



# FINDING THE CONCENTRATION OF ETHANOIC ACID IN VINEGAR



Aim Vinegar contains ethanoic acid,  $\text{CH}_3\text{COOH}$ . You are going to find the concentration of ethanoic acid in malt vinegar from a local supermarket.

Safety

	sodium hydroxide ethanoic acid
--	-----------------------------------

- Method
- 1) Pipette  $25 \text{ cm}^3$  of the malt vinegar into a  $250 \text{ cm}^3$  volumetric flask and make it up to  $250 \text{ cm}^3$ .
  - 2) Titrate  $25 \text{ cm}^3$  portions of this solution against the sodium hydroxide until concordant results are achieved. Use phenolphthalein as indicator. Phenolphthalein is colourless in acid and purple in alkali. Tabulate your results clearly.

- Analysis
- 3) Write an equation for the reaction between ethanoic acid ( $\text{CH}_3\text{COOH}$ ) and sodium hydroxide.  
.....
  - 4) Use your results to find the concentration of ethanoic acid in the malt vinegar in  $\text{mol dm}^{-3}$ .  
.....  
.....  
.....  
.....  
.....  
.....
  - 5) Use your results to find the concentration of ethanoic acid in the malt vinegar in  $\text{g dm}^{-3}$ .  
.....  
.....

6) Calculate the maximum percentage apparatus error in the final result. Standard errors in apparatus are as follows:

volumetric flask	$\pm 0.1 \text{ cm}^3$
25 cm <sup>3</sup> pipette	$\pm 0.1 \text{ cm}^3$
burette (start & end readings and end point )	$\pm 0.15 \text{ cm}^3$

.....

.....

.....

.....

.....

Evaluation

7) Comment on the reliability of your method. ....

.....

.....

8) Write down the mean class value for the concentration of the ethanoic acid in mol dm<sup>-3</sup> (we shall assume that the class mean is the correct value).

.....

9) Find the percentage difference between your value and the class mean value.

.....

.....

10) Comment on the accuracy of your result. ....

.....

11) The manufacturer states that the concentration of the ethanoic acid in the vinegar is 60.2 g dm<sup>-3</sup>. Is the manufacturer's figure accurate?

.....

.....

12) If you overfilled the original pipette when taking 25 cm<sup>3</sup> of malt vinegar out of the bottle, explain how it would have affected your final value of the concentration of the ethanoic acid.

.....

.....

.....

13) If you had not overfilled the volumetric flask when preparing the stock solution, explain how it would have affected your final value of the concentration of the ethanoic acid.

.....

.....

.....