

The density of a liquid is calculated by dividing the mass of the liquid by its volume. Sugar has a higher density than water and ethanol. By making up standard solutions of sugar (in an ethanol/water mixture) and determining the density of these solutions, the % sugar in a sample of an alcopop can be determined.

Below is one method for determining the % sugar in an alcopop.

**A. Preparation of standard sugar solutions**

As the density of alcoholic drinks is different from water, you need to prepare a standard ethanol solution which gives you the same % ethanol as the drink you are studying. For example, if the drink you are studying contains 7% alcohol, you should prepare a solution which contains 7% ethanol:

1. **Preparing 500 cm3 7% ethanol:**

Transfer 35cm3 of ethanol into a 500cm3 flask and make up to the mark using deionised water.

1. **Preparing standard sugar solutions and determining their density**

You should prepare a set of standard solutions which cover the range of sugar concentrations the alcopop is likely to have. For example, many alcopops have a sugar concentration of 7g per 100ml of drink (7%). It would be reasonable to prepare the following standards: 4%, 5%, 6%, 7%, 8%, 9% and 10%.

Here is a simple method for preparing a 4% sugar solution.

1. Accurately measure 2g of sucrose and dissolve in a beaker containing about 25cm3 of the ethanol solution that you prepared in step A
2. Transfer this to a 50cm3 standard flask and make up to the mark with ethanol solution.
3. Using a pipette, measure 25 cm3 of the sugar solution and measure its mass.
4. Calculate the density of the solution = mass of solution ÷ volume
5. Repeat this to prepare all of the % sucrose solutions and use the results to plot a graph of density versus % sucrose.
6. **Determining the % sucrose of the alcopop**
7. C:\Documents and Settings\esoc\Local Settings\Temporary Internet Files\Content.IE5\K3T6CJFS\MC900023737[1].wmfUsing a pipette, measure 25 cm3 of the alcopop and measure its mass.
8. Calculate the density of the solution = mass of solution ÷ volume
9. Use your graph to calculate the % sucrose of the alcopop.

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**Tips**

***Acuracy***

*You need to make your measurements* ***as carefully as possible.***

*An error in weighing of 0.01g will give a difference in sugar content of 0.1%*

*The volume needs even more care. Use a dropper to add the final few cm3 of water so that the meniscus* ***just*** *touches the line and is the same every time. 1 drop of water has a mass of about 0.02g so will have an effect of about 0.2% on your final sugar content.*

*These errors may sound small but you are working in the main between a range of 5 – 10% for alcopops. So in proportion these can be significant errors.*

***Fizz***

*It is impossible to pipette a liquid accurately if it is fizzing. To de-gas a sample. Put it in a flask and stir or shake. (Or shake it in a bottle releasing the pressure by undoing the cap from time to time).*