

## Oxidation of ethanol to ethanoic acid

### Aims

To oxidise ethanol to ethanoic acid.



### Apparatus

Goggles  
Bench mat  
Test tubes  
Test tube rack

Quickfit apparatus  
250cm<sup>3</sup> beaker  
Teat pipettes  
Bunsen burner

2 x retort stand, boss and clamp  
Tripod and gauze mat  
Digital top pan balance  
Broken porcelain pieces

### Reagents

Ethanol  

Sodium dichromate(VI)  


1M sulphuric acid 

2M sodium hydroxide solution 

1M ammonia solution 

0.5M sodium carbonate solution

Silver nitrate solution 

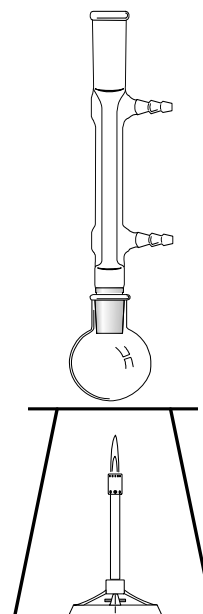
Fehling's solutions 1 and 2 

Universal Indicator solution

### Methods

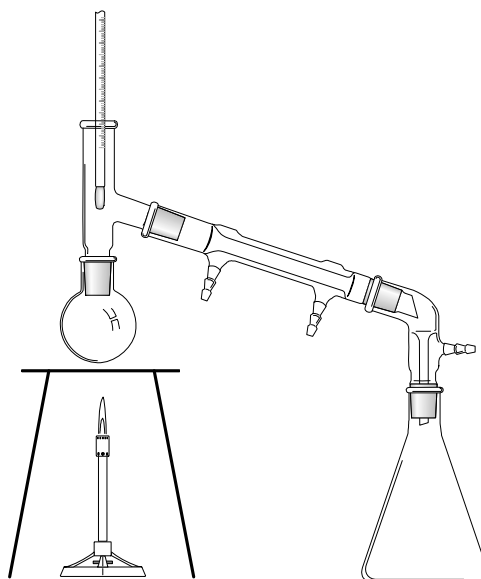
#### Part One Oxidation of ethanol to ethanoic acid

- Place about 10cm<sup>3</sup> of dilute sulphuric acid into the pear-shaped Quickfit flask. Add 2–3g of sodium dichromate(VI) and a few pieces of broken porcelain. Swirl the contents of the flask until the solution is complete (warm if necessary).
- Cool the mixture under a running tap. Set up the Quickfit apparatus for refluxing.
- Add 1cm<sup>3</sup> of ethanol **dropwise** down the condenser and into the flask.
- Boil under reflux for 20 minutes.
- Rearrange the apparatus for distillation and distil 2–3 cm<sup>3</sup> of liquid.



#### Part Two Tests on your product

- Notice the smell of your product. Compare it with that of ethanol.
- Add a few drops to some solid sodium carbonate.
- Add a drop to moistened universal indicator paper.



### Analysis

Explain your observations. Include equations in your explanations where appropriate.

## Oxidation of ethanol to ethanal

### Technician's Notes

In addition to normal laboratory apparatus:

#### Per class

Minimum of one digital top pan balance  
Small pieces of broken porcelain (or anti-bumping granules)

#### Reagents:

Sodium dichromate(VI) with a small spatula  
Ethanol (allow 4cm<sup>3</sup> per student)  
Fehling's solutions 1 and 2 (allow 2cm<sup>3</sup> of each per student)  
Sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>)

Please ensure plentiful supply of:

- bench sulphuric acid
- bench sodium hydroxide solution
- ammonia solution
- silver nitrate solution
- Universal Indicator solution

#### Per student

2 x boiling tubes  
4 x test tubes  
2 x teat pipettes  
1 x wash bottle of de-ionised water  
1 x 10cm<sup>3</sup> measuring cylinder  
Delivery tube and bung to fit one of the boiling tubes:

