

## Ethanol as a solvent

## MATERIALS

At selection by student

## Introduction

Ethanol is widely used as a solvent for many consumer products, as well as in the chemical industry.

In this activity you will investigate why this is the case. You will plan an investigation, choose your materials and equipment, and perform a practical investigation to obtain information about the classes of substances for which ethanol is good solvent.

On completion of this investigation, you will be able to:

- select a range of compounds to be tested that will give you the best results in gathering useful information
- recognise the chemical properties of ethanol that make it a good solvent
- identify the general classes of substances that readily dissolve in ethanol
- relate the molecular structure of a substance to its solubility in ethanol.



## Syllabus

Plan, choose equipment for and perform a first-hand investigation to gather information about the range of substances that can be dissolved by ethanol.

## Procedure

- 1 Plan an investigation to test a wide range of different substances (elements and compounds) for their solubility in ethanol, in order to gather enough information to draw a valid conclusion.
- 2 Before you start, select a range of substances you would like to test. Complete a risk assessment for the investigation and fill in the pre-lab safety information for each dangerous or hazardous substance used.
- 3 Collate all observations in a results table.
- 4 Prepare a written scientific report that includes answers to the Discussion and Follow-up questions.

## Discussion

- 1 Write the structural formula of ethanol showing all bonds. Explain if the molecule is polar or non-polar, by referring to the bonds in the molecule.
- 2 a List the liquid substances that readily dissolved in ethanol.  
b Explain, in terms of molecular structure and bonding, what these substances have in common.
- 3 c Explain, in terms of intermolecular bonding, what these substances have in common with ethanol.
- 4 a List the solid substances that dissolved in ethanol.  
b In terms of their bonding and structure, did they show any similarity?

- 5 Iodine has non-polar molecules. Explain why it dissolves better in ethanol than water.

- 6 a List the substances that did not dissolve in ethanol.  
b What do these substances have in common?
- 7 Some solutes dissolved to form a clear solution, but some seemed to produce new products as indicated by a colour change. From your observations of the solubility of a variety of solutes in ethanol, give one example of a solute that dissolves to form a clear solution and one example where new products were formed. Explain the mechanism of dissolving.

## FOLLOW-UP

- 1 Name at least three commercial products that contain ethanol as a solvent.
- 2 Write chemical equations and name the starting materials for two different industrial productions of ethanol in Australia.
- 3 Name two commercial uses for ethanol (other than as a solvent).
- 4 Write a chemical equation and mention a catalyst for the production of ethene from ethanol.

## INVESTIGATION 22: Ethanol as a solvent

Access Material Safety Data Sheets (MSDS) for the chemicals to be used and complete the safety table.

## Pre-lab safety information

Material used

Hazard

Control

Please indicate by signing that you have understood the information in the safety table.

Name (print): \_\_\_\_\_

I understand the safety information (signature): \_\_\_\_\_

## Disposal of waste

All liquid solutes that dissolve in ethanol can be washed down the sink. Collect insoluble organic matter in a fume cupboard in a beaker containing cat litter or perlite. Leave the collected organic matter to evaporate overnight. Wrap the perlite in plastic or paper and dispose of it in the garbage.