHYLMETHANAMIDE
dimethylglyoxime		see - BUTANEDIONE DIOXIME
(N,N)-dimethylmethanamide 73.10	<i>TOXIC</i>	(dimethyl formamide) Used as a solvent especially in the preparation of plastics.
dimethyl phthalate		see - DIMETHYLBENZENE-1,2-DICARBOXYLATE
2,2-dimethylpropane 72.15	<i>FLAMMABLE</i>	(n-pentane) <i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>
dinitrogen oxide		see - di-NITROGEN OXIDE
1,4-dioxan <i>Short safe shelf life.</i>	<i>HIGHLY FLAMMABLE, HARMFUL, IRRITANT</i>	(1,4-dioxycyclohexane) Used as a solvent.
diphenyl		see - BIPHENYL
diphenylamine 169.23	<i>TOXIC</i>	Used in tests for nitrate(V). <i>Wear eye protection and gloves. Use a fume cupboard.</i>
0.5g diphenylamine to 100ml concentrated sulphuric acid (<i>CORROSIVE</i>) carefully diluted in 20ml water (weighed out as ice).		
1,5-diphenylcarbazon 240.27		for mercury 0.1g 1,5-diphenylcarbazon to 100ml IMS (<i>FLAMMABLE</i>). see - BENZOPHENONE
diphenylmethanone		
direct red 23		A dye for cotton and other cellulose fibres without the need for mordants. Use sodium chloride to aid the absorption of the dye by the material.
disinfectants		FOR STERILIZING CLINICAL THERMOMETERS - cetrimide solution or chloroxylenol solution FOR STERILISING CEREAL GRAINS - 2g mercury(II)chloride (mercuric chloride) to 100ml ethanol FOR STERILISING GLASSWARE -2% chlorox (10% sodium oxochlorate(I)) or 20% Milton (1% sodium oxochlorate(I))
disodium hydrogen phosphate		see - di SODIUM HYDROGEN ORTHOPHOSPHATE
disodium tetraborate		see - di- SODIUM TETRABORATE
disperse yellow 7		Used as a dye for man-made fibres. Make a suspension of the dye in water (it is insoluble).
di-sulphur dichloride	<i>CORROSIVE, water-reactive</i>	<i>Wear eye protection and gloves. Use a fume cupboard.</i>
dithizone		see - DIPHENYLTHIOCARBAZENE
DNA		see - DEOXYRIBONUCLEIC ACID

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
dodecamolybdophosphoric acid 2257.6		(phosphomolybdic acid)
dodecane		
<i>n</i>-dodecanoic acid 200.32		(lauric acid) Used in the preparation of soaps, detergents and cosmetics.
Insoluble in water.		
dodecan-1-ol 186.34		(lauryl alcohol) Used in the preparation of detergents.
Insoluble in water.		
dried milk medium		see - CULTURE MEDIA, DRIED MILK
dried yeast medium		see - CULTURE MEDIA, DRIED YEAST
Drosophila culture medium		see - CULTURE MEDIA, DROSOPHILA spp.
dry ice		see - CARBON DIOXIDE, SOLID
drying agents		see - CALCIUM CHLORIDE, LITHIUM CHLORIDE and - SILICA GEL
dutch metal		A cheap substitute for gold leaf.
EDTA		see - ETHYLENEDIAMINETETRAACETIC ACID disodium...
egg albumen		see - ALBUMEN, EGG
egg yolk agar		see - AGAR, EGG YOLK
egg yolk medium		see - CULTURE MEDIA, EGG YOLK
Ehrlich's haematoxylin		see - HAEMATOXYLIN, EHRICK'S
electrolysis		see - LEAD(II)ETHANOATE
Eosin Y		Used as a stain for cytoplasm.
100ml alcoholic solution - dissolve 1g eosin Y in 99ml 75% ethanol (<i>FLAMMABLE</i>) (see - INDUSTRIAL METHYLATED SPIRIT).		
100ml aqueous solution - dissolve 1g eosin Y in 99ml water.		
Counterstain after basic dye - dissolve 0.5g eosin Y in 25ml 95% ethanol (<i>FLAMMABLE, HARMFUL</i>) or 25ml IMS (<i>FLAMMABLE, HARMFUL</i>). Dilute to 100ml with water.		
erythrosin B		
0.1g erythrosin to 70ml IMS (<i>FLAMMABLE</i>). Dilute to 100ml with water.		
ethanal 44.05		<i>EXTREMELY FLAMMABLE, HARMFUL</i> (acetaldehyde) Used in organic synthesis.
<i>Category 3 carcinogen.</i>		
<i>Wear eye protection and gloves. Use in a well-ventilated area. Keep away from sources of ignition.</i>		
<i>Pressure may build up in stored containers.</i>		
ethan-1-al-2-oic acid-1-water 92.05	<i>TOXIC</i>	(glyoxilic acid, glyoxalic acid)
ethanal tetramer 176.21		<i>FLAMMABLE, HARMFUL</i> (metaldehyde) Used as a fuel in model steam engines.
<i>Wear eye protection and gloves. Use in a well-ventilated area.</i>		
ethanal trimer 132.16		<i>HIGHLY FLAMMABLE, TOXIC</i> (paraldehyde)
<i>Wear eye protection and gloves. Use in a fume cupboard.</i>		
ethanamide 59.07		<i>HARMFUL - category 3 carcinogen</i> (acetamide) Used in Hoffman bromination reaction and as a solvent.
ethane-1,2-diamine		<i>CORROSIVE</i> (ethylene diamine)
ethane-1,2-diamine hydrate		<i>FLAMMABLE</i> (ethylene diamine hydrate) see - ETHYLENE GLYCOL
ethane-1,2-diol		
ethanedioic acid, anhydrous 90.04		<i>HARMFUL/TOXIC</i> (oxalic acid) bench solution = 1M (2N)
<i>Wear eye protection and gloves</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
ethanedioic acid-2-water 126.07 <i>Wear eye protection and gloves</i> 1 litre 0.1M - 12.6g ethanedioic acid-2-water made up to 1000ml with water. 1 litre 1M (HARMFUL) - 126.07g ethanedioic acid-2-water made up to 1000ml with water.	HARMFUL	(oxalic acid) bench solution = 1M (2N) used in tests for ethanoates see - METHYL CYANIDE
ethanenitrile ethanoic acid 60.05 <i>Wear eye protection and gloves when preparing solutions. Always add acid to water (never water to acid).</i> <i>Use a fume cupboard.</i> The following recipes assume the use of 99.6%w/v (= 17.5M) ethanoic acid. 1 litre 0.1M - add 6ml ethanoic acid to 994ml water 1 litre 1M - add 57ml ethanoic acid to 943ml water 1 litre 2M (IRRITANT) - add 115ml ethanoic acid to 885ml water 1 litre 5M (CORROSIVE) - add 285ml ethanoic acid to 715ml water 1 litre 0.5% - add 5ml ethanoic acid to 995ml water. 1 litre 1% - add 10ml ethanoic acid to 990ml water. 1 litre 2% - add 20ml ethanoic acid to 980ml water If required, to ensure that glacial ethanoic acid is dry, add ethanoic anhydride (CORROSIVE).	CORROSIVE	(acetic acid) Bench solution = 1M (1N) CL
ethanoic alcohol 25ml glacial ethanoic acid (CORROSIVE) to 75ml 99% Industrial Methylated Spirit (FLAMMABLE).	FLAMMABLE	(acetic alcohol, Clarke's fluid)
ethanoic anhydride 102.09 <i>Use a fume cupboard and wear eye protection.</i> Used in the preparations of plastics and aspirin.	FLAMMABLE, CORROSIVE	(acetic anhydride) water-reactive
ethanol 46.07 <i>Wear eye protection. Keep away from sources of ignition.</i> Industrial methylated spirit (IMS) may be used in place of ethanol in most school experiments 1 litre 70% ethanol - 700ml ethanol and 300ml water 1 litre 90% ethanol - 900ml ethanol and 100ml water 1 litre 95% ethanol - 950ml ethanol and 50ml water For % recipes using IMS see - INDUSTRIAL METHYLATED SPIRIT.	FLAMMABLE, HARMFUL	(ethyl alcohol) see also - INDUSTRIAL METHYLATED SPIRIT
ethanolamine ethanoyl chloride		see - 2-AMINOETHANOL HIGHLY FLAMMABLE, CORROSIVE (acetyl chloride) Used as a solvent and in organic synthesis.
2-ethanoyloxybenzoic acid 180.16 <i>Wear eye protection and gloves. Use a fume cupboard.</i> 2-ethanoyloxybenzoic acid is the active component of aspirin.	HARMFUL, IRRITANT	(acetyl salicylic acid)
ethenyl ethanoate 86.09 <i>Wear eye protection and gloves. Use in a fume cupboard. Keep away from sources of ignition.</i>	FLAMMABLE	(vinyl acetate) Used in polymerisation reactions.
ether ethoxyethane 74.12 <i>Use and keep well away from all sources of ignition. Replace annually. Pressure may build up in stored containers. Use alternatives wherever possible for uses other than Drosophila.</i>		see - ETHOXYETHANE EXTREMELY FLAMMABLE, HARMFUL (diethyl ether, ether) (diethyl ether, ether) Used to etherise <i>Drosophila</i> spp. & in Grignard reagent.
2-ethoxyethanol 90.12 Miscible with water and ethanol.	FLAMMABLE, IRRITANT	(cellosolve) Used as a solvent.
ethyl acetate ethyl acetoacetate ethyl alcohol		see - ETHYL ETHANOATE see - ETHYL-3-OXOBUTANOATE see - ETHANOL

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
ethylamine 45.09 <i>Wear eye protection and gloves.</i> Miscible with water.	FLAMMABLE	
ethylammonium chloride ethylbenzenecarboxylate 150.18	HARMFUL	(ethyl benzoate)
ethyl benzoate		see - ETHYLBENZENECARBOXYLATE
ethyl bromide		see - BROMOETHANE
ethyl carbamate 89.09	TOXIC	(ethyl urethane) Used as a solvent and in the preparation of resins.
ethyl cinnamate		see - ETHYL-3-PHENYLPROPENOATE
ethylene chloride		see - 1,2-DICHLOROETHANE
ethylene diamine		see - ETHANE-1,2-DIAMINE
ethylenediamine-1,2-di-aminoethane		see - ETHANE-1,2-DIAMINE
ethylenediamine hydrate		see - ETHANE-1,2-DIAMINE HYDRATE
ethylenediaminetetraacetic acid disodium salt <i>Wear eye protection.</i>		(EDTA, sequestric acid disodium salt, sodium edetate) Used in biological solutions especially for the extraction and restriction of nucleic acids (DNA and RNA). see - 1,2-DIBROMOETHANE see - 1,2-DICHLOROETHANE
ethylene dibromide		
ethylene dichloride		
ethylene glycol 62.07	HARMFUL	(ethane-1,2-diol) Used as a solvent, as an antifreeze, in viscosity experiments and in the preparation of resins.
ethyl ethanoate 88.11 <i>Wear eye protection and gloves. Use in a well-ventilated area.</i>	HIGHLY FLAMMABLE	(ethyl acetate) Used as a solvent and in the preparations of esters, soap and perspex.
ethyl ethanoethanoate		see - ETHYL-3-OXOBUTANOATE
ethyl iodide		see - IODOETHANE
ethyl methyl ketone		see - BUTANONE
ethyl-3-oxobutanoate 130.14		(acetoacetic ester, ethyl acetoacetate)
ethyl-3-phenylpropenoate		(ethyl cinnamate) Used in hollow prism experiment as a substitute for carbon disulphide. see - ETHYL CARBAMATE
ethyl urethane		
ethyne gas preparation <i>Wear eye protection. DO NOT STORE.</i> Add water drop by drop to a few small pieces of calcium dicarbide (HIGHLY FLAMMABLE) in a test tube. Collect the gas over water.	HIGHLY FLAMMABLE	
Fast green		(malachite green) counterstain to safranin
COUNTERSTAIN TO SAFRANIN - 0.5g fast green FCF to 50ml absolute ethanol (FLAMMABLE) and 50ml clove oil (HARMFUL).		
INDICATOR (MALACHITE GREEN) - 2g fast green to 100ml water		
Fehling's solution A	HARMFUL	
<i>Wear eye protection.</i> 69.2g copper(II)sulphate-5-water (HARMFUL) made up to 1000ml with water. Add 1-2 drops concentrated sulphuric acid (CORROSIVE) to clear the solution.		
Fehling's solution B	CORROSIVE	
<i>Wear eye protection.</i> 154g sodium hydroxide (CORROSIVE) and 350g sodium potassium 2,3-dihydroxybutane-1,4-dioate (potassium sodium tartrate) made up to 1000ml with water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
Fehling's solution		test for reducing sugars
<i>Wear eye protection and gloves. Use a water bath when heating. Wherever possible, use Benedict's reagent as a safer alternative.</i>		
Mix equal volumes of Fehling's solutions A (<i>HARMFUL</i>) and B (<i>CORROSIVE</i>) before use		
ferric alum		see - IRON(III)AMMONIUM SULPHATE(VI)
ferric ammonium sulphate		see - IRON(III)AMMONIUM SULPHATE(VI)
ferric chloride		see - IRON(III)CHLORIDE
ferric nitrate		see - IRON(III)NITRATE(V)
ferric oxide		see - IRON(III)OXIDE
ferric sulphate		see - IRON(III)SULPHATE(VI)
ferrous ammonium sulphate		see - <i>di</i> -AMMONIUM IRON(II)SULPHATE(VI)
ferrous oxalate		see - IRON(II)ETHANEDIOATE
ferrous sulphate		see - IRON(II)SULPHATE(VI)
ferrous sulphide		see - IRON(II)SULPHIDE
fibrin		a biological protein
Insoluble in water		Fibrin is involved with blood clotting.
fluorescein	<i>HARMFUL</i>	(1,3-dihydroxybenzene, phthalein)
332.31		Used for observation of light rays in water and as a constituent of dyes and indicators.
stock solution - 1g fluorescein dissolved in 1ml ethanol (<i>FLAMMABLE</i>) made up to 1000ml with water		
final solution - 1ml stock solution made up to 1000ml with water		
or - 0.1g fluorescein to 100ml 70% IMS (<i>FLAMMABLE</i>).		
fluorspar		see - CALCIUM FLUORIDE
food tests		
test for		see -
Vitamin C		DICHLOROPHENOLINDOPHENOL
starch		IODINE IN POTASSIUM IODIDE
sugar		BENEDICT'S REAGENT
protein		BIURET'S SOLUTION
		COLE'S MODIFICATION OF MILLON'S REAGENT
fat - smear test using a microscope slide		
fool's gold		see - IRON PYRITES
formaldehyde		see - METHANAL
formalin		see - METHANAL
formic acid		see - METHANOIC ACID
freezing mixtures		Mixtures of substances used to produce temperatures below 0°C.
<i>Wear eye protection and gloves whilst adding dry ice in small pieces to the solutions below.</i>		
-12°C = ammonium chloride, potassium nitrate(V) and water in the ratio 5:5:16 by weight		
-15°C = ammonium nitrate(V) and water in the ratio 1:1 by weight		
-16°C = ammonium chloride, potassium nitrate(V), sodium sulphate and water in the ratio 5:5:8:16 by weight		
-18°C = ice and sodium chloride in the ratio 2:1 by weight		
-22°C = ammonium nitrate(V), sodium carbonate-10-water and water in the ratio 1:1:1		
-40°C = sodium sulphate(VI)-10-water, ammonium nitrate(V) and 1M nitric(V)acid in the ratio 6:5:5 by weight		
French chalk		see - CALCIUM CARBONATE, TALC
d(-) fructose		(laevulose, fruit sugar)
180.16		
Soluble in water.		
Fry's reagent	<i>CORROSIVE</i>	
<i>wear eye protection and gloves</i>		an etching solution for revealing strain lines in steels
115g copper(II)chloride to 120ml s.g.1.18 hydrochloric acid (<i>CORROSIVE</i>). Add to 75ml water		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
fuchsin	<i>HARMFUL</i>	(magenta, rosaniline hydrochloride)
Acid fuchsin (Mallory) - 0.5% aqueous solution i.e. dissolve 0.5g fuchsin in 100ml water.		
Basic fuchsin (<i>FLAMMABLE</i>) - dissolve 1g fuchsin in a mixture of 100ml IMS (<i>FLAMMABLE, HARMFUL</i>) with 100ml water.		
fullers earth		a clay used for adsorption
fumaric acid		see - <i>trans</i> -BUTENE-1,4-DIOIC ACID
fusion mixture		
23g: Mix 10g anhydrous sodium carbonate and 13g anhydrous potassium carbonate.		
d(+)-galactose		(a hexose sugar)
180.16		
Soluble in water.		
galena		see - LEAD SULPHIDE, GALENA
gallium		
69.72		
gelatin solutions		for xylem in plant stems
100ml 5% for xylem in plant stems - dissolve 5g gelatin in 100ml hot water. Add safranin to dye the solution.		
Cool to 45°C. Place young seedlings in the solution for a few minutes. Cut the stems under the solution.		
100ml 2% (jelly) - dissolve 2g gelatin in 100ml hot water. The solution should set to a jelly as it cools.		
gentian violet		Used as a stain and a fungicide.
(a mixture of methyl rosaniline, methyl violet and crystal violet)		
100ml standard solution (<i>TOXIC</i>) - 1g gentian violet to a mixture of 15ml IMS (<i>FLAMMABLE, HARMFUL</i>), 80ml water and 3ml aniline (phenylamine, <i>TOXIC</i>).		
germanium		
72.59		
germination agar		see - AGAR, GERMINATION OF SMALL SEEDS
gibberellic acid		a stimulant for plant growth
346.38		
100ppm (0.01% w/w in lanolin)- 0.1g gibberellic acid to 0.1ml absolute ethanol. Add 10g warmed lanolin. Mix thoroughly.		
glacial acetic acid		see - ETHANOIC ACID
d(+)-glucose, anhydrous		(a hexose sugar, dextrose, grape sugar)
180.16		
1 litre 1% - 10g d(+)-glucose, anhydrous made up to 1000ml with water.		
d(+/-) glucose-1-water		(a hexose sugar, dextrose, grape sugar)
198.17		
glucose nutrient broth		see - BROTH, GLUCOSE NUTRIENT
glucose-1-phosphate(V)		
42ml 95% ethanol (<i>FLAMMABLE</i>), 18ml glacial ethanoic acid (<i>CORROSIVE</i>), 2ml nitric acid (<i>CORROSIVE</i>) 11ml saturated solution of mercury(II)chloride (<i>TOXIC</i>) and 60ml water.		
glucose yeast extract broth		see - BROTH, GLUCOSE YEAST EXTRACT
glucose yeast extract Lemco broth		see - BROTH, GLUCOSE YEAST EXTRACT LEMCO
L -glutamic acid		an amino acid
147.1		
L -glutamine		an amino acid
146.1		
glutaraldehyde solution		see - PENTANE-1,5-DIAL SOLUTION
glycerine		see - PROPANE-1,2,3-TRIOL
glycerine jelly		(glycerol jelly)
Warm 5g gelatine with 30ml water on a water bath for 2 hours. Add 35ml glycerine (propane-1,2,3-triol) and continue warming for 15 minutes. Filter through paper pulp.		
glycerol		see - PROPANE-1,2,3-TRIOL
glycerol triacetate		(triacetin)
218.21		Used in the preparation of plastics.
glycine		see - AMINOETHANOIC ACID

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
N-glycyl-DL-leucine		an amino acid
glyoxilic acid		see - ETHAN-1-AL-2-OIC ACID-1-WATER
Gram's iodine		see - IODINE
granite		an igneous rock
Grenacher alcoholic		see - BORAX CARMINE
Grignard reagents		Used to prepare secondary and tertiary alcohols.
Made by dissolving magnesium ribbon or powder in a dry ethereal solution of an alkyl bromide or iodide (e.g. bromobenzene).		
guanine		A purine nucleic acid base.
151.13		Used in chromatography
gum acacia		(gum arabic)
Soluble in water.		Used as an adhesive.
gypsum		see - CALCIUM SULPHATE-2-WATER, GYPSUM
haematite	Fe ₂ O ₃	an iron ore (iron(III)oxide)
159.71		
haematoxylin, Delafield's	HARMFUL	general stain for nuclei
<i>Wear eye protection.</i>		
Dissolve 4g haematoxylin in 25ml absolute ethanol (FLAMMABLE, HARMFUL). Add to 400ml saturated iron(III)ammonium sulphate(VI)-12-water (ammonium alum). Stand in a cotton wool - stoppered flask in the light for 4 days. Filter and add 100ml propane-1,2,3-triol (glycerol) and 100ml methanol (TOXIC, FLAMMABLE). Place in light and warmth for six weeks before use.		
haematoxylin, Ehrlich's		general histological dye
<i>Wear eye protection.</i>		
Dissolve 2g haematoxylin in 100ml absolute ethanol (FLAMMABLE, HARMFUL). Add 100ml water, 100ml propane-1,2,3-triol (glycerol), 10ml glacial ethanoic acid (CORROSIVE), and excess aluminium(III)potassium sulphate(VI)-12-water. Leave in a stoppered bottle in sunlight, removing the stopper for a few minutes every few days and shaking well. Continue for a few weeks before use.		
hard water		see - WATER, HARD
Harlow's solution A		
<i>Wear eye protection.</i>		
saturated chlorine water (see CHLORINE WATER for preparation details)		
Harlow's solution B		
3% sodium sulphate(IV) solution (sodium sulphite, HARMFUL) - 3g sodium sulphate(IV) to 100ml water.		
Harlow's solution		
<i>Wear eye protection and gloves</i>		
To use - place wood shavings in solution A for 2 hours. Transfer to solution B at 90°C for 15 minutes. Repeat until the wood shavings start to disintegrate.		
n-heptane		see - HEPTANE
heptane		HIGHLY FLAMMABLE
100.21		
hexachloroplatinic(IV) acid-6-water		CORROSIVE
517.92		(chloroplatinic acid, platinum chloride solution)
		Used to platinise glass and ceramics.
hexacyanocobaltate(III) paper		see - COBALTICYANIDE PAPER
hexadecanoic acid		(palmitic acid)
256.43		Used in the preparation of soaps.
100ml 0.01% (0.1 gram per litre) in petroleum ether - 0.01g hexadecanoic acid to 100ml petroleum ether		
40-60°C (HIGHLY FLAMMABLE, HARMFUL).		
hexadecan-1-ol		(cetyl alcohol)
242.45		Used in the preparation of cosmetics.
hexahydrobenzene		see - CYCLOHEXANE
hexahydrophenol		see - CYCLOHEXANOL
hexamethylenediamine		see - 1,6-DIAMINOHEXANE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
hexamethylene tetramine 140.19	FLAMMABLE, HARMFUL, IRRITANT	Used as a fuel for model steam engines. (hexamine, urotropine) see - HEXAMETHYLENE TETRAMINE
hexamine 140.19		
hexane 86.18	HIGHLY FLAMMABLE, HARMFUL	
		<i>Wear eye protection and gloves. Use in a well-ventilated area. Use alternatives wherever possible.</i>
n-hexane		see - HEXANE
hexane-1,6-diamine		see - 1,6-DIAMINOHEXANE
1,6-hexanediamine		see - 1,6-DIAMINOHEXANE
hexanedioic acid 146.14	IRRITANT	(adipic acid, butanedicarboxylic acid) Used in the preparation of nylon.
hexanedioyl chloride 183.04	CORROSIVE, water-reactive	(adipoyl chloride)
		For solutions for nylon preparation, use cyclohexane as the solvent instead.
hexanoic acid 116.16		(n-hexoic acid, caproic acid) Used in the preparation of esters.
n-hexoic acid		see - HEXANOIC ACID
L-histidine 155.2		an amino acid
housefly agar		see - AGAR, HOUSEFLY
hydrazine hydrate		see - HYDRAZINIUM HYDRATE
hydrazinium hydrate 50.06	TOXIC, CORROSIVE	Used in the preparation of expanded plastics.
		<i>May cause cancer (category 2 carcinogen). Use alternatives wherever possible.</i>
hydriodic acid 127.91	CORROSIVE	(aqueous hydrogen iodide) Used to prepare organic iodide and as a reducing agent.
hydrobromic acid 80.91	CORROSIVE	(aqueous hydrogen bromide) Used to prepare organic bromides.
hydrochloric acid 36.46	CORROSIVE	bench solution = 2M (2N)
		s.g.1.18 (36%) concentrated hydrochloric acid is 11.7M.
		CORROSIVE - add acid to water and wear eye protection and gloves when preparing solutions
		1 litre 0.1M - add 8ml s.g.1.18 (36%) concentrated hydrochloric acid to 992ml water or add 10ml s.g.1.16 (32%) concentrated hydrochloric acid to 990ml water
		1 litre 0.5M - add 42ml s.g.1.18 (36%) concentrated hydrochloric acid to 958ml water or add 49ml s.g.1.16 (32%) concentrated hydrochloric acid to 951ml water
		1 litre 1M - add 84ml s.g.1.18 (36%) concentrated hydrochloric acid to 916ml water or add 97ml s.g.1.16 (32%) concentrated hydrochloric acid to 903ml water
		1 litre 2M (IRRITANT)- add 170ml s.g.1.18 (36%) concentrated hydrochloric acid to 830ml water or add 195ml s.g.1.16 (32%) concentrated hydrochloric acid to 805ml water
		1 litre 2.5M (IRRITANT)- add 210ml s.g.1.18 (36%) concentrated hydrochloric acid to 790ml water or add 242ml s.g.1.16 (32%) concentrated hydrochloric acid to 758ml water
		1 litre 3M (IRRITANT) - add 252ml s.g.1.18 (36%) concentrated hydrochloric acid to 748ml water or add 291ml s.g.1.16 (32%) concentrated hydrochloric acid to 709ml water
		1 litre 4M (IRRITANT) - add 340ml s.g.1.18 (36%) concentrated hydrochloric acid to 660ml water or add 385ml s.g.1.16 (32%) concentrated hydrochloric acid to 615ml water
		1 litre 5M (IRRITANT) - add 420ml s.g.1.18 (36%) concentrated hydrochloric acid to 580ml water or add 485ml s.g.1.16 (32%) concentrated hydrochloric acid to 515ml water
		3% hydrochloric acid is approximately 1M.
hydrogen bromide gas preparation		
		<i>Wear eye protection and gloves. Work in a fume cupboard.</i>
		React 90% phosphoric acid (CORROSIVE) with sodium bromide.
hydrogen carbonate indicator		see -BICARBONATE INDICATOR

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
hydrogen chloride gas preparation	CORROSIVE	
<i>Wear eye protection and gloves. Work in a fume cupboard.</i>		
Drip concentrated sulphuric acid (CORROSIVE) onto crushed rock salt. Do not collect the gas over water.		
OR, react 90% phosphoric acid (CORROSIVE) with sodium chloride.		
OR, drip 10ml concentrated sulphuric acid (CORROSIVE) onto 5M hydrochloric acid (IRRITANT).		
If required, dry the gas with anhydrous calcium chloride.		
hydrogen gas		EXTREMELY FLAMMABLE
2.02		
<i>Wear eye protection. Use in a well-ventilated area. Provide safety screens for demonstrations.</i>		
hydrogen gas preparation		
<i>Wear gloves and eye protection. Use safety screens or a fume cupboard.</i>		
Drip 3M sulphuric acid (CORROSIVE) (or 3M hydrochloric acid (IRRITANT)) containing a spatula of copper(II)sulphate-5-water (HARMFUL) onto granulated zinc or magnesium turnings. Use anhydrous calcium chloride (IRRITANT) to dry the gas.		
hydrogen peroxide		CORROSIVE, OXIDIZING
34.01		bench solution = 1M or 10 vol
<i>Pressure can build up in bottles while stored. Wear gloves and eye protection when making solutions.</i>		
<i>Hydrogen peroxide has a short shelf life.</i>		
100 vol.(30%) hydrogen peroxide is 8.3M (CORROSIVE). 20vol.(6%) hydrogen peroxide is 1.7M (IRRITANT)		
1 litre 0.2M - add 23ml 100vol. hydrogen peroxide to 977ml water or add 115ml 20vol. hydrogen peroxide to 885ml water.		
1 litre 1M - add 115ml 100vol. hydrogen peroxide to 885ml water or add 570ml 20vol. hydrogen peroxide to 430ml water.		
1 litre 10 vol. - add 100ml 100vol. hydrogen peroxide to 900ml water or add 500ml 20vol. hydrogen peroxide to 500ml water.		
1 litre 20 vol. (IRRITANT) - add 200ml 100vol. hydrogen peroxide to 800ml water		
STAIN REMOVER FOR POTASSIUM MANGANATE(VII) - add a few drops of 2M hydrochloric acid to 20vol. hydrogen peroxide (IRRITANT). Dilute with an equal volume of water. Immerse the stained area until the stain disappears, then rinse well in cold water.		
hydrogen sulphide gas prep		VERY TOXIC, EXTREMELY FLAMMABLE - DO NOT STORE
34.08		
<i>Wear eye protection. Use a fume cupboard.</i>		
Prepare by dripping 3M hydrochloric acid (IRRITANT) onto iron(II)sulphide (HARMFUL).		
hydrogen sulphide solution		DO NOT STORE
<i>Wear eye protection. Use a fume cupboard.</i>		
Bubble hydrogen sulphide gas (prepared as above) through an inverted funnel into water for about ten minutes. Does not keep.		
hydroquinone		see - BENZENE-1,4-DIOL
1,3,5-tri-hydroxybenzene		see - BENZENE-1,3,5-TRIOL
2-hydroxybenzenecarboxylic acid		see - 2-HYDROXYBENZOIC ACID
2-hydroxybenzoic acid		HARMFUL, IRRITANT (salicylic acid)
138.12		
<i>Wear eye protection and gloves.</i>		
2-hydroxybutanedioic acid		Used in preparation of aspirin (malic acid, hydroxysuccinic acid)
134.09		
hydroxylammonium chloride		IRRITANT
<i>Wear eye protection and gloves</i>		
Used in reactions with iron(III)salts and in preparation of oximes.		
tris-(hydroxymethyl)methylamine		see - 2-AMINO-2-(HYDROXYMETHYL)PROPANE-1,3-DIOL
4-hydroxy-4-methylpentan-2-one		FLAMMABLE (di-acetone alcohol)
132.16		
2-hydroxypropane-1,2,3-tricarboxylic acid		(citric acid)
210.14		Used in flavouring effervescent drinks and as a constituent of spills kits.
2-hydroxypropanoic acid		CORROSIVE (lactic acid)
90.08		Used in dyeing.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
8-hydroxyquinoline	HARMFUL	(oxine) Used as a reagent in metal analysis.
hypophosphoric acid		see - PHOSPHINIC ACID
IAA		see - INDOL-3YL-ETHANOIC ACID
IMS		see - INDUSTRIAL METHYLATED SPIRIT
1,2,3-indane trione hydrate 178.14	HIGHLY FLAMMABLE, HARMFUL, IRRITANT	(ninhydrin) used as a fixative see - under chemical names for recipes
<i>Wear eye protection and gloves. Spray in a fume cupboard. Keep away from sources of ignition.</i>		
indicators		Indicators made up in ethanol are HIGHLY FLAMMABLE .
BROMOPHENOL BLUE		indicator for pH 2.8 - 4.6, colour change yellow-blue
CONGO RED		indicator for pH 3.0 - 5.2, colour change blue to red
METHYL ORANGE		indicator for pH 2.8 - 4.6, colour change red - yellow
BROMOCRESOL GREEN		indicator for pH 3.8 - 5.4, colour change yellow to blue
METHYL RED		indicator for pH 4.4 - 6.2, colour change red - yellow
BROMOCRESOL PURPLE		indicator for pH 5.2 - 6.8, colour change yellow to violet/blue
BROMOTHYMOL BLUE		indicator for pH 6.0 - 7.6, colour change yellow - blue
NEUTRAL RED		indicator for pH 6.8 to 8.0, colour change red-orange
PHENOL RED		indicator for pH 6.8 - 8.4, colour change yellow to red
CRESOL RED		indicator for pH 7.0 - 8.8, colour change yellow to red
PHENOLPHTHALEIN		indicator for pH 8.2 - 9.8, colour change colourless - red
UNIVERSAL INDICATOR		indicator for pH 1 to 14, various colours
YAMADA'S INDICATOR		indicator for pH 4 to 10, various colours
You can make your own pH indicators by grinding any of the following in water, and filtering before use: blackberries, red cabbage, red or blue flower petals, beetroot, blackcurrants, etc. Freeze the solutions in ice cube trays and they will store for months.		
indigo 262.27		(indigotin) Used as a blue dye
<i>wear disposable gloves when handling solid indigo. Wear eye protection when preparing solutions.</i>		
Grind 4g indigo and add to 20ml concentrated sulphuric acid (CORROSIVE). Leave for 24 hours before pouring into 980ml water. Filter.		
indigo carmine 466.35		(5,5-indigo disulphonic acid)
indigo carmine solution, reduced		for detecting oxygen
0.1g indigo carmine (5,5-indigo disulphonic acid) to 100ml boiled and cooled water. Add fresh 5% sodium sulphinate (sodium hyposulphite) until the solution is a yellowish - green colour.		
5,5-indigo disulphonic acid		see - INDIGO CARMINE
indigotin		see - INDIGO
indium 114.82		
indol-3yl-acetic acid		see - INDOL-3YL-ETHANOIC ACID
indol-3yl-ethanoic acid 175.19	HARMFUL	
indol-3yl-ethanoic acid, paste		The most common naturally occurring plant "hormone". (IAA, indole acetic acid) Used to stimulate plant growth by applying to cut stem tips.
30ml 1% IAA in lanolin - Dissolve 0.01g indol-3yl-ethanoic acid in 2ml absolute ethanol (FLAMMABLE, HARMFUL). Add 100ml water, drop by drop while gently stirring. Stir 10ml of this solution into 20ml lanolin warmed and just melted in a water bath. Mix well and store in a refrigerator. Keeps for months.		
indol-3yl-ethanoic acid, solution		(IAA) for stimulating plant growth
1 litre 100 ppm - dissolve 0.1g indole-2-acetic acid in 2ml absolute ethanol. Add 900ml water. Warm to 80°C in a water bath for 5 minutes (to evaporate the ethanol). Dilute to 1000ml with water. Store in a refrigerator. The solution will only keep for about two weeks.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
Industrial methylated spirit	<i>FLAMMABLE, HARMFUL</i>	
<p>Industrial Methylated Spirit (IMS) contains approximately 95% ethanol and 5% methanol. It may be obtained duty free under license from H.M. Excise. You will have to keep records of use and fill in an annual return form. You will need to quote your license number when ordering. IMS is thus cheaper than most alcohols, and can often be substituted for ethanol.</p> <p>1 litre 10% ethanol - 105ml IMS to 895ml water 1 litre 50% ethanol - 526ml IMS to 474ml water 1 litre 70% ethanol - 737ml IMS to 263ml water 1 litre 75% ethanol - 789ml IMS to 211ml water 1 litre 80% ethanol - 842ml IMS to 158ml water 1 litre 90% ethanol - 947ml IMS to 53ml water 1 litre 95% ethanol - 1000ml IMS</p>		
ink		
<p>FOR MANOMETER FLUID - add a drip of washing-up-liquid to red ink FOR DISTILLATION - use a water-soluble ink (such as Quink). Add as much water as you wish.</p>		
invisible ink		
<p>Use 0.01M cobalt(II)chloride solution and dry paper in a drying cabinet.</p>		
iodic(V) acid	<i>OXIDIZING AGENT, CORROSIVE</i>	
175.91		
<p>Soluble in water. <i>Wear eye protection.</i></p>		
iodine	<i>HARMFUL, CORROSIVE</i>	
253.80		
<p>Used to show sublimation and is a constituent of many biological stains. <i>Supply 1M sodium thiosulphate solution for neutralising spills</i> <i>Wear eye protection and gloves. Use in a well-ventilated area. Store in a glass-stoppered bottle.</i></p>		
<p>AS A TEST FOR STARCH (colour change red/brown to blue/black):</p>		
<p>1 litre 0.05M(0.5N) - 12.7g iodine to a solution of 20g potassium iodide in 100ml water. Dilute to 1000ml with water.</p>		
<p>1 litre 0.2M - 51g iodine to a solution of 33g potassium iodide in 100ml water. Dilute to 1000ml with water.</p>		
<p>ALCOHOLIC IODINE (<i>IRRITANT</i>) 100ml - 1g iodine and 1g potassium iodide to 100ml 70% ethanol.</p>		
<p>GRAM'S IODINE (<i>HARMFUL</i>) 3 litres - 20g potassium iodide to 100ml water. Add 12g iodine and dilute to 3000ml (3 litres) with water.</p>		
<p>TINCTURE OF IODINE (<i>IRRITANT</i>) 1 litre - 70g iodine to a solution of 50g potassium iodide in 100ml water. Dilute to 1000ml with water.</p>		
<p>IODINE FIXATIVE - saturated solution of iodine in 5% aqueous potassium iodide.</p>		
<p>ALBERT'S IODINE (a biological stain, <i>IRRITANT</i>) - dissolve 2g iodine in a solution of 3g potassium iodide in 300ml water.</p>		
<p>LUGOL'S IODINE (a biological stain, <i>IRRITANT</i>) - dissolve 1g iodine in a solution of 2g potassium iodide in 100ml water.</p>		
iodine(V)oxide	<i>OXIDIZING AGENT</i>	
333.81		(iodine pentoxide, iodic anhydride) see - IODINE(V)OXIDE
iodine pentoxide		
iodine trichloride	<i>CORROSIVE, water-reactive</i>	
233.26		A very strong disinfectant.
iodine water	<i>IRRITANT</i>	
<p>Use 0.05M iodine (for recipe see - IODINE above)</p>		
iodoform		see - TRIODOMETHANE
iodomethane	<i>TOXIC</i>	(methyl iodide) category 3 carcinogen
141.94		
<p><i>Wear eye protection and gloves. Use in a fume cupboard. Light sensitive.</i></p>		
1-iodopentane		(n-amyI iodide)
198.05		
iron, metal		
55.85		
iron(III)alum		see - IRON(III)AMMONIUM SULPHATE(VI)
iron(II)ammonium sulphate(VI)		see - AMMONIUM IRON(II)SULPHATE(VI)

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
iron(III)ammonium sulphate(VI)-12-water 482.18		indicator (ammonium iron(III)sulphate(VI), ferric ammonium sulphate, ferric alum)
100ml indicator solution - dissolve 10g iron(III)ammonium sulphate(VI)-12-water in 100ml water containing a few drops of concentrated sulphuric acid (<i>CORROSIVE</i>).		
or - dissolve 10g iron(III)ammonium sulphate(VI)-12-water in 100ml hot water. Cool. Add concentrated nitric acid (<i>CORROSIVE</i>) drop by drop while shaking, until the brown colour disappears.		
100ml iron(III)ammonium sulphate(VI) acid solution - dissolve 0.2g iron(III)ammonium sulphate(VI)-12-water in a mixture of 50ml water with 6ml 1M nitric acid (<i>CORROSIVE</i>). Dilute to 100ml with water.		(ferrous carbonate)
iron(II)carbonate 115.87		
iron(III)chloride, anhydrous 162.21	<i>IRRITANT, water-reactive</i>	(ferric chloride)
<i>Wear eye protection and gloves when handling the solid.</i>		
iron(III)chloride-6-water 270.30	<i>IRRITANT</i>	(ferric chloride) bench solution = 0.5M (1.5N)
<i>Used in tests for benzoates and salicylates and for etching PCBs.</i>		
<i>Wear eye protection and gloves when handling the solid. Avoid raising dust.</i>		
1 litre 0.1M - dissolve 27.0g iron(III)chloride-6-water in 250ml 0.2M hydrochloric acid. Dilute to 1000ml with water (i.e. add about 750ml water).		
1 litre 0.2M - dissolve 54.0g iron(III)chloride-6-water in 250ml 0.2M hydrochloric acid. Dilute to 1000ml with water		
1 litre 0.5M - dissolve 135.2g iron(III)chloride-6-water in 250ml 1M hydrochloric acid. Dilute to 1000ml with water		
1 litre 1M (<i>IRRITANT</i>) - dissolve 270.3g iron(III)chloride-6-water in 250ml 1M hydrochloric acid. Dilute to 1000ml with water.		
1 litre solution for etching printed circuit boards (<i>IRRITANT</i>) - dissolve 500g iron(III)chloride-6-water in 250ml 1M hydrochloric acid. Dilute to 1000ml with water.		
Filter these solutions before use if necessary.		
iron(II)ethanedioate 179.90	<i>HARMFUL/TOXIC</i>	(ferrous oxalate, iron(II)oxalate)
iron(III)nitrate(V)-9-water 404.00	<i>OXIDIZING AGENT, IRRITANT</i>	(ferric nitrate) bench solution = 0.25M
1 litre 0.2M - 81g iron(III)nitrate(V)-9-water made up to 1000ml with water.		
1 litre 0.25M - 101g iron(III)nitrate(V)-9-water made up to 1000ml with water.		
iron ore		see - HAEMATITE, IRON PYRITES, MAGNETITE
iron(II)oxalate-2-water		see - IRON(II)ETHANEDIOATE
iron(III)oxide 159.69		(ferric oxide, haematite)
Used as a pigment, as a catalyst, and in the thermite reaction.		
Virually insoluble in water.		
iron pyrites		(fool's gold, sulphide of iron)
Iron pyrites is the most common naturally occurring sulphide mineral.		
iron(II)sulphate(VI)-7-water 278.01	<i>HARMFUL</i>	(ferrous sulphate, green vitriol) bench solution = 0.5M (1N)
<i>Wear eye protection.</i>		used in tests for nitrates & oxygen concentration
1 litre 0.1M - dissolve 27.8g iron(II)sulphate(VI)-7-water in 250ml 0.1M sulphuric acid. Dilute to 1000ml with water.		
1 litre 0.2M - dissolve 55.6g iron(II)sulphate(VI)-7-water in 250ml 0.1M sulphuric acid. Dilute to 1000ml with water.		
1 litre 0.5M - dissolve 139g iron(II)sulphate(VI)-7-water in 250ml 1M sulphuric acid (<i>IRRITANT</i>). Dilute to 1000ml by adding to water.		
1 litre 1M (<i>HARMFUL</i>) - dissolve 278g iron(II)sulphate(VI)-7-water in 250ml 1M sulphuric acid (<i>IRRITANT</i>). Dilute to 1000ml by adding to water.		
1 litre solution for estimating oxygen concentration in water (0.008M) - dissolve 2.2g iron(II)sulphate(VI)-7-water in 10ml 0.1M sulphuric acid. Dilute to 1000ml with water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
iron(III)sulphate(VI)-9-water 562.04	<i>IRRITANT</i>	(ferric sulphate) bench solution = 0.25M
<i>Wear eye protection and remember to add acid to water, not water to acid.</i>		
1 litre 0.2M - dissolve 112.4g iron(III)sulphate(VI)-9-water in a mixture of 100ml concentrated sulphuric acid (<i>CORROSIVE</i>) and 100ml water. Dilute to 1000ml by adding to water.		
1 litre 0.25M - dissolve 140.5g iron(III)sulphate(VI)-9-water in a mixture of 100ml concentrated sulphuric acid (<i>CORROSIVE</i>) and 100ml water. Dilute to 1000ml by adding to water.		
iron(II)sulphide 87.91	<i>HARMFUL</i>	(ferrous sulphide)
isophthalic acid		see - <i>iso</i> -PHTHALIC ACID
isotonic saline		see - SALINE, ISOTONIC
Janus green B		stain for fungi and protozoa (diazine green)
<i>wear disposable gloves when handling solid Janus Green B</i>		
0.1g Janus green B to 1000ml isotonic saline		
kaolin		(china clay) Used as a raw material for making ceramics.
kerosene	<i>FLAMMABLE</i>	(domestic paraffin, paraffin oil) Used as a fuel and as manometer fluid.
FOR MANOMETER FLUID - shake with Sudan III or Sudan blue to give a deep colour		
kieselguhr		(diatomite) Used in thin layer chromatography.
lactic acid		see - 2-HYDROXYPROPANOIC ACID
lactophenol	<i>TOXIC</i>	for use in microscopy
<i>Wear eye protection and gloves. Keep polyethylene glycol handy in case of phenol spills. Use alternatives wherever possible.</i>		
100g phenol (<i>TOXIC</i>) to 100ml water. Add 100ml glycerine and 100ml lactic acid (2-hydroxypropanoic acid, <i>CORROSIVE</i>).		
lactose 360.31		(a disaccharide, milk sugar)
laevulose		see - <i>D</i> (-)-FRUCTOSE
lampblack		used as a "paint" in thermal expts.
Lampblack consists of 80/85% carbon (soot).		
lanolin		Used in the preparation of cosmetics
laughing gas		see - <i>di</i> NITROGEN OXIDE
lauric acid		see - <i>n</i> -DODECANOIC ACID
lauroyl peroxide		see - DI(DODECANOYL)PEROXIDE
lauryl alcohol		see - DODECAN-1-OL
lead, metal 207.19	<i>HARMFUL</i>	- <i>danger of cumulative effects</i>
lead(II)acetate		see - LEAD(II)ETHANOATE
lead(IV)acetate		see - LEAD(IV)ETHANOATE
lead(II)bromide 367.01	<i>TOXIC</i>	(plumbous bromide)
lead(II)carbonate 267.21	<i>HARMFUL</i>	- <i>danger of cumulative effects</i> (plumbous carbonate)
lead(II)carbonate,cerussite	<i>HARMFUL</i>	- <i>danger of cumulative effects</i> a lead ore in the form of naturally occurring lead(II)carbonate.
lead(II)chloride 278.10	<i>HARMFUL</i>	- <i>danger of cumulative effects</i> (plumbous chloride)
lead dioxide		see - LEAD(IV)OXIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
lead(II)ethanoate-3-water 379.33	<i>TOXIC</i>	(plumbous acetate, lead(II)acetate) Used as a mordant in dyeing, etc. bench solution = 0.5M (0.5N)
1 litre 0.1M (<i>TOXIC</i>) - 37.9g lead(II)ethanoate-3-water made up to 1000ml with water.		
1 litre 0.2M (<i>TOXIC</i>) - 75.9g lead(II)ethanoate-3-water made up to 1000ml with water		
1 litre 0.5M (<i>TOXIC</i>) - 189g lead(II)ethanoate-3-water made up to 1000ml with water.		
100ml saturated solution (for electrolytic deposition of lead crystals, <i>TOXIC</i>) - 30g lead(II)ethanoate-3-water made up to 100ml with water. Add a few drops of ethanoic acid (<i>CORROSIVE</i>). Use 2 carbon or 2 platinum electrodes with a d.c. supply of 12V (less than 50mA)		
lead(IV)ethanoate	<i>TOXIC</i>	(lead(IV)acetate) used in tests for sulphates
100ml 10% (<i>TOXIC</i>) - 10g lead(IV)ethanoate made up to 100ml with water.		
lead(II)iodide 461.0	<i>HARMFUL</i>	- danger of cumulative effects
lead monoxide		see - LEAD(II)OXIDE
lead(II)nitrate 331.21	<i>TOXIC, OXIDIZING</i>	bench solution = 0.1M (0.2N)
<i>Wear eye protection. Use in a well-ventilated area.</i>		
1 litre 0.1M (<i>TOXIC</i>) - 33.1g lead(II)nitrate made up to 1000ml with water		
1 litre 0.2M (<i>TOXIC</i>) - 66.2g lead(II)nitrate made up to 1000ml with water		
1 litre 1M (<i>TOXIC</i>) - 331.2g lead(II)nitrate made up to 1000ml with water		
lead ore		see - LEAD(II)SULPHIDE - GALENA see also- LEAD(II)CARBONATE-CERRUSITE see - LEAD(II)/(IV)OXIDE
lead oxide		
lead(II)oxide 223.20	<i>TOXIC</i>	(lead monoxide, litharge) Used with zinc oxide to make "glass".
<i>Avoid raising dust.</i>		
lead(II)/(IV)oxide 685.57	<i>TOXIC</i>	(mniium, red lead)
lead(IV)oxide 239.20	<i>TOXIC</i>	(lead dioxide)
lead(II)sulphate 303.25	<i>HARMFUL</i>	- danger of cumulative effects (plumbous sulphate)
Virtually insoluble in water.		
lead(II)sulphide 239.25	<i>HARMFUL</i>	- danger of cumulative effects (plumbous sulphide)
lead(II)sulphide, galena		the most common lead ore
lead tetraacetate		see - LEAD(IV)ETHANOATE
iso-leucine 131.2		an amino acid
L-leucine 131.2		an amino acid
light green SF		general botanical acid stain
general stain (Masson's Light Green) - dissolve 2g light green SF in 100ml 2% ethanoic acid (2ml glacial ethanoic acid (<i>CORROSIVE</i>) added to 98ml water)		
general stain (Light Green Stain) - dissolve 0.1g light green in 100ml 90% ethanol (<i>FLAMMABLE, HARMFUL</i>). saturated solution - excess light green SF yellowish in 90% ethanol (<i>FLAMMABLE, HARMFUL</i>). Allow to stand for a day and filter before use.		
light green in clove oil (<i>TOXIC</i>) - dissolve 0.2g light green yellowish in 50ml absolute ethanol (<i>FLAMMABLE, HARMFUL</i>). Add 50ml clove oil. or - dissolve 1g light green SF in 25ml absolute ethanol (<i>FLAMMABLE, HARMFUL</i>). Add 75ml clove oil.		
lignite		see - COAL
lime		see - CALCIUM HYDROXIDE
limestone		see - CALCIUM CARBONATE, LIMESTONE
lime water		see - CALCIUM HYDROXIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
linoleic acid 280.45		an unsaturated fatty acid (vitamin F) Used as a drying agent in paints.
linseed oil		contains solid and liquid glycerides of unsaturated fatty acids. Used in polymerisation reactions and as a drying oil.
lipase <i>wear gloves and eye protection when preparing solutions</i>		<i>IRRITANT</i> Used as an enzyme to break down fats and oils.
litharge		see - LEAD(II)OXIDE
lithium, metal 6.94		<i>FLAMMABLE, CORROSIVE, water-reactive</i> <i>Wear eye protection and gloves. Use tongs and a safety screen. Store in liquid paraffin.</i>
lithium aluminium hydride		see - LITHIUM TETRAHYDRIDOALUMINATE(III)
lithium carbonate 73.89		
lithium chloride 42.40	<i>HARMFUL, IRRITANT</i>	Used as a flux.
Soluble in water.		
lithium hydroxide-1-water 41.96	<i>CORROSIVE</i>	bench solution = 0.4M (0.4N)
<i>wear gloves and eye protection when making up solutions</i>		
100ml standard solution - 1.75g lithium hydroxide-1-water and 5.0g potassium nitrate (<i>OXIDIZING</i>) to 100ml water. Use a soda lime guard tube on the storage bottle.		
lithium nitrate 68.94		<i>OXIDIZING, HARMFUL, IRRITANT</i>
lithium tetrahydridoaluminate(III) 37.95		(aluminium lithium hydride) <i>HIGHLY FLAMMABLE, CORROSIVE</i> Used as a reducing agent in organic chemistry.
litmus		indicator for pH 5.0 - 8.0, colour change red to blue
1 litre standard solution - 1g litmus powder made up to 1000ml with water.		
litmus paper, blue		turns red in the presence of acids, bleaches in the presence of chlorine
Soak filter paper strips in litmus solution and hang up to dry.		
litmus paper, red		turns blue in the presence of alkalis
Add a few drops of 1M sulphuric acid to litmus solution until a red colour is observed. Dip strips of filter paper in this solution, then hang up to dry.		
lubricant		
FOR STOP CLOCKS - Use propane-1,2,3-triol (glycerol)		
Lucas' reagent	<i>CORROSIVE</i>	
<i>use a fume cupboard, wear gloves and eye protection</i>		
68g anhydrous zinc chloride to 49ml s.g. 1.16 concentrated hydrochloric acid (or 43ml s.g. 1.18 concentrated hydrochloric acid) in an ice bath. Stir to dissolve and store in a glass container with a glass stopper.		
luminol		see - <i>NN-3-AMINOPHTHALOYLHYDRAZINE</i> see also - <i>CHEMILUMINESCENCE</i>
lycopodium	<i>FLAMMABLE</i>	
L-lysine 146.2		an amino acid
lysol	<i>CORROSIVE, TOXIC</i> (a solution of cresols in soft soap)	Used as a disinfectant. see - <i>FUCHSIN</i>
magenta		
magnesia mixture <i>Wear gloves and eye protection.</i>		Used in tests for phosphates.
Dissolve 55g magnesium chloride-2-water (or 85g magnesium chloride-6-water) and 134g anhydrous ammonium chloride (<i>HARMFUL</i>) in 100ml water. Add 350ml 0.880 ammonia (<i>CORROSIVE</i>).		
Dilute to 1000ml by adding to water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
magnesium, metal 24.31	<i>HIGHLY FLAMMABLE</i>	
<i>Wear eye protection when burning. View through cobalt blue glass.</i>		
Available as powder, ribbon and turnings. Usually, for reactions involving magnesium, magnesium ribbon is cut into lengths of 2 to 5cm.		
magnesium carbonate 84.32		(magnesite)
Virtually insoluble in water.		
magnesium chlorate(VII) Use alternatives.	<i>OXIDIZING, HARMFUL, IRRITANT</i>	(magnesium perchlorate)
magnesium chloride-2-water 131.24		bench solution = 0.25M
1 litre 0.25M - 32.8g magnesium chloride-2-water made up to 1000ml with water.		
magnesium chloride-6-water 203.31		bench solution = 0.25M
1 litre 0.25M - 50.8g magnesium chloride-6-water made up to 1000ml with water		
magnesium hydroxide 58.33		Used as an antacid in milk of magnesia.
magnesium nitrate(V)-6-water 256.41	<i>OXIDIZING AGENT</i>	bench solution = 0.25M (0.5N)
1 litre 0.25M - 64.1g magnesium nitrate(V)-6-water made up to 1000ml with water.		
magnesium oxide 40.30		Used as an antacid.
magnesium perchlorate		see - MAGNESIUM CHLORATE(VII)
dimagnesium trisilicate		(talc, magnesium silicate)
		Used as talc and as an antacid.
magnesium sulphate(VI)-7-water 246.48		(Epsom salts)
		bench solution = 0.5M (1N)
		used in tests for carbonates and bicarbonates
1 litre 0.1M - 24.6g magnesium sulphate(VI)-7-water made up to 1000ml with water.		
1 litre 0.5M - 123g magnesium sulphate(VI)-7-water made up to 1000ml with water.		
1 litre 1M - 246g magnesium sulphate(VI)-7-water made up to 1000ml with water		
magnesium uranyl(VI)acetate		see also - AMMONIACAL MAGNESIUM SULPHATE
magnesium uranyl(VI)ethanoate <i>TOXIC</i>		see - MAGNESIUM URANYL(VI)ETHANOATE
<i>Wear eye protection and gloves.</i>		
100ml standard solution - dissolve 10g uranyl ethanoate in a mixture of 50ml water and 5ml 1M ethanoic acid.		
Gently heat 30ml magnesium ethanoate in a mixture of 30ml water and 3ml ethanoic acid (<i>CORROSIVE</i>). Mix the solutions together. Cool and filter.		
magneson I solution		see - 4-(4-NITROPHENYLAZO)RESORCINOL
magnetite 231.57	Fe ₃ O ₄	(an iron ore, tri-iron tetroxide)
malachite 221.2		(a common copper ore, basic copper carbonate)
malachite green		see - FAST GREEN
maleic acid		see - <i>cis</i> -BUTENE-1,4-DIOIC ACID
maleic anhydride		see - <i>cis</i> -BUTENE-1,4-DIOIC ANHYDRIDE
malic acid		see - 2-HYDROXYBUTANEDIOIC ACID
Mallory stain		see - FUCHSIN, ACID
malonic acid		see - PROPANEDIOIC ACID
malt agar		see - AGAR, MALT
malt extract broth		see - BROTH, MALT EXTRACT

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
maltose 342.30 1 litre 1% - 10g maltose made up to 1000ml with water.		a disaccharide (malt sugar)
manganese 54.94		a hard, white, brittle metal Used in alloys.
manganese(II)acetate manganese(II)carbonate 114.95		see - MANGANESE ETHANOATE (manganous carbonate)
manganese(II)chloride-4-water 197.91 1 litre 0.25M - 49.5g manganese(II)chloride-4-water made up to 1000ml with water.		(manganous chloride) bench solution = 0.25M (0.5N)
manganese dioxide manganese(II)ethanoate-4-water 245.09		see - MANGANESE(IV)OXIDE (manganous acetate)
manganese(II)nitrate(V)-6-water 72g manganese(II)nitrate(V)-6-water made up to 1000ml with water	<i>OXIDIZING</i>	(manganous nitrate) bench solution = 0.25M
manganese(IV)oxide 86.94 Virtually insoluble in water.	<i>HARMFUL, IRRITANT</i>	(manganese dioxide) Used in the preparation of oxygen and chlorine gases, as an oxidizing agent, and in Leclanche cells.
manganese(II)sulphate(VI)-4-water 223.06 1 litre 0.25M - 56g manganese(II)sulphate(VI)-4-water made up to 1000ml with water.		(manganous sulphate) bench solution = 0.25M
manganous acetate manganous carbonate manganous chloride manganous ethanoate manganous nitrate manganous sulphate		see - MANGANESE(II)ETHANOATE see - MANGANESE(II)CARBONATE see - MANGANESE(II)CHLORIDE see - MANGANESE(II)ETHANOATE see - MANGANESE(II)NITRATE(V) see - MANGANESE(II)SULPHATE(VI)
D-mannitol 182.17 Soluble in water and hot ethanol.		Used in the preparation of plastics and biological media.
mannitol yeast extract agar mannitol yeast extract broth manometer fluid marble chips masson		see - AGAR, MANNITOL YEAST EXTRACT see - BROTH, MANNITOL YEAST EXTRACT see - KEROSENE or INK see - CALCIUM CARBONATE, MARBLE CHIPS see - PONCEAU FUCHSIN
Mayer's albumen Separate eggs to obtain 50ml egg white. Add 50ml glycerine and stir to break up the albumen. Add 1g sodium silicate dissolved in a little water. Mix well and filter,.		
Mayer's haemalum <i>For preparation and use - wear eye protection and gloves and work in a well-ventilated area.</i> Dissolve 1g haematoxylin, 0.2g sodium iodate(V)-5-water (<i>OXIDIZING</i>) and 50g aluminium(III)potassium(I)sulphate(VI)-12-water in 1000ml water by leaving on a magnetic stirrer overnight. Then add 50g 2,2,2-trichloroethanediol (chloral hydrate, <i>TOXIC, CORROSIVE</i>) and 1g 2-hydroxypropane-1,2,3-tricarboxylic acid (citric acid). Leave at room temperature for a few months before use. Careful boiling (<i>in a fume cupboard</i>) will render the solution ready for immediate use		counterstain for Sudan III fat staining. see - 2,4,6-TRIAMINO-s-TRIAZINE
melamine		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
melting points and boiling points		
	melting	boiling
mercury	-39.00°C	+357°C
octadecanoic acid (stearic acid)	+69.00°C	
Woods metal	+70.00°C	
naphthalene	+80.00°C	+218°C
sodium	+98.00°C	+200°C
	melting	boiling
2-methylpropan-2-ol	+25°C	
phenyl-2-hydroxybenzenecarboxylate	+42°C	
4-methylphenylamine	+43°C	
1-methyl-4-nitrobenzene	+52°C	
1,3-dinitrobenzene	+90°C	
dinitrogen tetroxide		+22°C
menthol		
156.27		
mercuric ammonium thiocyanate solution		
		see - AMMONIUM MERCURITHIOCYANATE SOLUTION
mercuric chloride		
		see - MERCURY(II)CHLORIDE
mercuric iodide		
		see - MERCURY(II)IODIDE
mercuric nitrate		
		see - MERCURY(II)NITRATE
mercuric oxide		
		see - MERCURY(II)OXIDE
mercuric sulphide		
		see - MERCURY(II)SULPHIDE
mercurous chloride		
		see - MERCURY(I)CHLORIDE
mercurous nitrate		
		see - MERCURY(I)NITRATE(V)
mercury		
	TOXIC	
200.59		
Wear eye protection and gloves. Use a fume cupboard. Clear up spills with spills kit.		
mercury(I)chloride		
		HARMFUL/TOXIC (calomel, mercurous chloride)
472.09		
wear eye protection and gloves		
Virtually insoluble in water.		
mercury(II)chloride		
		VERY TOXIC, IRRITANT (mercuric chloride)
271.50		
Wear eye protection and gloves		
1 litre 0.1M (TOXIC) - 27g mercury(II)chloride made up to 1000ml with water		
1 litre 1M (TOXIC) - 271g mercury(II)chloride made up to 1000ml with water.		
100ml solution for sterilising the surface of seeds (HARMFUL) - 0.1g mercury(II)chloride in 100ml water.		
Immerse seeds in solution for 1 minute, then wash in sterile water.		
1 litre saturated solution (TOXIC) - 68g mercury(II)chloride made up to 1000ml with water.		
mercury(II)iodide		
		TOXIC, IRRITANT (mercuric iodide)
454.40		
wear eye protection and gloves		
mercury(I)nitrate(V)-2-water		
		TOXIC, OXIDIZING (mercurous nitrate)
561.22		
wear eye protection and gloves		
1 litre 0.1M (TOXIC) - 56.1g mercury(I)nitrate(V)-2-water to 800ml water. Add 1M nitric acid (CORROSIVE)		
drop by drop until all the solid has dissolved. Dilute to 1000ml with water.		
mercury(I)nitrate(V) solution		
		TOXIC
25g mercury(I)nitrate(V)-1-water to 800ml water. Add nitric acid drop by drop until all the solid has dissolved.		
Dilute to 1000ml with water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
mercury(II)nitrate(V)-¹/₂-water 333.61 <i>Wear eye protection and gloves.</i> 1 litre 0.25M (TOXIC) - 83.4g mercury(II)nitrate(V)-1/2-water made up to 1000ml with water.	VERY TOXIC, OXIDIZING (mercuric nitrate)	bench solution = 0.25M
mercury(II)oxide 216.59 <i>Wear eye protection and gloves.</i>	VERY TOXIC, IRRITANT (mercuric oxide)	Comes in red and yellow forms
mercury(II)sulphide 232.65 <i>Wear eye protection and gloves.</i> Virtually insoluble in water.	TOXIC, IRRITANT (mercuric sulphide)	
mesityl oxide 98.15	FLAMMABLE, HARMFUL	Used as a solvent and in organic synthesis.
meta fuel		see - ETHANAL TETRAMER
metaldehyde		see - ETHANAL TETRAMER
metaphosphoric acid		see - POLYTRIOXOPHOSPHORIC(V) ACID
methanal <i>Use in a fume cupboard. Wear eye protection and gloves.</i> Use a substitute for preserving specimens available from leading suppliers. 40% methanal (TOXIC) is 13.3M.	TOXIC	(formaldehyde, formalin)
methanoic acid 46.0 <i>Wear eye protection and gloves</i>	CORROSIVE (formic acid)	Used in dyeing and electroplating.
methanol 32.04 <i>Wear eye protection. Use in a well-ventilated area.</i>	HIGHLY FLAMMABLE, TOXIC (methyl alcohol)	Used as a solvent, for denaturing ethanol, and in organic synthesis.
L-methionine 149.2		an amino acid
4-methoxybenzaldehyde		see - ANISALDEHYDE
4-methoxyphenylamine 123.16	TOXIC	(p-anisidine) Used to make dyes.
methyl acetate		see - METHYL ETHANOATE
methyl alcohol		see - METHANOL
methylamine 31.06	HIGHLY FLAMMABLE, IRRITANT, HARMFUL	Used in organic synthesis and the preparation of dyes.
4-N-methylammonium phenosulphate	TOXIC (metol)	Used as a developer in photography.
methylated spirit, purple Purple methylated spirit contains traces of paraffin, methyl violet and pyridine. It is not suitable as a substitute for IMS or ethanol. <i>Wear eye protection. Keep away from sources of ignition.</i>	FLAMMABLE	
methylbenzene 92.13 <i>Wear eye protection and gloves. Keep away from sources of ignition. Wherever possible, use dimethylbenzene or methylbenzenecarboxylate instead.</i> Insoluble in water, miscible with ethanol.	HIGHLY FLAMMABLE, HARMFUL (toluene)	Used as a solvent.
3-methylbutan-1-ol 88.15 <i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>	FLAMMABLE, HARMFUL (iso-amyl alcohol)	Used as a solvent.
3-methylbutan-2-one 86.13	FLAMMABLE (methyl-iso-propyl ketone)	

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
3-methylbutylethanoate 130.19	<i>FLAMMABLE, HARMFUL</i>	(iso-amyl acetate, pentylethanoate, banana oil) Used as a solvent.
<i>Wear eye protection. Use in a well-ventilated area away from sources of ignition.</i>		
methyl carbamide		see - METHYL UREA
methyl cellulose		
Soluble in water to make very viscous solutions.		
methyl chloroform		see - 1,1,1-TRICHLOROETHANE
methyl cyanide 41.05	<i>HIGHLY FLAMMABLE, TOXIC</i>	(acetonitrile, ethanenitrile) Used as a solvent and in organic synthesis.
<i>Use benzonitrile (cyanobenzene) as a safer alternative.</i>		
methylene blue	<i>IRRITANT</i>	stain for nucleii
<i>Wear disposable gloves when handling solid methylene blue</i>		
LIVING ORGANISMS: - 1g methylene blue and 0.6g sodium chloride to 100ml water.		
DEAD TISSUE - 0.3g methylene blue to 30ml 95% ethanol (<i>FLAMMABLE</i>). Add 100ml water.		
methylene chloride		see - DICHLOROMETHANE
methylene dichloride		see - DICHLOROMETHANE
methylethanoate 74.08	<i>HIGHLY FLAMMABLE</i>	(methyl acetate)
<i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>		
1-methylethoxy-1-methylethane		(di-iso propyl ether) <i>SERIOUS EXPLOSION RISK - DO NOT STORE</i>
methyl ethyl ketone		see - BUTANONE
2-(2-methylethyl)-5-methylphenol 150.22		(thymol, 3-hydroxy- <i>p</i> -cymene) Used as a disinfectant.
methyl formate		see - METHYL METHANOATE
methyl green		
methyl-2-hydroxybenzenecarboxylate	<i>HARMFUL</i>	(methyl salicylate) Used in the preparation of flavours and perfumes.
methyl-4-hydroxybenzenecarboxylate		see - METHYL-4-HYDROXYBENZOATE
methyl-4-hydroxybenzoate 152.15	<i>IRRITANT</i>	(nipagin, methyl-4-hydroxybenzenecarboxylate) fungal inhibitor used in <i>Drosophila</i> media
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
methyl-<i>p</i>-hydroxybenzoate		see - METHYL-4-HYDROXYBENZOATE
methyl iodide		see - IODOMETHANE
methyl-iso-propyl-ketone		see - 3-METHYLBUTAN-2-ONE
methyl methacrylate		see - METHYL-2-METHYLPROPENOATE
methyl methanoate 60.05	<i>HIGHLY FLAMMABLE</i>	(methyl formate)
methyl-2-methylpropenoate	<i>HIGHLY FLAMMABLE, IRRITANT</i>	
<i>Wear eye protection and gloves. Use a fume cupboard. (methyl methacrylate)</i>		
		Used in polymerisation reactions to make perspex.
1-methyl-4-nitrobenzene 137.14	<i>TOXIC</i>	(4-nitortoluene, <i>p</i> -nitrotoluene)
methyl orange 327.35		(helianthine sodium salt) Used as an indicator, especially in titrations.
<i>Wear disposable gloves when handling solid methyl orange</i>		
		indicator for pH 2.8 - 4.6, colour change red - yellow
3 methods are described below		
1) dissolve 0.4g methyl orange in 200ml IMS (<i>FLAMMABLE, HARMFUL</i>).		
2) 0.5g methyl orange made up to 1000ml with water. Filter before use.		
3) 0.5g methyl orange made up to 985ml with water. Add 15.2ml 0.1M hydrochloric acid. Filter before use.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
methyl orange, screened		
<i>wear disposable gloves when handling solid methyl orange</i>		
		indicator for pH 3 - 4.5, colour change violet - green
2 methods are described below		
1) 1g methyl orange and 2.6g xylene cyanol FF made up to 1000ml with water.		
2) 1g methyl orange and 1.4g xylene cyanol FF made up to 500ml with 50% ethanol (see - INDUSTRIAL METHYLATED SPIRIT).		
methyl orange xylene cyanol		
		indicator for pH 2.9-4.6, colour change violet to green
0.9g methyl orange xylene cyanol to 50ml IMS (FLAMMABLE). Add 200ml water.		
4-methylpentan-2-one		
100.16		FLAMMABLE (iso-butyl methyl ketone)
<i>Wear eye protection and gloves. Keep away from sources of ignition.</i>		
2-methylphenol		
		TOXIC, CORROSIVE (o-cresol)
<i>Wear eye protection and gloves.</i>		
		Used in polymerisation reactions and in the preparation of dyes.
3-methylphenol		
		TOXIC, CORROSIVE (m-cresol)
<i>Wear eye protection and gloves.</i>		
		Used in polymerisation reactions and in the preparation of dyes.
4-methylphenol		
		TOXIC, CORROSIVE (p-cresol)
<i>Wear eye protection and gloves.</i>		
		Used in polymerisation reactions and in the preparation of dyes.
2-methylphenylamine		
		TOXIC (o-toluidine, 2-methylaminobenzene)
		a liquid used in the preparation of dyes.
4-methylphenylamine		
		TOXIC (p-toluidine, 4-methylaminobenzene)
		a white solid used in the preparation of dyes.
2-methylpropan-1-ol		
74.12		FLAMMABLE, HARMFUL (iso-butyl alcohol)
2-methylpropan-2-ol		
74.12		HIGHLY FLAMMABLE, HARMFUL (tert-butyl alcohol)
2-methylpropanoic acid		
88.11		CORROSIVE (butanoic acid, iso-butyric acid)
2-methylpropylethanoate		
116.16		FLAMMABLE (iso-butyl acetate)
		Used as a solvent for lacquers.
Soluble in ethanol. Slightly soluble in water.		
methyl red		
269.30		indicator for pH 4.4 - 6.2, colour change red - yellow
<i>wear disposable gloves and eye protection when handling solid methyl red</i>		
3 methods are described below		
1) 1g methyl red free acid to 1000ml hot water		
2) dissolve 1g methyl red free acid in 600ml IMS (FLAMMABLE, HARMFUL). Dilute to 1000ml with water.		
3) 0.2g methyl red to 300ml ethanol or IMS (FLAMMABLE)		
methyl red and methylene blue solution		
<i>wear disposable gloves and eye protection when handling solid methyl red and methylene blue.</i>		
Dissolve 0.5g methyl red in 1000ml 80% ethanol (FLAMMABLE, HARMFUL). Dissolve 0.4g methylene blue in 20ml water. Mix the two solutions together.		
5-methylresorcinol		
		see - 3,5-DIHYDROXYMETHYLBENZENE
methylsalicylate		
		see - METHYL-2-HYDROXYBENZENOATE
methyl urea		
74.08		HARMFUL (methyl carbamide)
methyl violet		
		(crystal violet)
		indicator for pH 0.1 - 2.0, colour change yellow to violet
1 litre indicator solution - dissolve 0.5g methyl violet in 1000ml water.		
100ml dye/stain (crystal violet-ammonium oxalate) - dissolve 2g methyl violet in 20ml ethanol (FLAMMABLE, HARMFUL). Mix with a solution of 80g ammonium ethanedioate (ammonium oxalate, HARMFUL) dissolved in 80ml water.		
metol		
		see - 4-N-METHYLAMMONIUM PHENOSULPHATE
microcosmic salt		
		see - AMMONIUM SODIUM HYDROGEN PHOSPHATE(V)

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
milk agar		see - AGAR, MILK
Millon's reagent	<i>TOXIC, CORROSIVE</i>	for detecting proteins <i>Use Biuret's solution as a substitute, or Cole's modification of Millon's reagent (listed earlier).</i>
mnium		see - LEAD(II)/(IV)OXIDE
molybdic(IV) acid		
161.95		
Murexide		(ammonium purpurate dye) Used as an indicator for calcium in titrations using EDTA.
naphthalene	<i>HARMFUL</i>	
128.17		Used in organic synthesis.
<i>Wear eye protection and gloves. Use stearic acid as a safer alternative in melting point experiments.</i>		
Insoluble in water. Slightly soluble in cold ethanol. Soluble in hot ethanol.		
naphthalen-1-ol	<i>HARMFUL</i>	(1-naphthol)
144.17		Used in the preparation of azo-dyes and perfumes.
<i>Wear eye protection and gloves.</i>		
naphthalen-2-ol	<i>HARMFUL</i>	(2-naphthol)
144.17		Used in the preparation of azo-dyes and perfumes and as a test for primary amines.
<i>Wear eye protection and gloves.</i>		
Light sensitive.		
1-naphthol		see - NAPHTHALEN-1-OL
2-naphthol		see - NAPHTHALEN-2-OL
1-naphthylethanoic acid		
Nessler's reagent	<i>TOXIC</i>	Used in tests for ammonia
An alkaline solution of potassium mercury iodide, consisting of excess potassium iodide, mercury iodide and sodium hydroxide. Ammonia in aqueous solutions is indicated by a yellow to brown colour.		
stock ammonium chloride solution for tests (1 litre) - 3.15g ammonium chloride made up to 1000ml with water.		
dilute ammonium chloride solution (1 litre) - 10ml stock solution + 990ml water.		
neutral red		basic vital stain
for the basic vital stain, 2 recipes are shown below:		
1) 0.1g neutral red to 1000ml isotonic saline (see - SALINE, ISOTONIC for recipe).		
2) 0.1g neutral red to 0.2ml 1% ethanoic acid. Add 100ml water.		
indicator for pH 6.8 to 8.0, colour change red to orange		
as a pH indicator - 0.1g to 100ml 50% ethanol (see - INDUSTRIAL METHYLATED SPIRIT) .		
nickel, metal	<i>IRRITANT, HARMFUL</i>	
58.71		Used in alloys and as a catalyst.
nickel ammonium sulphate	<i>HARMFUL, IRRITANT</i>	
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
nickel(II)carbonate	<i>HARMFUL, IRRITANT</i>	
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
nickel(II)chloride-6-water	<i>HARMFUL, IRRITANT</i>	
237.69		bench solution = 0.25M
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
1 litre 0.1M - 23.7g nickel(II)chloride-6-water made up to 1000ml with water.		
1 litre 0.25M (<i>HARMFUL</i>) - 59.4g nickel(II)chloride-6-water made up to 1000ml with water.		
nickel(II)hydroxide	<i>HARMFUL, IRRITANT</i>	
92.72		
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
nickel(II)nitrate(V)-6-water	<i>OXIDIZING AGENT, HARMFUL</i>	
290.79		bench solution = 0.25M
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
1 litre 0.25M (<i>HARMFUL</i>) - 72.7g nickel(II)nitrate(V)-6-water made up to 1000ml with water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
nickel(II)oxide 74.71	<i>TOXIC, IRRITANT</i>	
<i>Wear eye protection and gloves. Avoid raising dust. May cause cancer by inhalation (category 1 carcinogen).</i>		
Insoluble in water.		
nickel(II)sulphate(VI)	<i>HARMFUL, IRRITANT</i>	bench solution = 0.25M
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
1 litre standard solution (<i>HARMFUL</i>) - 66g nickel(II)sulphate(VI)-6-water made up to 1000ml with water.		
nigrosin		A dye used as a black pigment.
nile blue		a fat stain
ninhydrin		see - 1,2,3- INDANE TRIONE HYDRATE
nipagin		see - METHYL-4-HYDROXYBENZOATE
nitre		see - SODIUM NITRATE
nitric acid 63.01	<i>CORROSIVE, OXIDIZING</i>	Bench solution = 2M(2N)
s.g. 1.42 = 70% w/w = 15.8M	fuming nitric acid = 95-100%	
<i>Wear eye protection and use gloves when handling concentrated solutions. Pressure may build up in bottles of fuming nitric acid.</i>		
<i>Remember - ALWAYS ADD ACID TO WATER. (not water to acid)</i>		
1 litre 0.1M (<i>IRRITANT</i>) - add 6ml s.g. 1.42 nitric acid to 994ml water.		
1 litre 0.5M (<i>CORROSIVE</i>) - add 31ml s.g. 1.42 nitric acid to 969ml water.		
1 litre 1M (<i>CORROSIVE</i>) - add 62ml s.g. 1.42 nitric acid to 938ml water or add 43ml fuming nitric acid to 957ml water		
1 litre 2M (<i>CORROSIVE</i>) - add 125ml s.g. 1.42 nitric acid to 875ml water or add 86ml fuming nitric acid to 914ml water		
1 litre 4M (<i>CORROSIVE</i>) - add 250ml s.g. 1.42 nitric acid to 750ml water or add 172ml fuming nitric acid to 828ml water		
1 litre 5M (<i>CORROSIVE</i>) - add 310ml s.g. 1.42 nitric acid to 690ml water or add 215ml fuming nitric acid to 785ml water		
nitric oxide		see - NITROGEN MONOXIDE
nitrobenzene 123.11	<i>VERY TOXIC</i>	(a yellow liquid)
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
p-nitrobenzene-azo-resorcinol		see - 4-(4-NITRO-PHENYL-AZO)RESORCINOL
nitroethane 75.07	<i>FLAMMABLE, HARMFUL</i>	
nitrogen dioxide	<i>VERY TOXIC</i> (nitrogen(IV)oxide, nitrogen tetroxide)	
<i>handle only in a fume cupboard</i>		
nitrogen dioxide gas preparation		
<i>Wear eye protection and gloves. Work in a fume cupboard.</i>		
Heat lead(II)nitrate (<i>OXIDIZING, TOXIC</i>).		
OR, drip 70% nitric acid (<i>CORROSIVE</i>) onto copper turnings (this gives other oxides as well as nitrogen dioxide).		
Collect gas by displacing air.		
nitrogen monoxide	<i>VERY TOXIC</i> (nitric oxide)	
<i>handle only in a fume cupboard</i>	Reacts on contact with oxygen in air to form nitrogen dioxide.	
nitrogen monoxide gas preparation		
<i>Wear eye protection and gloves. Work in a fume cupboard.</i>		
Make a solution of 50g sodium nitrate(III) (sodium nitrite, <i>TOXIC</i>) in 100ml water. Drip this onto iron(II)sulphate covered with 5M hydrochloric acid (<i>IRRITANT</i>). Collect the gas over water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
di nitrogen monoxide gas preparation		
<i>Wear eye protection and gloves. Work in a fume cupboard.</i>		
Make a solution of 10g hydroxylamine hydrochloride in 50ml water. Drip it onto a warmed solution of 100g iron(II)ammonium sulphate in 200ml water.		
OR, gently heat 13g ammonium sulphate with 20g potassium nitrate (<i>OXIDIZING</i>) and collect the gas. Stop heating if you see brown fumes.		
di nitrogen oxide	<i>TOXIC</i>	(nitrous oxide, laughing gas) (a colourless gas)
<i>handle only in a fume cupboard</i>		
Soluble in water and ethanol.		
2-nitrophenol	<i>HARMFUL</i>	(<i>o</i> -nitrophenol)
139.11		
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
4-nitrophenol	<i>HARMFUL, CORROSIVE</i>	(<i>p</i> -nitrophenol)
139.11		
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
<i>o</i>-nitrophenol		see - 2-NITROPHENOL
<i>p</i>-nitrophenol		see - 4-NITROPHENOL
4-(4-nitro-phenyl-azo)benzene-1,3-diol		see - 4-(4-NITRO-PHENYL-AZO)RESORCINOL
4-(4-nitro-phenyl-azo)resorcinol	<i>HARMFUL</i>	
259.23		(magneson I, <i>p</i> -nitrobenzene-azo-resorcinol)
<i>Wear eye protection and gloves.</i>		
Gives a blue colour with magnesium ions in alkaline solutions.		
nitrous oxide		see - <i>di</i> NITROGEN OXIDE
4-nitrotoluene		see - 1-METHYL-4- NITROBENZENE
<i>p</i>-nitrotoluene		see - 1-METHYL-4- NITROBENZENE
nutrient agar		see - AGAR, NUTRIENT
nutrient broth		see - BROTH, NUTRIENT
nylon preparation		
2 solutions are prepared as below:		
1) DIAMINE SOLUTION - dissolve 2.2g 1,6-diaminohexane (hexamethylene diamine, <i>CORROSIVE, HARMFUL</i>) in 50ml water.		
2) DIOYL CHLORIDE SOLUTION - dissolve 1.5g decanedioyl chloride (sebacoyl chloride, <i>CORROSIVE</i>) in 50ml cyclohexane (<i>FLAMMABLE, IRRITANT</i>).		
(hexanedioyl chloride may be used in place of decanedioyl chloride but is less stable)		
Put 3ml diamine solution in a 10ml beaker. Pour 3ml dioyl chloride solution carefully onto the diamine solution by pouring down a glass rod. Nylon forms at the interface between the two solutions. It may be picked up with a small glass rod, and wound around the rod as it is formed.		
octadecanoic acid		(stearic acid)
284.49		Used in the preparation of soaps and candles.
100ml 0.01% (0.1 gram per litre) in petroleum ether - 0.01g octadecanoic acid to 100ml petroleum ether		
40-60°C (<i>FLAMMABLE</i>).		
Octadecanoic acid (stearic acid) makes a good alternative to naphthalene for melting point experiments.		
<i>n</i>-octadecanol		see - OCTADECAN-1-OL
octadecan-1-ol		(stearyl alcohol, <i>n</i> -octadecanol)
270.50		
octadec-9-enoic acid		(oleic acid)
282.47		
<i>Becomes rancid quickly when exposed to air.</i>		
Melting point is 15°C		
100ml 0.01% (0.1gram per litre) in petroleum ether - 0.01ml octadec-9-enoic acid to 100ml petroleum ether		
40-60°C (<i>FLAMMABLE</i>).		
<i>iso</i>-octane		see - 2,2,4-TRIMETHYLPENTANE
<i>n</i>-octanol		see - OCTAN-1-OL

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
octan-1-ol 130.23		(n-octanol, n-octyl alcohol) Used as a solvent.
octan-2-ol 130.23		(capryl alcohol, sec-octyl alcohol) Used as a foam reducing agent.
oct-1-ene		<i>HIGHLY FLAMMABLE, HARMFUL</i>
n-octyl alcohol		see - OCTAN-1-OL
sec-octyl alcohol		see - OCTAN-2-OL
oil, castor		see - CASTOR OIL
oil, crude		see - CRUDE OIL SUBSTITUTE
oil, linseed		see - LINSEED OIL
oleic acid		see - OCTADEC-9-ENOIC ACID
oleum		see - SULPHURIC ACID, FUMING
orcein acetic		<i>CORROSIVE</i> (aceto orcein)
<i>Wear eye protection. Use a fume cupboard.</i>		
Heat 2g orcein in 90ml glacial ethanoic acid (<i>CORROSIVE</i>). Cool and add to 110ml water. Shake and filter.		
orcinol		see - 3,5-DIHYDROXYMETHYLBENZENE
orthophosphoric acid		see - PHOSPHORIC(V)ACID
oxalic acid		see - ETHANEDIOIC ACID
oxine		see - 8-HYDROXYQUINOLINE
2-oxopropanoic acid		(pyruvic acid)
oxygen gas preparation		<i>OXIDIZING AGENT</i>
<i>Wear eye protection. Use a fume cupboard for large scale preparations.</i>		
Drip 6% (20 vol.) hydrogen peroxide from a dropping funnel onto manganese(IV) oxide, or potassium manganate(VII) covered in water. Collect the gas over water.		
oxygen mixture		<i>OXIDIZING, HARMFUL</i> used as a catalyst
1g potassium chlorate(V)(<i>OXIDIZING, HARMFUL</i>) to 0.05g manganese(IV)oxide or copper(II)oxide.		
<i>DO NOT STORE</i>		
palladium chloride 177.31		
palmitic acid		see - HEXADECANOIC ACID
pancreatin		a mixture of pancreatic enzymes.
paraffin, domestic (paraffin oil)		see - KEROSENE
paraffin, liquid		
A mixture of liquid hydrocarbons.		Used in "cracking" experiments.
paraffin wax		
Comes in three forms: white soft, white refined (has a melting point of 44 - 46°C), and soft yellow (petroleum jelly).		
paraformaldehyde		see - POLY(METHANAL)
paraldehyde		see - ETHANAL TRIMER
pectin		
Pectin occurs in plant cell walls. Soluble in water. Solutions can set to a gel.		Used in jam making and enzyme experiments.
pectinase		An enzyme used to break down pectin.
5g pectolytic enzyme (available from home-brew / wine-making shops) to 100ml water.		
pentane 72.15		<i>EXTREMELY FLAMMABLE</i> Used as a solvent.
pentane-1,5-dial solution	<i>TOXIC</i>	(glutaraldehyde solution) Used as a disinfectant.
Pentane-1,5-dial is an oil soluble in water.		
pentan-1-ol 88.15		<i>FLAMMABLE, HARMFUL</i> (n-amyl alcohol) Used as a solvent.
<i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>		
pentlandite		A sulphide of iron and nickel.
pentylethanoate		see - 3-METHYLBUTYLETHANOATE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
pepsin		proteolytic enzyme
Shelf life 1 -2 years. Glycerin of pepsin B.P., available from pharmacists, has a shelf life of 3 years. Pepsin breaks down proteins into peptones in an acid medium.		
peptone, bacteriological		for making bacteriological media
Soluble in water.		
peptone water		
Heat 10g peptone and 5g sodium chloride in 1000ml water until dissolved. Autoclave to sterilise.		
perchloric acid		see - CHLORIC(VII) ACID
perchloroethylene		see - 1,1,2,2-TETRACHLOROETHYLENE
petroleum jelly		see - PARAFFIN WAX
petroleum, crude		see - CRUDE OIL SUBSTITUTE
petroleum ether		see - PETROLEUM SPIRIT
phenol		<i>TOXIC, CORROSIVE</i> (carbolic acid)
<i>Wear eye protection and gloves. Keep polyethylene glycol ready to neutralise spills.</i>		
Soluble in water.		
phenolindo-2,6-dichlorophenol		Used in the preparation of disinfectants, plastics and dyes.
phenolphthal		see - 2,6-DICHLOROPHENOLINDOPHENOL
phenolphthalein		see - PHENOLPHTHALEIN
318.33		A pH indicator especially used in titrations.
indicator for pH 8.2 - 9.8, colour change colourless to violet red		
1 litre indicator - 5g phenolphthalein to 500ml ethanol. Dilute to 1000ml with water, stirring continuously.		
100ml 0.1% (w/v) - 0.1g phenolphthalein to 100ml 50% ethanol.		
phenolphthalein/ thymol blue solution		
0.1g thymol blue to 2.2ml 0.1M sodium hydroxide and 50ml IMS (FLAMMABLE). Dilute to 100ml with water. Mix 90ml of this solution with 30ml 0.1% (w/v) phenolphthalein solution.		
phenol red		(phenolsulphonthalein)
indicator for pH 6.8 - 8.4, colour change yellow to red		
Two recipes are shown below:		
1) 1 litre indicator - 1g phenol red to 28.4ml 0.1M sodium hydroxide. Dilute to 1000ml with water.		
2) 500ml indicator - 0.1g phenol red to 100ml IMS (FLAMMABLE). Add 400ml water.		
phenylacetic acid		<i>HARMFUL</i>
136.15		
L-phenylalanine		an amino acid
165.2		
phenylamine		<i>TOXIC</i> (aniline, aminobenzene)
129.6		Used in the preparation of dyes and plastics.
<i>A category 3 carcinogen.</i>		
<i>Use alternatives wherever possible. Wear eye protection and gloves. Use a fume cupboard.</i>		
phenylammonium chloride		<i>TOXIC</i> (aniline hydrochloride)
Used to stain lignified cells yellow		
<i>Use alternatives wherever possible. Wear eye protection and gloves. Use a fume cupboard.</i>		
100ml solution (<i>TOXIC</i>) - 2g aniline hydrochloride to 100ml 58.5% ethanol (a mixture of 65ml 90% ethanol and 35ml water). Add 2ml 2M hydrochloric acid (<i>IRRITANT</i>). Does not keep well.		
phenylammonium sulphate		<i>TOXIC</i> stain for lignin
284.34		(aniline sulphate)
<i>Use alternatives wherever possible. Wear eye protection and gloves. Use a fume cupboard.</i>		
100ml standard solution (1%, <i>TOXIC</i>) - 1g to 89ml 70% ethanol (IMS). Add 10ml 0.05M sulphuric acid. Store in a dark bottle.		
Soluble in water.		
phenylbenzene		see - BIPHENYL
phenyl benzene carboxylate		see - PHENYL BENZOATE
phenyl benzoate		<i>FLAMMABLE</i> (phenyl benzene carboxylate)
Used in nitration reactions.		
m-phenylene diamine		see - 1,3-DIAMINO BENZENE
p-phenylenediamine		see - BENZENE-1,4-DIAMINE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
N-phenyl ethanamide 135.17	<i>HARMFUL</i>	(acetanilide, antifebrin) Used in the preparation of dyes.
phenylethanone 120.15	<i>HARMFUL</i>	(acetophenone, phenyl methyl ketone, acetylbenzene) Used in organic synthesis.
Insoluble in water. Soluble in most organic solvents.		
phenylethylene 104.15	<i>FLAMMABLE, HARMFUL</i>	(styrene) Used in polymerisation reactions.
<i>Wear eye protection and gloves. Use in a well-ventilated area.</i>		
Soluble in ethanol.		
phenylhydrazine 108.14	<i>TOXIC</i>	Used in reactions to identify aldehydes and ketones.
<i>Wear eye protection and gloves.</i>		
phenyl-2-hydroxybenzene carboxylate		(phenyl salicylate, salol) Used in melting point and crystallisation experiments. see - PHENYL-2-HYDROXYBENZENE CARBOXYLATE
phenyl-2-hydroxybenzoate		
phenylmethanol 108.14	<i>HARMFUL</i>	(benzyl alcohol) Used as a solvent.
(phenylmethyl)amine 107.16	<i>TOXIC, CORROSIVE</i>	(benzyl amine)
3-phenylpropenoic acid 148.16		(cinnamic acid) Used in the preparation of perfumes.
phenylsalicylate		see - PHENYL-2-HYDROXYBENZENE CARBOXYLATE
phenylthiocarbamide		see - PHENYLTHIOUREA
phenylthiourea	<i>TOXIC</i>	(PTC, phenylthiocarbamide) Used in taste tests.
For taste tests, make a weak solution and soak filter paper strips in it. Leave them to dry before use. Restrict the number of strips used to 2 per person and allow no access to the solid or solution in the class.		
pH indicators		see - indicators
phloroglucinol		see - BENZENE-1,3,5-TRIOLE
phosphate buffer		see - BUFFER, PHOSPHATE
phosphinic acid 161.98	<i>CORROSIVE</i>	(hypophosphoric acid) Used as a reducing agent.
phosphomolybdic acid		see - DODECA-MOLYBDOPHOSPHORIC ACID
phosphoric(V) acid 98.00	<i>CORROSIVE</i>	(orthophosphoric acid) Used to prepare hydrogen halides, and in fertilisers.
<i>Wear eye protection and gloves.</i>		
phosphorus, red 30.9738	<i>HIGHLY FLAMMABLE</i>	Used to demonstrate allotropes
<i>Wear eye protection and gloves.</i>		
phosphorus, white (yellow) 30.9738	<i>TOXIC, HIGHLY FLAMMABLE</i>	Used to demonstrate allotropes
<i>Wear eye protection and gloves. Use tongs. Cut under water. Store in water (check water level regularly). Short shelf life.</i>		
phosphorus(III)chloride 137.33	<i>CORROSIVE, water-reactive</i>	(phosphorus trichloride) Used as a chlorinating agent.
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
phosphorus(V)chloride 208.24	<i>CORROSIVE, water-reactive</i>	(phosphorus pentachloride)
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
phosphorus(V)oxide 141.94	<i>CORROSIVE, HARMFUL, water-reactive</i>	(phosphorus pentoxide) Used as a drying agent.
<i>Wear eye protection and gloves. Use a fume cupboard.</i>		
phosphorus pentachloride		see - PHOSPHORUS(V)CHLORIDE
phosphorus pentoxide		see - PHOSPHORUS(V)OXIDE
phosphorus trichloride		see - PHOSPHORUS(III)CHLORIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
photography developer	<i>FLAMMABLE</i>	
DEVELOPER - 2.3g Metol, 75.0g anhydrous sodium sulphite, 17.0g benzene-1,4-diol (hydroquinone), 65.0g anhydrous sodium carbonate and 2.8g potassium bromide to 750ml water at 52 degrees Celsius. Dilute to 1000ml with water. Dilute 1:1, 1:2, or 1:3 before use with water.		
photography fixer	<i>FLAMMABLE</i>	
photography stop	<i>FLAMMABLE</i>	
iso-phthalic acid		see - BENZENE-1,2-DICARBOXYLIC ACID
phthalic anhydride		see - BENZENE-1,2-DICARBOXYLIC ANHYDRIDE
picric acid		see - 2,4,6-TRINITROPHENOL
picrolonic acid		
264.21		
piperazine solution		see - DIETHANE-1,1',2,2'-DIAMINE SOLUTION
plaster of paris		see - CALCIUM SULPHATE(VI)-hemihydrate
plating solutions		
COPPER PLATING - 1M copper(II)sulphate-5-water with a few mls 1M sulphuric acid.		
NICKEL PLATING - 5g ammonium nickel sulphate-6-water to 100ml water.		
ZINC PLATING - 33g zinc sulphate-7-water to 100ml water. Add 5 drops 1M sulphuric acid and 2 spatulas boric acid crystals.		
platinum		
195.09		
plumbous salts		see - LEAD(II)salts
polyethenol		(polyvinyl alcohol, PVA) Used in adhesives.
Soluble in water.		neutraliser for phenol burns
polyethylene glycol		see - POLYETHENOL
polymerised vinyl alcohol		see - POLYETHENOL
poly(methanal)	<i>TOXIC</i>	(paraformaldehyde, paramethanal) Used in fumigation.
Soluble in water.		
polytrioxophosphoric(v) acid	<i>CORROSIVE</i>	(metaphosphoric acid)
79.98		
polyvinyl alcohol		see - POLYETHENOL
ponceau fuchsin		(masson) Used as a general dye/stain.
		see - ALUMINIUM(III)POTASSIUM(I)SULPHATE(VI)
potash alum		
potassium, metal	<i>HIGHLY FLAMMABLE, CORROSIVE, water-reactive</i>	
39.10		
<i>Wear eye protection and gloves. Use tongs. Short safe shelf life; old stock may explode when cut.</i>		
<i>Store in liquid paraffin.</i>		
potassium alum		see - ALUMINIUM(III) POTASSIUM(I)SULPHATE(VI)
potassium aluminium sulphate		see - ALUMINIUM(III)POTASSIUM(I)SULPHATE(VI)
potassium bicarbonate		see - POTASSIUM HYDROGEN CARBONATE
potassium bisulphate		see - POTASSIUM HYDROGEN SULPHATE
potassium bromate(V)	<i>OXIDIZING, TOXIC</i>	
167.00		Used in titration experiments and bromate/bromine clock.
<i>Wear eye protection. May cause cancer if swallowed (category 2 carcinogen).</i>		
1 litre 0.005M - 0.83g potassium bromate(V) made up to 1000ml with water.		
1 litre 0.01M - 1.67g potassium bromate(V) made up to 1000ml with water.		
potassium bromide		Used in photography, etc.
119.00		bench solution = 0.5M
1 litre 0.2M - 23.8g potassium bromide made up to 1000ml with water.		
1 litre 0.5M - 59.5g potassium bromide made up to 1000ml with water.		
1 litre 1M - 119g potassium bromide made up to 1000ml with water.		
1 litre saturated solution - 652g potassium bromide dissolved in 1000ml hot water. Store with excess solid in the bottle.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
potassium carbonate, anhydrous	IRRITANT (potash)	
138.21		bench solution = 1.5M
1 litre 1.5M - 207g anhydrous potassium carbonate made up to 1000ml with water.		
1 litre 2M - 276g anhydrous potassium carbonate made up to 1000ml with water		
potassium carbonate-1¹/₂-water	IRRITANT	
165.23		Used in the preparation of soaps. bench solution = 1.5M
1 litre 1.5M - 248g potassium carbonate-1 ¹ / ₂ -water made up to 1000ml with water.		
1 litre 2M - 330g potassium carbonate-1 ¹ / ₂ -water made up to 1000ml with water.		
potassium chlorate		see - POTASSIUM CHLORATE(V)
potassium chlorate(V)	OXIDIZING, HARMFUL (potassium chlorate)	
122.55		Used as a general oxidizing agent.
1 litre saturated solution - 73g potassium chlorate(V) to 1000ml hot water. Store with excess solid in the bottle.		
potassium chlorate(VII)	OXIDIZING, HARMFUL (potassium perchlorate)	
138.55		
potassium chloride	IRRITANT	
74.55		Used as a fertiliser.
<i>wear eye protection and gloves</i>		
Saturated solution is for refilling pH and some oxygen probes. Store with excess solid.		
1 litre 0.1M - 7.5g potassium chloride made up to 1000ml with water		
1 litre 0.5M - 37.3g potassium chloride made up to 1000ml with water.		
1 litre 1M - 74.5g potassium chloride made up to 1000ml with water		
1 litre saturated solution - 347g potassium chloride in 1000ml hot water. Store with excess solid in the bottle.		
potassium chromate(VI)	OXIDIZING, TOXIC, CORROSIVE	
194.19		bench solution = 0.1M (0.2N) Use 0.2M as indicator for silver nitrate (red precipitate).
1 litre 0.1M (IRRITANT) - 19.4g potassium chromate(VI) made up to 1000ml with water		
1 litre 0.2M (IRRITANT) - 38.8g potassium chromate(VI) made up to 1000ml with water		
1 litre 1M (IRRITANT) - 194.2g potassium chromate(VI) made up to 1000ml with water		
tri-potassium citrate		
324.41		
potassium cyanide	VERY TOXIC	
65.12		bench solution = 0.5M (0.5N)
<i>Use alternatives wherever possible.</i>		
1 litre 0.5M (TOXIC) - 32.5g potassium cyanide made up to 1000ml with water.		
potassium dichromate(VI)	OXIDIZING, TOXIC, CORROSIVE	
294.18		bench solution = 1M (6N)
<i>wear eye protection and gloves.</i>		
1 litre 0.02M (TOXIC) - 5.9g potassium dichromate(VI) made up to 1000ml with water.		
1 litre 0.1M (TOXIC) - 29.4g potassium dichromate(VI) made up to 1000ml with water		
1 litre 0.2M (VERY TOXIC) - 58.8g potassium dichromate(VI) made up to 1000ml with water		
1 litre saturated solution (VERY TOXIC) - 121g potassium dichromate(VI) made up to 1000ml with water. Store with excess solid in the bottle.		
100ml acidified 0.1M potassium dichromate solution (CORROSIVE, TOXIC) - 2.94g potassium dichromate(VI) to a mixture of 10ml concentrated sulphuric acid (CORROSIVE) in 90ml water.		
potassium dihydrogen orthophosphate		
136.09		
potassium ethanedioate	HARMFUL (potassium oxalate)	
184.23		
Soluble in water.		
potassium ferricyanide		see - POTASSIUM HEXACYANOFERRATE(III)
potassium ferrocyanide		see - POTASSIUM HEXACYANOFERRATE(II)-3-water
potassium fluoride	TOXIC	

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
potassium hexacyanoferrate(II)-3-water 422.39 <i>wear eye protection</i> 1 litre 0.5M - 211g potassium hexacyanoferrate(II)-3-water (potassium ferrocyanide) made up to 1000ml with water.	HARMFUL	(potassium ferrocyanide) bench solution = 0.5M (2N) indicator for iron(III)salts (blue colour) and zinc salts
potassium hexacyanoferrate(III) 329.25 1 litre 0.125M - 41.2g potassium hexacyanoferrate(III) (potassium ferricyanide) made up to 1000ml with water. Does not keep well.	HARMFUL	(potassium ferricyanide) bench solution = 0.125M (0.375N) indicator for iron(II)salts (blue colour).
potassium hydrogen carbonate 100.12 Soluble in water. for maintaining the carbon dioxide concentration of air, see - SODIUM HYDROGEN CARBONATE solution		(potassium bicarbonate) Used as an antacid.
di-potassium hydrogen orthophosphate di-potassium hydrogen phosphate(V), anhydrous 174.18		see - <i>di</i> POTASSIUM HYDROGEN PHOSPHATE(V)
di-potassium hydrogen phosphate(V)-3-water 228.22		
potassium di-hydrogen orthophosphate		
potassium hydrogen sulphate 136.16	CORROSIVE	(potassium bisulphate)
potassium hydroxide 56.11 <i>wear eye protection and gloves. Carry out preparation in a fume cupboard.</i> <i>Add solid pellets a few at a time while stirring. Store the solution in a bottle with a rubber bung</i> (for recipes using 75% potassium hydroxide, multiply the amount of potassium hydroxide by 0.75) 1 litre 0.1M (IRRITANT) - 5.6g potassium hydroxide made up to 1000ml with water 1 litre 1M (CORROSIVE) - 56.1g potassium hydroxide made up to 1000ml with water 1 litre 2M (CORROSIVE) - 112.2g potassium hydroxide made up to 1000ml with water 1 litre 5M (30%, CORROSIVE) - 281g potassium hydroxide made up to 1000ml with water saturated solution (CORROSIVE) - Place 50ml 5M solution in a conical flask. Slowly add 50g potassium hydroxide, stirring continuously. Cool the flask periodically in a cold water bath.	CORROSIVE	(caustic potash) bench solution = 1M (1N)
potassium hydroxide, alcoholic		see - ALCOHOLIC POTASSIUM HYDROXIDE
potassium iodate		see - POTASSIUM IODATE(V)
potassium iodate(V) 214.00 <i>Wear eye protection.</i> 1 litre 0.0167M - 3.6g potassium iodate(V) to 1000ml water.	OXIDIZING, HARMFUL	bench solution = 0.0167M
potassium iodide 166.00 1 litre 0.1M - 16.6g potassium iodide made up to 1000ml with water 1 litre 0.2M - 33.2g potassium iodide made up to 1000ml with water 1 litre 0.5M - 83.0g potassium iodide made up to 1000ml with water 1 litre 1M - 166.0g potassium iodide made up to 1000ml with water 1 litre saturated solution - 1000g potassium iodide made up to 1000ml with water Store saturated solution in a bottle with excess solid.		bench solution = 0.2M (0.2N) Used in chemical analysis, photography and for iodine solutions.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
potassium manganate(VII) 158.03	<i>OXIDISING, HARMFUL</i> (potassium permanganate)	bench solution = 0.02M (0.1N) Used as an oxidizing agent, in volumetric analysis, and as a disinfectant. <i>Wear eye protection and gloves. Remove stains with acidified 20vol. hydrogen peroxide.</i>
Warm solutions gently to dissolve the crystals. Store in a very clean, dark bottle.		
1 litre 0.01M - 1.6g potassium manganate(VII) made up to 1000ml with water		
1 litre 0.02M - 3.2g potassium manganate(VII) made up to 1000ml with water		
1 litre 0.1M - 15.8g potassium manganate(VII) made up to 1000ml with water		
1 litre 0.2M - 31.6g potassium manganate(VII) made up to 1000ml with water		
1 litre saturated solution - 400g potassium manganate(VII) made up to 1000ml with water		
5 litres solution for earthworm extraction (enough for 1 square metre of ground) - 20g potassium manganate(VII) made up to 5000ml with water.		
Baeyer's test (1% aqueous solution) - 1g potassium manganate(VII) per 100ml water.		
100ml acidified potassium manganate(VII) - dissolve 0.5g potassium manganate(VII) in a mixture of 5ml 0.1M sulphuric acid and 95ml water.		
potassium metabisulphite 222.31		
potassium nitrate		see - POTASSIUM NITRATE(V)
potassium nitrate(V) 101.1	<i>OXIDIZING</i> (saltpetre)	Used as an oxidizing agent and as a fertiliser.
1 litre saturated solution - 316g potassium nitrate(V) in 1000ml hot water. Store with excess solid in the bottle.		
tri-potassium orthophosphate 230.28		
potassium oxalate		see - POTASSIUM ETHANEDIOATE
potassium perchlorate		see - POTASSIUM CHLORATE(VII)
potassium permanganate		see - POTASSIUM MANGANATE(VII)
potassium peroxodisulphate(VI) 270.31	<i>OXIDIZING, HARMFUL</i>	(potassium persulphate)
<i>Wear eye protection and gloves. Short shelf life.</i>		
potassium persulphate		see - POTASSIUM PEROXODISULPHATE(VI)
potassium phosphate		see - POTASSIUM DIHYDROGEN ORTHOPHOSPHATE, see - diPOTASSIUM HYDROGEN ORTHOPHOSPHATE see - triPOTASSIUM ORTHOPHOSPHATE
potassium sodium tartrate-4-water 282.22		(Rochelle salt) Used to make baking powders.
Soluble in water.		
potassium sulphate(VI) 174.25		bench solution = 0.25M Used in fertilisers.
1 litre 0.25M - 43.6g potassium sulphate(VI) made up to 1000ml with water.		
potassium sulphide-9-water 272.3	<i>CORROSIVE, HARMFUL</i>	
1 litre 1M - 272g potassium sulphide-9-water made up to 1000ml with water.		
potassium thiocyanate 97.18	<i>HARMFUL</i>	Used in tests for iron(III)salts and in the preparation of dyes. bench solution = 1M (1N)
1 litre 0.02M - 1.94g potassium thiocyanate made up to 1000ml with water.		
1 litre 1M - 97.2g potassium thiocyanate made up to 1000ml with water.		
proflavine hemisulphate 552.61		Used as an antiseptic.
Antiseptic - make a dilute solution in water.		
L-proline 115.1		(pyrrolidine-2-carboxylic acid) an amino acid
propional	<i>HIGHLY FLAMMABLE, IRRITANT</i>	(propionaldehyde)
<i>Wear eye protection.</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
propanedioic acid 104.06 Soluble in water and ethanol.		(malonic acid) Used in organic synthesis.
propane-1,2-diol 76.10	<i>HARMFUL</i>	(propylene glycol) Used in organic synthesis and as a solvent.
propane-1,2,3-triol 92.10		(glycerol, glycerine) Used in organic synthesis and as a lubricant.
propanoic acid 74.08 <i>Wear eye protection and gloves. Use in a fume cupboard.</i>	<i>CORROSIVE</i>	(propionic acid)
propan-1-ol 60.10 Miscible with water. <i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>	<i>HIGHLY FLAMMABLE, HARMFUL</i>	(n-propyl alcohol) Used as a solvent.
propan-2-ol 60.10 <i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>	<i>HIGHLY FLAMMABLE, HARMFUL</i>	(iso-propyl alcohol) Used in organic synthesis and as a solvent.
propan-2-one 58.08 <i>Wear eye protection and gloves. Keep away from sources of ignition.</i> 100ml chlorophyll solvent (<i>FLAMMABLE</i>) - a mixture of 80ml propan-2-one and 20ml water.	<i>HIGHLY FLAMMABLE</i>	(acetone, propanone) Used as a solvent.
propanone		see - PROPAN-2-ONE
propionaldehyde		see - PROPANAL
propionic acid		see - PROPANOIC ACID
iso-propyl acetate		see - iso-PROPYL ETHANOATE
iso-propyl alcohol		see - PROPAN-2-OL
n-propyl alcohol		see - PROPAN-1-OL
propylene glycol		see - PROPANE-1,2-DIOL
iso-propyl ethanoate 102.13 <i>Wear eye protection and gloves. Keep away from sources of ignition. Use in a fume cupboard.</i>	<i>FLAMMABLE</i>	(IPA, iso-propyl acetate)
n-propyl iodide		see - 1-IODOPROPANE
PTC		see - PHENYLTHIOUREA
pumice		igneous rock
purple methylated spirit		see - METHYLATED SPIRIT, PURPLE
pyridine 79.10	<i>HIGHLY FLAMMABLE, HARMFUL</i>	Used to make methylated spirit unpalatable.
pyrogalllic acid		see - BENZENE-1,2,3-TRIOL
pyrogallol		see - BENZENE-1,2,3-TRIOL
pyronine-methyl green <i>Wear eye protection and gloves.</i> 100ml standard solution - dissolve 0.8g pyronine methyl green (Pappenheim) in 20ml IMS (<i>FLAMMABLE, HARMFUL</i>). Dilute to 1000 ml with water.		stain for plasma cells
pyruvic acid		see - 2-OXOPROPANOIC ACID
quartz 60.1 Quartz is found in igneous, metamorphic and sedimentary rocks.		naturally crystalline silicon dioxide
quicklime		see - CALCIUM OXIDE
quinine <i>Use cold tea as a safer alternative for taste tests</i>	<i>HARMFUL</i>	Used in taste tests
quinol		see - BENZENE-1,4-DIOL
quinoline 129.16 Insoluble in water. Soluble in most organic solvents.		Used as a solvent and in the preparation of dyes.

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
quinone		see - CYCLOHEXADIENE-1,4-DIONE
rate of reaction experiments		
Standard experiments test the effects of a number of variables on the rate of reaction, e.g.:-		
SIZE /SURFACE AREA - different sized marble chips with 2M Hydrochloric acid (wear eye protection)		
red lead		see - LEAD(II)/(IV)OXIDE
rennet		for cheese making
Rennet is made from an extract of calf's stomach. It contains the enzyme rennin which clots milk.		
resazurin		for testing the freshness of milk
Resazurin is very light sensitive. Milk samples being tested should be kept in the dark.		
resorcinol		see - BENZENE-1,3-DIOL
D-ribose		a pentose.
150.13		
Rinmann green test		see - COBALTICYANIDE PAPER
RNA		see - RIBONUCLEIC ACID
rock salt		see - SODIUM CHLORIDE, ROCK SALT
rosaniline		Used as a base for fuchsin dyes.
rose water		for making cosmetics
rosin		(colophony) Used as a soldering flux.
rubidium chloride		
120.9		
Sach's water culture solutions		for showing effects of mineral deficiencies on plants
COMPLETE - 0.25g calcium sulphate(VI), 0.25g calcium phosphate(V), 0.25g magnesium sulphate(VI) 0.08g sodium chloride, 0.70g potassium nitrate(V) and 0.005g iron(III)chloride made up to 1000ml with water		
LACKING CALCIUM - 0.2g potassium sulphate(VI), 0.71g sodium phosphate(V), 0.25g magnesium sulphate(VI) 0.08g sodium chloride, 0.70g potassium nitrate(V) and 0.005g iron(III)chloride made up to 1000ml with water		
LACKING IRON - 0.25g calcium sulphate(VI), 0.25g calcium phosphate(V), 0.25g magnesium sulphate(VI) 0.08g sodium chloride, 0.70g potassium nitrate(V) made up to 1000ml with water		
LACKING NITROGEN - 0.25g calcium sulphate(VI), 0.25g calcium phosphate(V), 0.25g magnesium sulphate (VI), 0.08g sodium chloride, 0.52g potassium chloride and 0.005g iron(III)chloride made up to 1000ml with water.		
LACKING PHOSPHORUS - 0.25g calcium sulphate(VI), 0.16g calcium nitrate(V), 0.25g magnesium sulphate(VI), 0.08g sodium chloride, 0.70g potassium nitrate(V) and 0.005g iron(III)chloride made up to 1000ml with water.		
LACKING SULPHUR -0.16g calcium chloride, 0.25g calcium phosphate(V), 0.21g magnesium chloride 0.08g sodium chloride, 0.70g potassium nitrate(V) and 0.005g iron(III)chloride made up to 1000ml with water		
LACKING MAGNESIUM - 0.25g calcium sulphate(VI), 0.25g calcium phosphate(V), 0.17g potassium sulphate(VI), 0.08g sodium chloride, 0.70g potassium nitrate(V) and 0.005g iron(III)chloride made up to 1000ml with water.		
LACKING POTASSIUM - 0.25g calcium sulphate(VI), 0.25g calcium phosphate(V), 0.25g magnesium sulphate(VI), 0.08g sodium chloride, 0.60g sodium nitrate(V) and 0.005g iron(III)chloride made up to 1000ml with water.		
safranin O		Used as a stain and a dye.
<i>Wear eye protection and gloves. Work in a well-ventilated area.</i>		
100ml basic counterstain for aniline blue and fast green -		
Dissolve 1g safranin O in a mixture of 99ml 50%ethanol with a few drops of aniline (phenylamine, <i>TOXIC</i>).		
Sakaguchi Solution A		IRRITANT
<i>Wear eye protection and gloves.</i>		
5g sodium hydroxide (<i>CORROSIVE</i>) made up to 100ml with water		
Sakaguchi Solution B		FLAMMABLE
<i>Wear eye protection.</i>		
1g naphthalen-1-ol (<i>HARMFUL</i>) made up to 100ml with IMS (<i>FLAMMABLE, HARMFUL</i>)		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
Sakaguchi Solution C	<i>IRRITANT</i>	
<i>Wear eye protection and gloves.</i>		
10% chlorine solution of sodium chlorate(I) (see SODIUM CHLORATE(I))		
Sakaguchi test		test for arginine/proteins
<i>Wear eye protection and gloves.</i>		
Add 1ml solution A and 2 drops Solution B to 2ml of the test solution. Mix, then add 1 drop of Solution C.		
sal ammoniac		see - AMMONIUM CHLORIDE
salicylic acid		see - 2-HYDROXYBENZOIC ACID
saline, isotonic		
Dissolve the appropriate amount of sodium chloride in 1000ml water.		
AMPHIBIAN -	6.4g	
BIRD -	7.5g	
INVERTEBRATE	7.5g	
MAMMAL -	9.0g	
salt		see - SODIUM CHLORIDE
saltpetre		see - POTASSIUM NITRATE
sandstone		a sedimentary rock
Sandstone mostly consists of grains of quartz and sand cemented with clay, calcium carbonate and iron oxide.		
saponin	<i>HARMFUL, IRRITANT</i>	Used to stabilise foam and emulsify oils.
Schultze's solution		see - CHLOR-ZINC-IODINE
Schweitzer's reagent		a solvent for cellulose
<i>Wear eye protection and gloves. Work in a well-ventilated area.</i>		
Dissolve 1.5g precipitated copper(II)hydroxide in 1000ml 20% (10M) ammonia solution (<i>CORROSIVE</i>) (see - AMMONIA SOLUTION for a recipe for 20% ammonia solution).		
screened methyl orange		see - METHYL ORANGE
sea water		
3 methods for the preparation of sea water are detailed below:		
1) Bubble carbon dioxide through a suspension of 0.12g calcium carbonate in 100ml water until a clear solution is formed. Add the following:- 27g sodium chloride, 11g magnesium chloride-6-water, 13g magnesium sulphate(VI)-7-water, 0.75g potassium chloride, 0.10g potassium bromide and 2.0g calcium sulphate(VI)-2-water. Dilute to 1000ml with water.		
2) 23.42g sodium chloride, 0.729g potassium chloride, 2.22g calcium chloride-6-water, 10.702g magnesium chloride-6-water, 9.0g sodium sulphate(VI)-10-water, 0.21g sodium hydrogencarbonate and 0.07g sodium bromide-2-water made up to 1000ml with water.		
3) Make up four solutions as follows:- 1.4g magnesium chloride to 1000ml water; 9.9g magnesium sulphate(VI)-7-water to 1000ml water; 114.0g sodium chloride to 1000ml water; and 5.7g potassium sulphate(VI) to 1000ml water. Mix together and dilute to 6000ml with water. Aerate for 48 hours and cool in a refrigerator.		
sebacic acid		Used in organic synthesis.
202.25		
sebacoyl chloride		see - DECANEDIOYL CHLORIDE
seed germination agar		see - AGAR, SEED GERMINATION
seed sterilizing		see - MERCURY(II)CHLORIDE
selenium	<i>TOXIC</i>	
78.96		
<i>Keep an exhibition sample only.</i>		
L-serine		an amino acid
105.1		
shellac		Used in varnishes, polishes and sealing wax.
Shellac is a natural resin which produces films from alcoholic and alkaline solutions.		
silica		see - SILICON(IV)OXIDE
silica gel, self-indicating		drying agent
turns from blue (dry) to pink (moist). Can be regenerated by heating overnight in a drying oven or similar.		
silicon fluid		used as a lubricant

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
silicon, metal 28.09 available as fused, lump and powder		
silicon carbide		see - CARBORUNDUM
silicon dioxide		see - SILICON(IV)OXIDE
silicon dioxide		see also - QUARTZ
silicon(IV)oxide 60.1		(silica, silicon dioxide) Used in the preparation of glass, ceramics and abrasives.
silicon tetrachloride	<i>CORROSIVE, water-reactive</i>	Used in the preparation of silicon compounds.
<i>Pressure may build up in stored bottles. Take care when opening (wear eye protection and gloves and use a fume cupboard; cover lid with a cloth before unscrewing). Take care not to allow water or water vapour to enter bottles.</i>		
silver 107.87		
silver nitrate(V) 169.87	<i>CORROSIVE, TOXIC, OXIDIZING</i>	bench solution = 0.1M (0.1N) Used in tests for chlorides, iodides, phosphates and tartrates.
<i>Wear eye protection and gloves. Store in dark bottles</i>		
1 litre 0.01M - 1.7g silver nitrate(V) made up to 1000ml with water		
1 litre 0.02M - 3.4g silver nitrate(V) made up to 1000ml with water		
1 litre 0.05M - 8.5g silver nitrate(V) made up to 1000ml with water		
1 litre 0.1M - 17.0g silver nitrate(V) made up to 1000ml with water		
1 litre 0.2M (<i>IRRITANT</i>) - 34.0g silver nitrate(V) made up to 1000ml with water		
1 litre 0.5M (<i>CORROSIVE</i>) - 84.9g silver nitrate(V) made up to 1000ml with water.		
1 litre saturated solution (<i>CORROSIVE</i>) - 2900g silver nitrate(V) made up to 1000ml with water		
ammoniacal silver nitrate		see - TOLLEN'S REAGENT
slaked lime		see - CALCIUM HYDROXIDE
slate		A metamorphic rock.
A natural form of aluminium silicate.		
soap bubble solution		
1) 4g sodium cis-octadec-9-enoate (sodium oleate) to 200ml water, stirring continuously. Leave to stand overnight and add 75ml propan-1,2,3-triol (glycerol). Leave for a few days. Siphon the clear solution from beneath the froth. Add 1ml 0.880 ammonia (<i>CORROSIVE</i>).		
2) 10ml Teepol made up to 1000ml with water.		
soap solution		
1) <i>HIGHLY FLAMMABLE</i> - take care not to ignite the ethanol while heating. 100g Castile soap to 1000ml 80% ethanol (<i>FLAMMABLE, HARMFUL</i>). Mix well and allow to stand before use.		
2) 10g soap flakes to a mixture of 500ml water with 500ml IMS (<i>FLAMMABLE, HARMFUL</i>). see also - SOAP BUBBLE SOLUTION		
soda lime	<i>CORROSIVE</i>	for absorbing carbon dioxide
<i>Wear eye protection and gloves.</i>		
Calcium hydroxide : sodium hydroxide in the ratio 2:1 by weight.		
sodium, metal 22.99	<i>HIGHLY FLAMMABLE, CORROSIVE, water-reactive</i>	
<i>Wear eye protection and gloves. Use tongs. Store under liquid paraffin.</i>		
sodium acetate		see - SODIUM ETHANOATE
sodium alginate		
Gently warm 3g sodium alginate to 100ml water, stirring continuously until dissolved		
sodium ammonium hydrogen phosphate		see - AMMONIUM SODIUM HYDROGEN PHOSPHATE(V)
sodium benzene carboxylate		see - SODIUM BENZOATE
sodium benzoate 144.11		(sodium benzene carboxylate) Used as an antiseptic and preservative.
Soluble in water.		
sodium bicarbonate		see - SODIUM HYDROGEN CARBONATE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
sodium bisulphate		see - SODIUM HYDROGEN SULPHATE
sodium bisulphite		see - SODIUM HYDROGEN SULPHITE
sodium borate		see - diSODIUM TETRABORATE
sodium bromide 102.90		
sodium carbonate, anhydrous 105.99	<i>IRRITANT</i>	bench solution = 1M (2N)
<i>Wear eye protection.</i>		
1 litre 0.02M - 2.12g sodium carbonate, anhydrous made up to 1000ml with water.		
1 litre 0.5M - 53.0g sodium carbonate, anhydrous made up to 1000ml with water		
1 litre 1M - 106g anhydrous sodium carbonate made up to 1000ml with water.		
sodium carbonate-10-water 286.14	<i>IRRITANT</i> (washing soda)	bench solution = 1M (2N)
1 litre 1M - 286g sodium carbonate-10-water made up to 1000ml with water.		
sodium chlorate		see - SODIUM CHLORATE(V)
sodium chlorate(I) 74.45	<i>CORROSIVE</i>	(bleach, sodium hypochlorite, sodium oxochlorate(I)) Used as a bleach, an oxidizing agent, an antiseptic and a fungicide.
<i>Wear gloves and eye protection. Short shelf life; pressure may build up in old stock bottles.</i>		
10% chlorine (<i>CORROSIVE</i>) - for laboratory bleach - 112g sodium chlorate(I) made up to 1000ml with water		
domestic bleach - 37g sodium chlorate(I) made up to 1000ml with water		
1% chlorine - sterilising solution for microbiological work - 11g sodium chlorate(I) made up to 1000ml with water.		
0.1% chlorine - for sterilising mouthpieces - 1g sodium chlorate(I) made up to 1000ml with water.		
1 litre 0.2M - 14.9g sodium chlorate(I) made up to 1000ml with water		
sodium chlorate(V) 106.44	<i>OXIDIZING, HARMFUL</i> (sodium chlorate)	Used as a mordant and an oxidizing agent.
Soluble in water.		
sodium chloride 58.44		bench solution = 1M (1N)
1 litre 0.02M - 1.17g sodium chloride made up to 1000ml with water.		
1 litre 0.1M - 5.8g sodium chloride made up to 1000ml with water		
1 litre 0.2M - 11.7g sodium chloride made up to 1000ml with water		
1 litre 0.5M - 29.2g sodium chloride made up to 1000ml with water		
1 litre 1M - 58.4g sodium chloride made up to 1000ml with water		
1 litre 2M - 116.9g sodium chloride made up to 1000ml with water		
1 litre saturated solution - 370g sodium chloride to 1000ml HOT water. Store with excess solid.		
sodium chloride, rock salt		for separation experiments
sodium chromate(VI), anhydrous 161.97	<i>OXIDIZING, HARMFUL/TOXIC, CORROSIVE</i>	
sodium chromate(VI)-4-water 234.03	<i>OXIDIZING, HARMFUL/TOXIC, CORROSIVE</i>	
sodium citrate		see - SODIUM 2-HYDROXYPROPANE-1,2,3-TRICARBOXYL.
tri-sodium citrate-2-water		see - SODIUM 2-HYDROXYPROPANE-1,2,3-TRICARBOXYL.
sodium cobaltinitrite		see - SODIUM HEXANITROCOBALTATE(III)
sodium cyanide 53.00	<i>TOXIC - DO NOT STORE</i>	
sodium dichromate(VI)-2-water 298.00	<i>OXIDIZING, HARMFUL/TOXIC, CORROSIVE</i>	
100ml acidified sodium dichromate solution (<i>CORROSIVE</i>) - (<i>wear eye protection and gloves</i>) 25g sodium dichromate to a mixture of 10ml concentrated sulphuric acid (<i>CORROSIVE</i>) with 75ml water.		
sodium dihydrogen orthophosphate		see - SODIUM DIHYDROGEN PHOSPHATE(V)
sodium dihydrogen phosphate(V) 119.98		Used in electroplating and dyeing.
Soluble in water.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
sodium disulphate(IV) <i>HARMFUL</i> 190.1		(sodium metabisulphite, sodium pyrosulphite)
sodium dithionite 174.10	<i>FLAMMABLE, HARMFUL</i>	Used in bleaching and as a reducing agent.
<i>Wear eye protection. Solutions do not store.</i>		(sodium hydrosulphite, sodium sulphinate)
sodium dodecyl sulphate 288.38	<i>HARMFUL</i>	(sodium lauryl sulphate) A detergent used as a solubilizing agent.
sodium lauryl sulphate is a mixture of sodium alkyl sulphates consisting mostly of sodium dodecyl sulphate.		
1 litre 0.001M - 0.29g sodium dodecyl sulphate made up to 1000ml with water. Does not store.		
1 litre 0.004M - 1.15g sodium dodecyl sulphate made up to 1000ml with water. Does not store.		
sodium ethanedioate 134.00	<i>HARMFUL</i>	(sodium oxalate)
1 litre 0.1M - 13.4g sodium ethanedioate made up to 1000ml with water.		
1 litre 0.3M (<i>HARMFUL</i>) - 40.2g sodium ethanedioate made up to 1000ml with water.		
sodium ethanoate, anhydrous 82.03		(sodium acetate) bench solution = 1M (1N)
1 litre 1M - 82.0g sodium ethanoate made up to 1000ml with water		
sodium ethanoate-3-water 136.08		
1 litre 0.1M - 13.6g sodium ethanoate-3-water made up to 1000ml with water		
sodium fluoride 41.99	<i>TOXIC</i>	
sodium formate		see - SODIUM METHANOATE
sodium hexametaphosphate		see - SODIUM HEXATRIOXOPHOSPHATE
sodium hexanitrocobaltate(III) 403.94	<i>OXIDIZING, TOXIC</i>	(sodium cobaltinitrite) bench solution = 0.16M reagent for potassium
1 litre 0.16M - 64g sodium hexanitrocobaltate(III) made up to 1000ml with water		
sodium hexatrioxophosphate		(Calgon, sodium hexametaphosphate) Used to treat hard water.
sodium hydrogen carbonate 84.01		(sodium bicarbonate) bench solution = 1M
1 litre 0.1M - 8.4g sodium hydrogen carbonate (sodium bicarbonate) made up to 1000ml with water.		
1 litre 1M - 84g sodium hydrogen carbonate (sodium bicarbonate) made up to 1000ml with water.		
1 litre saturated solution - 96g sodium hydrogen carbonate in 1000ml hot water. Store with excess solid in the bottle.		
tri-sodium hydrogen carbonate-2-water 226.03		(sodium sesquicarbonate)
di-sodium hydrogen orthophosphate-12-water 358.14		bench solution = 0.167M (0.5N) Used in the preparation of dyes, fertilisers and detergents.
1 litre 0.1M - 35.8g disodium hydrogen phosphate(V)-12-water made up to 1000ml with water.		
1 litre 0.15M - 53.7g disodium hydrogen phosphate(V)-12-water made up to 1000ml with water.		
di-sodium hydrogen orthophosphate-2-water 177.99		used in test for magnesium salts
di-sodium hydrogen phosphate(V)		see - di-SODIUM HYDROGEN ORTHOPHOSPHATE
sodium hydrogen sulphate 120.06	<i>CORROSIVE, water-reactive</i>	(sodium bisulphate)
sodium hydrogen sulphite	<i>HARMFUL</i>	(sodium bisulphite, sodium metabisulphate) for aldehydes and ketones
Pass sulphur dioxide gas through sodium carbonate crystals just covered with water until the solution clears, leaving an apple-green colour.		
sodium hydrosulphite		see - SODIUM DITHIONITE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
sodium hydroxide	CORROSIVE	(caustic soda)
40.00		bench solution = 2M (2N)
<i>Wear eye protection and gloves. Carry out preparations in a fume cupboard.</i>		
Add solid pellets to water a few at a time while stirring.		
<i>Store in bottles with plastic tops. Store 10M sodium hydroxide in a plastic bottle.</i>		
1 litre 0.02M		- 0.80g sodium hydroxide to 1000ml water
1 litre 0.05M (<i>IRRITANT</i>)		- 2g sodium hydroxide to 1000ml water
1 litre 0.1M (<i>IRRITANT</i>)		- 4g sodium hydroxide to 1000ml water
1 litre 0.2M (<i>IRRITANT</i>)		- 8g sodium hydroxide to 1000ml water
1 litre 0.5M (<i>CORROSIVE</i>)		- 20g sodium hydroxide made up to 1000ml with water.
1 litre 1M (<i>CORROSIVE</i>)		- 40g sodium hydroxide made up to 1000ml with water
1 litre 2M (<i>CORROSIVE</i>)		- 80g sodium hydroxide made up to 1000ml with water
1 litre 5M (<i>CORROSIVE</i>)		- 200g sodium hydroxide made up to 1000ml with water
1 litre 6M (<i>CORROSIVE</i>)		- 240g sodium hydroxide made up to 1000ml with water.
1 litre 10M (<i>CORROSIVE</i>)		- 400g sodium hydroxide made up to 1000ml with water
1 litre 30% (<i>CORROSIVE</i>)		- 300g sodium hydroxide made up to 1000ml with water
1 litre 0.1M sodium hydroxide, alcoholic (<i>IRRITANT, FLAMMABLE</i>)		- 4g sodium hydroxide to 1000ml IMS.
sodium 2-hydroxypropane-1,2,3-tricarboxylate		(sodium citrate)
294.10		(<i>tri</i> -sodium citrate-2-water)
sodium hypochlorite		see - SODIUM CHLORATE(I)
sodium iodate		see - SODIUM IODATE(V)
sodium iodate(V)-5-water	OXIDIZING	(sodium iodate)
264		
sodium iodide		
149.9		
100ml solution for Finkelstein reaction - 6g sodium iodide in 100ml propan-2-one (<i>HIGHLY FLAMMABLE</i>).		
sodium lauryl sulphate		see - SODIUM DODECYL SULPHATE
sodium metabisulphate		see - SODIUM HYDROGEN SULPHITE
sodium metabisulphite		see - SODIUM DISULPHATE(IV)
sodium metaperiodate		see - SODIUM IODATE(VII)
sodium methanoate		(sodium formate)
68.01		
sodium nitrate		see - SODIUM NITRATE(V)
sodium nitrate(III)	TOXIC, OXIDIZING	(sodium nitrite)
69.00		
<i>Wear eye protection and gloves.</i>		
1 litre 0.05M		- 3.45g sodium nitrate(III) made up to 1000ml with water.
1 litre 0.1M (<i>HARMFUL</i>)		- 6.9g sodium nitrate(III) made up to 1000ml with water.
1 litre 0.5M (<i>HARMFUL</i>)		- 34.5g sodium nitrate(III) made up to 1000ml with water.
1 litre 1M (<i>HARMFUL</i>)		- 69g sodium nitrate(III) made up to 1000ml with water.
sodium nitrate(V)	OXIDIZING	(nitre, sodium nitrate)
84.99		Used as a fertiliser and an oxidizing agent.
		bench solution = 1M (1N)
1 litre 1M		- 85.0g sodium nitrate(V) made up to 1000ml with water
sodium nitrite		see - SODIUM NITRATE(III)
sodium nitroprusside		see - SODIUM NITROSOPENTACYANOFERRATE(III)
sodium nitrosopentacyanoferrate(III)	VERY TOXIC	
297.95		(sodium nitroprusside, sodium pentacyanonitrosylferrate(II))
100ml reagent for sulphur (1% aqueous solution) - 1g sodium nitrosopentacyanoferrate(III) in 100ml water.		
sodium octadecanoate		(sodium stearate)
306.47		
sodium octadec-9-enoate		(sodium oleate)
304.45		
sodium oleate		see - SODIUM OCTADEC-9-ENOATE
tri-sodium orthophosphate		see - <i>tri</i> -SODIUM PHOSPHATE(V)

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
sodium orthovanadate		see - SODIUM VANADATE(V)
sodium oxalate		see - SODIUM ETHANEDIOATE
sodium oxochlorate(I)		see - SODIUM CHLORATE(I)
sodium pentacyanonitrosylferrate(II)		see - SODIUM NITROSOPENTACYANOFERRATE(III)
sodium perborate-4-water		see - SODIUM PEROXOBORATE
sodium peroxide 78	<i>OXIDIZING, CORROSIVE</i>	Used in bleaching and as a disinfectant.
<i>Wear eye protection and gloves.</i>		
sodium peroxoborate 153.86	<i>OXIDIZING</i> (sodium perborate-4-water)	Used in bleaching and as a disinfectant.
Soluble in water.		
sodium peroxodisulphate(VI) 238.10	<i>OXIDIZING</i> (sodium persulphate)	
sodium persulphate		see - SODIUM PEROXODISULPHATE(VI)
sodium phosphate		see - SODIUM DIHYDROGEN PHOSPHATE,
sodium phosphate		see also - <i>di</i> SODIUM HYDROGEN ORTHOPHOSPHATE
sodium phosphate		see also - <i>tri</i> SODIUM PHOSPHATE(V)
<i>tri</i>-sodium phosphate(V)-12-water 380.13		(<i>tri</i> -sodium orthophosphate) Used in detergents and water softeners. bench solution = 0.167M (0.5N)
1 litre 0.167M - 60g <i>tri</i> -sodium phosphate-12-water made up to 1000ml with water		
sodium polytrioxophosphate		see - SODIUM HEXATRIOXOPHOSPHATE
sodium potassium tartrate		see - POTASSIUM SODIUM TARTRATE-4-water
sodium propionate 96.06		
sodium pyrosulphate		see - SODIUM DISULPHATE(IV)
sodium sesquicarbonate-2-water		see - <i>tri</i> -SODIUM HYDROGEN CARBONATE-2-WATER
sodium silicate 122.06	<i>IRRITANT</i>	
<i>Wear eye protection.</i>		
Soluble in water.		
sodium silicate solution 12% Na ₂ O and 30% SiO ₂		(water glass)
sodium stearate		see - SODIUM OCTADECANOATE
sodium sulphate		see - SODIUM SULPHATE(VI)
sodium sulphate(IV), anhydrous <i>HARMFUL</i> (sodium sulphite)		
142.1		Used as a reducing agent, as a preservative for sodium thiosulphate solutions, and for bleaching.
Soluble in water.		
sodium sulphate(IV)-7-water <i>HARMFUL</i> (sodium sulphite)		
252.15		
1 litre 0.1M sodium sulphite - 25.2g sodium sulphate(IV)-7-water made up to 1000ml with water.		
1 litre 1M sodium sulphite - 252g sodium sulphate(IV)-7-water made up to 1000ml with water.		
sodium sulphate(VI)-10-water		(sodium sulphate, Glauber's salt)
322.19		Used in the preparation of soaps, dyes and detergents. bench solution = 0.1M
1 litre 0.1M sodium sulphate - 32.2g sodium sulphate(VI)-10-water made up to 1000ml with water.		
1 litre 1M sodium sulphate - 322g sodium sulphate (VI)-10-water made up to 1000ml with water		
sodium sulphide-9-water <i>CORROSIVE, HARMFUL</i>		
240.18		Used in the preparation of soaps and dyes. bench solution = 0.25M (0.5N)
1 litre 0.1M - 24g sodium sulphide-9-water made up to 1000ml with water.		
1 litre 0.25M - 60g sodium sulphide-9-water made up to 1000ml with water.		
1 litre 1M - 240g sodium sulphide-9-water made up to 1000ml with water.		
sodium sulphinate		see - SODIUM DITHIONITE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
sodium sulphite		see - SODIUM SULPHATE(IV)
di-sodium tetraborate-10-water 381.36 Soluble in water.		(borax, sodium borate) Used as an antiseptic, as a flux, and in the preparation of glass and ceramics.
sodium thiocyanate 81.07		
sodium thiosulphate(VI)-5-water 248.17		(sodium hyposulphite) Used as a fixer in photography. bench solution = 1M (1N)
1 litre 0.002M - 0.50g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.005M - 1.24g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.01M - 2.48g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.02M - 4.96g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.05M - 12.4g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.1M - 24.8g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.15M - 37.2g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.2M - 49.6g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 0.5M - 124.1g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 1M - 248.2g sodium thiosulphate(VI)-5-water made up to 1000ml with water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre saturated solution - 950g sodium thiosulphate(VI)-5-water to 1000ml HOT water. Add 1g sodium sulphate(IV) (sodium sulphite) to increase the shelf life of the solution.		
1 litre 4% (40 grams per litre) - 40g sodium thiosulphate(VI)-5-water made up to 1000ml with water.		
sodium triorthophosphate		see - <i>tri</i> -SODIUM PHOSPHATE(V)
sodium vanadate(V)	TOXIC	(sodium orthovanadate)
Use ammonium vanadate(V) (ammonium metavanadate) as a cheaper alternative.		
soft wax		see - WAX, SOFT
l(-)-sorbose 180.15		a hexose sugar
Solochrome black		an indicator for Ca and Mg ions. Gives a red colour with Calcium and Magnesium ions in hard water with EDTA.
spermaceti		A wax used in cosmetics. Spermaceti mostly consists of cetyl palmitate (the palmitic ester of hexadecan-1-ol).
spirit duplicating fluid	FLAMMABLE	
squalene		see - 2,6,10,15,19,23-HEXAMETHYL TETRACOSANE
stains		see - METHYLENE BLUE, SUDANIII, etc.
stain removers		
BALLPOINT INK - sponge with IMS (FLAMMABLE).		
WRITING INK - cover stain with 2% potassium manganate(VII). Leave for a few minutes. Remove the potassium manganate(VII) with oxalic acid solution (HARMFUL) and rinse well with water.		
POTASSIUM MANGANATE(VII) - remove stains with acidified 20 vol. hydrogen peroxide (IRRITANT).		
stannic bromide		see - TIN(IV)BROMIDE
stannic chloride		see - TIN(IV)CHLORIDE
stannic iodide		see - TIN(IV)IODIDE
stannic oxide		see - TIN(IV)OXIDE
stannous chloride		see - TIN(II)CHLORIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
stannous sulphate		see - TIN(II)SULPHATE
starch (162.1)		a polysaccharide Used as the substrate for digestion by diastase.
starch agar		see - AGAR, STARCH
starch solution		indicator for iodine and substrate for amylase
Generally a 1% starch solution is used. Two recipes are shown below. Neither stores well:		
1) Mix 2.5g starch to a paste with cool water and dilute to 250ml with boiling water. Cool before use.		
2) Mix 1g starch to a paste with 10ml cool water. Add drop by drop to 90ml boiling water. Continue to boil for 5 minutes. Cool before use.		
starch-iodide paper		turns blue in the presence of chlorine gas
stearic acid		see - OCTADECANOIC ACID
stearyl alcohol		see - OCTADECAN-1-OL
sterilizing solutions		see - SODIUM CHLORATE(I) see also - MERCURY(II)CHLORIDE see also - DISINFECTANTS
stopclock lubricant		Prevent ground glass parts from sticking by using propane-1,2,3-triol (glycerol) as a lubricant.
strontium 87.62		<i>FLAMMABLE, CORROSIVE, water-reactive</i> Strontium has similar chemical properties to calcium.
strontium chloride-6-water 266.62	<i>IRRITANT</i>	bench solution = 0.25M 1 litre 0.25M - 67g strontium chloride-6-water made up to 1000ml with water.
strontium nitrate, anhydrous 211.63	<i>OXIDIZING</i>	
strontium sulphate 183.7		Virtually insoluble in water. 1 litre saturated solution (0.0015M) - 0.28g strontium sulphate made up to 1000ml with water.
styrene		see - PHENYLETHENE
succinaldehyde		see - BUTANEDIAL
succinic acid		see - BUTANEDIOIC ACID
sucrose 342.30		a disaccharide (sugar) SUCROSE SOLUTION (for fermentation) - 150g sucrose made up to 1000ml with water. 1 litre 0.5M - 171g sucrose made up to 1000ml with water.
sudan III		stain for fats <i>wear disposable gloves and eye protection</i> 100ml stain for fats (<i>FLAMMABLE</i>) - dissolve 5g sudan III in a mixture of 50ml 70% ethanol (<i>FLAMMABLE, HARMFUL</i>) and 50ml propanone (acetone, <i>HIGHLY FLAMMABLE</i>) over a warm water bath. Bottle and leave to stand for a few days, shaking occasionally. Filter.
sudan black B		stain for fats <i>wear disposable gloves and eye protection</i> Dissolve 5g Sudan black B in 100ml 70% ethanol (<i>FLAMMABLE, HARMFUL</i>) by refluxing for 20 minutes. Allow to cool before filtering.
sugar		see - SUCROSE
sugar peptone water		(pH 7.4) 10g peptone, 5g sodium chloride, 5g sucrose (sugar) and 20ml universal indicator (<i>FLAMMABLE</i>) made up to 1000ml with water. Autoclave.
sulphamic acid		see - AMINOSULPHONIC ACID
sulphanilic acid		see - 4-AMINOBENZENESULPHONIC ACID
sulphur, flowers 32.06	<i>FLAMMABLE</i>	
sulphur, roll 32.06	<i>FLAMMABLE</i>	
sulphurated lime		see - CALCIUM SULPHIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
sulphur chloride		see - <i>di</i> -SULPHUR DICHLORIDE
sulphur dioxide gas 64.1	TOXIC - DO NOT STORE	(sulphur(IV)oxide gas)
sulphur dioxide, aqueous solution	CORROSIVE	
<i>Wear eye protection and gloves.</i> (sulphurous acid, sulphuric(IV)acid)		
Pass sulphur dioxide slowly through water until a saturated solution is formed. Pass the gas through an upside-down funnel with the rim of the funnel just touching the water surface.		
sulphur dioxide gas preparation		
<i>Wear eye protection and gloves. Work in a fume cupboard.</i>		
Drip 2M sulphuric acid (CORROSIVE) onto sodium sulphate(IV)(sodium sulphite, HARMFUL).		
OR, drip concentrated sulphuric acid (CORROSIVE) onto copper turnings.		
sulphuric acid	CORROSIVE	
98.07 97% w/w = 18.0M		bench solution = 1M
<i>Wear eye protection and gloves. Remember to ADD ACID TO WATER.</i>		
1 litre 0.1M - add 5ml concentrated sulphuric acid to 995ml water		
1 litre 0.5M (IRRITANT) - add 27ml concentrated sulphuric acid to 973ml water		
1 litre 1M (IRRITANT) - add 54ml concentrated sulphuric acid to 946ml water		
1 litre 2M (CORROSIVE) - add 110ml concentrated sulphuric acid to 890ml water		
1 litre 3M (CORROSIVE) - add 162ml concentrated sulphuric acid to 838ml water.		
1 litre 4M (CORROSIVE) - add 216ml concentrated sulphuric acid to 784ml water		
1 litre 5M (CORROSIVE) - add 270ml concentrated sulphuric acid to 730ml water		
1 litre battery acid (CORROSIVE) - add 230ml concentrated sulphuric acid to 770ml water		
1 litre 75% (CORROSIVE) - add 773ml concentrated sulphuric acid to 227ml water.		
fuming sulphuric acid (oleum) is VERY CORROSIVE . Use alternatives.		
sulphuric(IV) acid solution		see - SULPHUR DIOXIDE AQUEOUS SOLUTION
sulphurous acid		see - SULPHUR DIOXIDE AQUEOUS SOLUTION
talc		see - MAGNESIUM SILICATE
tannic acid 1701.23		Used in tanning and as a mordant.
100ml 10% (w/v) - 10g tannic acid to 100ml water.		
tartaric acid		see - 2,3-DIHYDROXYBUTANEDIOIC ACID
teepol		a liquid anionic detergent for lab use
tellurium 127.60	TOXIC - DO NOT STORE	Used in alloys and for colouring glass.
<i>Keep an exhibition sample only.</i>		
terephthalic acid 166.13		(1,4-benzenedicarboxylic acid) Used in the preparation of polyesters.
Virtually insoluble in water and ethanol.		
tetrachloroauric(III) acid 339.79	CORROSIVE	(chloroauric acid)
1,1,2,2-tetrachloroethane 167.85	TOXIC	(acetylene tetrachloride) Used as a solvent.
1,1,2,2-tetrachloroethylene 165.85	HARMFUL	(perchloroethylene) Used as a solvent.
tetrachloromethane 153.8	TOXIC	(carbon tetrachloride)
This chemical is no longer manufactured in bulk because of its adverse effects on the ozone layer. Use alternative solvents wherever possible, e.g. tetrachloroethylene or 1,1,1-trichloroethane.		
tetraethylammonium bromide 210.16		
1,2,3,4-tetrahydrobenzene		see - CYCLOHEXENE
tetrahydrofuran		see - CYCLO-1,4-OXYBUTANE
tetrazolium salt		see - 2,3,5-TRIPHENYLTETRAZOLIUM CHLORIDE

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
thermit reaction starter mixture		
Mix 1.7g barium peroxide (<i>HARMFUL, OXIDIZING</i>) with 0.2g magnesium powder (<i>FLAMMABLE</i>) using a wooden spatula. Place in a desiccator for at least 1 day before use, to ensure the reactants are completely dry.		
thiocarbamide		see - THIOUREA
thioglycollic acid		see - 2-THIOLETHANOIC ACID
thiolacetic acid		see - 2-THIOLETHANOIC ACID
thiourea	<i>TOXIC</i>	(thiocarbamide)
76.12		
<i>Wear eye protection and gloves. Avoid raising dust.</i>		
Slightly soluble in water and ethanol. Used in organic synthesis and as a reagent for Bismuth.		
100ml standard solution - dissolve 10g thiourea (thiocarbamide) in 100ml water.		
L-threonene		an amino acid
119.1		
thymine		a pyrimidine nucleic acid base.
126.12		Used for chromatography.
thymol		see - 2-(2-METHYLETHYL)-5-METHYLPHENOL
thymol blue		(thymol-sulphon-phthalein)
<i>Wear eye protection.</i>		indicator for pH 1.2 - 2.8, colour change red to yellow & indicator for pH 8.0 - 9.6, colour change yellow to violet/blue
Two recipes are shown below for 1 litre indicator solution:		
1) Dissolve 1g thymol blue in 21.5ml 0.1M sodium hydroxide (<i>IRRITANT</i>). Dilute to 1000ml with water.		
2) Dissolve 0.4g thymol blue in 200ml IMS (<i>FLAMMABLE</i>). Add 800ml water.		
tin		
118.69		Used in tin plating, in alloys and with lead in solders.
available as foil, granules and powder		
tin(IV)bromide, anhydrous	<i>CORROSIVE, water-reactive</i>	(stannic bromide)
438.31		
<i>Wear eye protection and use a fume cupboard.</i>		
tin(II)chloride, anhydrous	<i>IRRITANT</i>	(stannous chloride)
189.6		Used as a reducing agent, as a mordant and as a tinning agent
tin(II)chloride-2-water	<i>IRRITANT</i>	(stannous chloride, tin salt)
225.63		bench solution = 0.5M
<i>Wear eye protection.</i>		Used as a mordant when dyeing.
Make up solutions as below, adding a piece of tin to help preserve the solution.		
Alternatively, make up the solutions with 100ml concentrated hydrochloric acid (<i>CORROSIVE</i>) and dilute to 1000ml with water.		
1 litre 0.1M - 22.6g tin(II)chloride-2-water made up to 1000ml with 1M hydrochloric acid. or - 19.0g tin(II)chloride, anhydrous made up to 1000ml with 1M hydrochloric acid.		
1 litre 0.2M - 45.1g tin(II)chloride-2-water made up to 1000ml with 1M hydrochloric acid. or - 37.9g tin(II)chloride, anhydrous made up to 1000ml with 1M hydrochloric acid.		
1 litre 0.5M - 112.8g tin(II)chloride-2-water made up to 1000ml with 1M hydrochloric acid. or - 94.8g tin(II)chloride, anhydrous made up to 1000ml with 1M hydrochloric acid.		
1 litre 1M - 225.6g tin(II)chloride-2-water made up to 1000ml with 1M hydrochloric acid. or - 189.6g tin(II)chloride, anhydrous made up to 1000ml with 1M hydrochloric acid.		
tin(II)chloride, anhydrous	<i>HARMFUL</i>	(stannous chloride)
189.60		see - TIN(II)CHLORIDE-2-WATER for solutions
tin(IV)chloride, anhydrous	<i>CORROSIVE, water-reactive</i>	(stannic chloride)
260.50		Used in the preparation of mordants.
<i>Wear eye protection and use a fume cupboard.</i>		
tin(IV)iodide, anhydrous	<i>CORROSIVE, water-reactive</i>	(stannic iodide)
<i>Wear eye protection and use a fume cupboard.</i>		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
tin(IV)oxide 150.69 <i>Wear eye protection and use a fume cupboard.</i> Virtually insoluble in water.	<i>CORROSIVE</i> , <i>water-reactive</i>	(stannic oxide, tin ash) Used in the manufacture of glass and polishes.
tin(II)sulphate 214.75		(stannous sulphate)
titanium 47.90		A fairly inert metal.
titanium dioxide		see - TITANIUM(IV)OXIDE
titanium(IV)oxide 79.90 Virtually insoluble in water.		(titanium dioxide) A pure white pigment used in paints.
titan yellow 695.75		(clayton yellow)
		indicator for pH 12.0 - 13.0, colour change yellow to red & reagent for magnesium salts
100ml indicator/reagent standard solution - 1g titan yellow made up to 100ml with water.		
Toison's solution		diluent for blood cell counts
Tollen's reagent <i>Wear eye protection and gloves.</i> Precipitate silver oxide from 0.1M silver nitrate solution by adding 1M sodium hydroxide (<i>CORROSIVE</i>). Redissolve in 1M ammonia solution (<i>IRRITANT</i>). Discard within 30 minutes by washing down the sink with lots of water to prevent the formation of <i>EXPLOSIVE</i> silver fulminate.	<i>EXPLOSIVE</i> , <i>CORROSIVE</i>	used in Friedel-Craft's reaction
toluene		see - METHYL BENZENE
o-toluidine		see - 2-METHYLPHENYLAMINE
p-toluidine		see - 4-METHYLPHENYLAMINE
tragacanth mucilage <i>Wear eye protection and gloves. Work in a well-ventilated area.</i> Dissolve 12.5g tragacanth in 25ml 90% ethanol (<i>FLAMMABLE</i> , <i>HARMFUL</i>). Dilute to 1000ml with trichloromethane water (chloroform, <i>TOXIC</i>)		
triacetin 2,4,6-triamino-s-triazine 126.12		see - GLYCEROL TRIACETATE <i>HARMFUL</i> (melamine) Used in polymerisation reactions.
tribromomethane 252.8	<i>TOXIC</i>	(bromoform) Used in organic synthesis, and to separate minerals into "floats" and "sinks".
Tributyryn agar		see - AGAR, TRIBUTYRIN
trichloroacetic acid 1,1,1-trichloroethane 133.41 <i>Wear eye protection and gloves. Use in a well-ventilated area.</i> This chemical is no longer manufactured in bulk because of its adverse effects on the ozone layer.		see - 2,2,2-TRICHLOROETHANOIC ACID <i>HARMFUL</i> (methyl chloroform, trichloroethylene) ORGANICS Used as a solvent, can be used as thinners for correcting fluids.
2,2,2-trichloroethanediol 165.4 <i>Wear eye protection and gloves. Use in a well-ventilated area.</i> 2,2,2-trichloroethanediol standard solution (<i>TOXIC</i> , <i>CORROSIVE</i>) - 50g 2,2,2-trichloroethanediol dissolved in 20ml water. 2,2,2-trichloroethanediol/iodine solution (for testing for starch in delicate plant tissues, e.g. mosses) (<i>TOXIC</i> , <i>CORROSIVE</i>) Dissolve 50g 2,2,2-trichloroethanediol (chloral hydrate) in 20ml 0.2M "iodine in potassium iodide" solution. (see - IODINE for recipe)	<i>TOXIC</i> , <i>CORROSIVE</i>	(chloral hydrate, trichloroethanal hydrate)

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
2,2,2-trichloroethanoic acid 163.39	<i>CORROSIVE</i> (trichloroacetic acid)	
<i>Wear eye protection and gloves. Work in a well-ventilated area.</i>		
25ml solution - 6g trichloroethanoic acid (<i>CORROSIVE</i>) to 25ml trichloromethane (<i>TOXIC</i>). Add 0.5ml 100vol. hydrogen peroxide (<i>CORROSIVE, OXIDIZING</i>). Does not store.		
trichloroethene	<i>HARMFUL</i> - category 3 carcinogen	
<i>Use in a fume cupboard. Use alternatives for degreasing and as solvents if possible.</i>		
Used as an alternative to 1,1,1-trichloroethane, tertachloromethane and trichloromethane.		
ACRYLIC CEMENT FOR PERSPEX - 7g acrylic scrap to 100ml trichlorethene. Leave in a bottle with a screwed on lid for about a week until dissolved.		
trichloroethylene		see - 1,1,1-TRICHLOROETHANE
trichloromethane 119.4	<i>TOXIC</i>	(chloroform) Used as a solvent.
<i>Wherever possible, use dichloromethane instead.</i>		
triethanolamine		see - TRI(2-HYDROXYETHYL)AMINE
triethylamine	<i>FLAMMABLE, IRRITANT</i>	
1,2,3-trihydroxybenzene		see - BENZENE-1,2,3-TRIOLE
1,3,5-trihydroxybenzene		see - BENZENE-1,3,5-TRIOLE
tri(2-hydroxyethyl)amine 149.19	<i>CORROSIVE</i> (triethanolamine)	Used as a solvent and as a stabiliser.
tri-iodomethane		see - TRIODOMETHANE
trimethylamine 59.11	<i>HIGHLY FLAMMABLE, IRRITANT</i>	Used in organic synthesis and in the preparation of dyes.
2,2,4-trimethylpentane 114.23	<i>HIGHLY FLAMMABLE</i> (iso-octane)	Used in defining octane numbers.
2,4,6-trinitrophenol 229.11	<i>TOXIC, CORROSIVE, (EXPLOSIVE when dry)</i>	(picric acid)
<i>Wear eye protection and gloves. Keep damp.</i>		
Slightly soluble in water.		
100ml 1% - 1g 2,4,6-trinitrophenol to 100ml water or 70% ethanol (<i>FLAMMABLE</i>).		
triiodomethane 393.8	<i>TOXIC</i>	(iodoform, tri-iodomethane) Used in tests for methyl groups and as an antiseptic.
2,3,5-triphenyltetrazolium chloride 334.81		<i>HARMFUL</i> (tetrazolium salt)
tris		see - 2-AMINO-2-(HYDROXYMETHYL)PROPANE-1,3-DIOL
trisodium phosphate		see - tri-SODIUM ORTHOPHOSPHATE
trypsin	<i>IRRITANT</i>	an enzyme which breaks down proteins into amino acids
<i>Wear gloves and eye protection when preparing solutions</i>		
L-tryptophan 204.2		an amino acid
L-tyrosine 181.2		an amino acid
turpentine	<i>FLAMMABLE, HARMFUL</i>	
<i>Wear eye protection and gloves. Use in a well-ventilated area away from sources of ignition.</i>		
Mostly consists of alpha-pinene (136.24)		
Used in reactions with chlorine and as a solvent.		
universal indicator	<i>FLAMMABLE</i>	indicator for pH 1 - 14, various colours.
You can make and use Yamada's indicator as a substitute over the pH range pH 4 to pH 10, see recipe.		
uracil 112.09		a ribonucleic acid base.
urea		see - CARBONYL DIAMIDE
L-valine 117.1		an amino acid
vanadium, metal 50.941		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
vanadium(V)oxide	<i>OXIDIZING, TOXIC</i> (vanadium pentoxide)	Used as a catalyst in the "contact process" for making sulphuric acid.
vanadium pentoxide		see - VANADIUM(V)OXIDE
Van Gieson's stain		
<i>Wear gloves and eye protection.</i>		
A mixture of 5ml 1% acid fuchsin (see - FUCHSIN, ACID) and 100ml saturated aqueous picric acid (2,4,6-trinitrophenol, <i>TOXIC, CORROSIVE</i>).		
variamine blue		Used as a dye.
<i>Wear gloves and eye protection.</i>		
(4-amino-4'-methoxydiphenylamine hydrochloride)		
100ml dye solution - 1.0g variamine blue to 100ml water		
vaseline		see - PETROLEUM JELLY
vegetable black paint		
Mix vegetable black with IMS (<i>FLAMMABLE</i>) until a very sticky mixture is obtained.		
vinyl acetate		see - ETHENYL ETHANOATE
vinyl alcohol, polymerised		see - POLYETHENOL
visking tubing		(dialysis tubing)
Visking tubing is made from cellulose. It should be wetted with water before use.		
vitamin C		see - L(-) ASCORBIC ACID
washing soda		see - SODIUM CARBONATE
water glass		see - SODIUM SILICATE SOLUTION
water, hard		
Mix 500ml saturated calcium sulphate solution with 500ml water.		
wax, bee's		see - BEE'S WAX
wax, carnauba		see - CARNAUBA WAX
wax, soft		for sealing coverslips
Mix equal amounts by weight of liquid paraffin and white soft petroleum jelly.		
Weigert's differentiator		a biological slide fixative
Dissolve 2g disodium tetraborate-10-water and 2.5g potassium hexacyanoferrate(II)-3-water (<i>HARMFUL</i>) in 200ml water.		
Weigert's stain		stain for elastic tissue
<i>Wear eye protection. Wear gloves when handling solid resorcin fuchsin.</i>		
Dissolve 1.25g resorcin fuchsin in a mixture of 2ml concentrated hydrochloric acid (<i>CORROSIVE</i>) with 100ml IMS (<i>FLAMMABLE, HARMFUL</i>) by gently warming in a water bath in a fume cupboard.		
white spirit		<i>FLAMMABLE</i> (a petroleum distillate)
		Used as a substitute for turpentine.
Woods metal		
melting point is 71°C		
Wood's metal is an alloy consisting of 50% bismuth, 25% lead, 12.5% tin and 12.5% cadmium.		
Wright's blood stain		
m-xylene		see - 1,3-DIMETHYLBENZENE
o-xylene		see - 1,2-DIMETHYLBENZENE
p-xylene		see - 1,4-DIMETHYLBENZENE
xylenol orange		(test for mercury, lead and zinc ions)
672.68		colour change yellow to red/purple
100ml solution - dissolve 0.1g xylenol orange in 50ml IMS (<i>FLAMMABLE, HARMFUL</i>). Add 50ml water.		
or - shake 0.1g xylenol orange vigorously with 100ml water until dissolved..		
Yamada's indicator		(substitute for universal indicator over pH 4 to 10)
<i>Wear eye protection. Wear gloves when handling the solid indicators.</i>		
2 litres - Dissolve 0.05g thymol blue, 0.12g methyl red, 1g phenolphthalein and 0.5g bromothymol blue in 1000ml IMS (<i>FLAMMABLE, HARMFUL</i>). Add 0.05M sodium hydroxide (<i>IRRITANT</i>) drop by drop until a green colour is seen. Dilute to 2000ml with water.		
colour change: pH4 (red), pH5 (orange), pH6 (yellow), pH7 (green), pH8 (blue), pH9 (indigo), pH10 (violet)		
yeast extract powder		For use in bacteriological media.
Water-soluble.		

Chemical Recipes Book

Chemical name and recipes	Hazard	Additional information
zinc, metal 65.38	<i>FLAMMABLE</i>	Strips are used as electrodes in Daniell cells and dry batteries.
Zinc is available as dust, powder, granules, foil and sheet. Dust, filings and powder are <i>FLAMMABLE</i> .		
zinc blende		see - ZINC SULPHIDE
zinc bromide 225.19	<i>CORROSIVE, water-reactive</i>	
<i>Avoid raising dust.</i> 1 litre 1M - 225g zinc bromide made up to 1000ml with water.		
zinc carbonate 125.4		
<i>Avoid raising dust.</i>		
zinc chloride solution made from zinc oxide	<i>IRRITANT</i>	
<i>Wear eye protection.</i> (anhydrous zinc chloride is <i>CORROSIVE</i>) 1 litre 0.05M - dissolve 4.069g zinc oxide in a few mls 1M hydrochloric acid (just enough to dissolve the solid). Dilute to 1000ml with water.		
zinc nitrate(V)-6-water 297.47	<i>OXIDIZING</i>	bench solution = 0.25M (0.5N)
<i>Avoid raising dust.</i> 1 litre 0.1M - 29.7g zinc nitrate(V)-6-water made up to 1000ml with water. 1 litre 0.2M - 59.5g zinc nitrate(V)-6-water made up to 1000ml with water. 1 litre 0.25M - 74.4g zinc nitrate(V)-6-water made up to 1000ml with water		
zinc oxide 81.38		A white powder used as a pigment and in cosmetics.
<i>Avoid raising dust.</i>		
zinc stearate		
<i>Avoid raising dust.</i>		
zinc sulphate(VI)-7-water 287.54	<i>IRRITANT</i> (white vitriol)	bench solution = 0.25M
<i>Avoid raising dust.</i> Used as a mordant and in zinc plating. 1 litre 0.1M - 28.8g zinc sulphate(VI)-7-water made up to 1000ml with water 1 litre 0.2M - 57.5g zinc sulphate(VI)-7-water made up to 1000ml with water 1 litre 0.25M - 71.9g zinc sulphate(VI)-7-water made up to 1000ml with water 1 litre 0.5M - 143.8g zinc sulphate(VI)-7-water made up to 1000ml with water 1 litre 1M (<i>IRRITANT</i>) - 287.5g zinc sulphate(VI)-7-water made up to 1000ml with water		
zinc sulphide 97.44	<i>HARMFUL</i>	Used as a pigment.
<i>Avoid raising dust.</i> Insoluble in water Zinc blende (sphalerite) is the naturally occurring common sulphide of zinc.		