

Investigating the analysis of wine

Background

Wine is a complex mixture of chemicals. It contains water, ethanol, metal ions, organic acids, sugars, tannins, antioxidants, and bactericides. The taste and quality of the wine is determined by the chemical composition. This investigation involves analysis of the various components.

Practical Techniques

You need to find out how to make up accurate solutions. You may need to find out about volumetric analysis (titrations), using a colorimeter, distillation, and using a pH meter.

Where to start

This investigation is based on an article in Chemistry Review by Derek Denby in January 1998.

The suggested components suitable for analysis are

- Wine acidity
- Alcohol content
- Sulphur dioxide content

There are several techniques involved in each aspect and you may only get the time to focus on one aspect of the analysis. It may be better to do this otherwise you may substitute quantity of work for quality of work.

There are two other excellent sources of information for this investigation - Chemistry in the Marketplace by Ben Selinger and the Royal Society of Chemistry Starter projects. These sources also include details about how to analyse for tannin content.

Possible investigations

- You may like to analyse for a particular component and compare the amounts between different types of wine (e.g. red and white, different grapes, different countries, week old opened wine and freshly opened wine etc).
- You could investigate the accuracy of a particular technique – Derek Denby gives suggestions in his article.

Sources of Information

- Denby D., What's in Wine, *Chemistry Review*, January 1998.
- Robertson K.J.A., Gray C., Wood, C.A. (2001) *Starter Investigations for Advanced Higher Chemistry*, Royal Society of Chemistry
- Selinger B., (1998), *Chemistry in the Marketplace*, Harcourt, Brace, Jovanovich, London
- Thorpe A., Making a standard solution, *Chemistry Review*, November 2002
- Ferguson M., Volumetric Analysis, *Chemistry Review*, September 1996
- The Chemistry Video Consortium and The Royal Society of Chemistry (2000) *Practical Chemistry for Schools and Colleges* CD ROM
- Haddard P.R., Sterns M., Wardlaw J., (1978) Analysis of Wine - An Undergraduate Project, *Education in Chemistry*, Vol 15, 87
- Fowles G.W.A., (1978) Sulphur dioxide and Tannin, *Education in Chemistry*, Vol 15, 89
- Battye P., Titrations, *Chemistry Review*, February 2003
- Thorpe A., Colorimetry, *Chemistry Review*, February 2003
- Thorpe A., Assessing the risks in practical work, *Chemistry Review*, September 2000
- Thorpe A., Experimental error and error analysis: just how good are those results, *Chemistry Review*, November 2001

Teachers' Notes

General

Fuller details of the experimental procedures have not been given as the three sources discussed are excellent and give all the information that students should need to carry out an investigation.

It is important to realise that students will probably not be able to carry out all the analytical techniques. They should be strongly encouraged to focus on a particular aspect.

Chemical Principles

Alcohols, organic acids, analytical techniques, quantitative chemistry

Essential Equipment

Burettes, pipettes, pH meter, colorimeter

Essential Chemicals

Sodium hydroxide, phenolphthalein, potassium dichromate (VI), ammonium iron (II) sulphate, silver nitrate, sulphuric acid, iodine, activated charcoal.

Safety

No risk assessment has been given. It is essential that students prepare a detailed risk assessment before they start. Teachers should check all plans and must be satisfied that this is suitable for the proposed investigation.