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| Chemical Demonstrations |
| Dry Ice in Indicator Solution |

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This reaction can be applied to curriculum for excellence.

*By contributing to experiments and investigations, I can develop my understanding of models of matter and can apply this to changes of state and the energy involved as they occur in nature.* SCN 3-05a

*Having taken part in practical activities to compare the properties of acids and bases, I have demonstrated ways of measuring and adjusting pH and can describe the significance of pH in everyday life.* SCN 3-18a

**N4 –** Chemical changes and structure

*Acids and alkalis*

**Introduction**

Dry ice is solid carbon dioxide.

When dropped into warm water, it sublimes (It does this in air anyway) rapidly and produces ‘clouds’ of CO2 and water vapour that sinks due to CO2 being denser than air.

If you put universal indicator in the water, you can see it changing colour as the CO2 dissolvesin the water to produce carbonic acid, a very weak acid.

**You will need**

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| Dry ice | Large flask |
| Warm water | Universal indicator |

**What you Do**

1. Fill the flask about ¾ full with warm water (from the tap).
2. Add some universal indicator solution, enough to give a good colour.
3. Drop a few pieces of dry ice into the flask
4. Watch as the vapour pours out and the indicator changes color,

**Safety**

Dry ice is extremely cold and can cause burns. Handle with gloves or tongs.

**What is happening?**

Dry ice sublimes rapidly due to the warmth of the water.

CO2 dissolves in the water to give carbonic acid.

CO2 + H2O 🡸🡺 H2CO3 🡸🡺 H+ + HCO3-

The production of carbonic acid in turn changes the colour of the universal indicator.

**Notes**

Dry ice can be purchased easily, though not inexpensively. It may be may be possible to obtain some from a nearby university: in this case it might be easier to co-ordinate with the physics department if they are carrying out the cloud chamber activity.

Dry ice can also be made in small quantities using a ‘snowpack’ adaptor for a CO2 cylinder. These cost about £100.

You can demonstrate density and fire-extinguishing by placing the flask in a circle of tea-lights which will go out as the CO2 cascades down the sides of the flask.

**It is the responsibility of teachers doing this demonstration to carry out an appropriate risk assessment.**