

**AS Level Chemistry A)**  
**H032/01 Breadth in chemistry**

**Question Set 11**

1. Ethanoic acid,  $\text{CH}_3\text{COOH}$ , is the main dissolved acid in vinegar.

(a) Ethanoic acid is a weak acid.

What is meant by *acid* and *weak acid*?

[1]

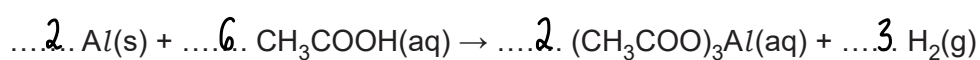
1. a) *acid*: proton donor

*weak acid*: an acid that only partially dissociates into ions in solution

(b) Aluminum is reacted with ethanoic acid.

(i) The unbalanced equation for the reaction is shown below.

Balance the equation.

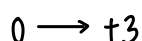


[1]

(ii) This reaction is a redox reaction.

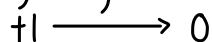
Deduce which element has been oxidised and which element has been reduced, and state the changes in oxidation number.

b)ii) aluminium has been oxidised



[2]

hydrogen has been reduced



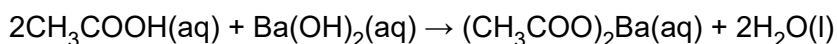
(c) A student plans to determine the concentration, in  $\text{mol dm}^{-3}$ , of  $\text{CH}_3\text{COOH}$  in a bottle of vinegar. The student will carry out a titration with aqueous barium hydroxide,  $\text{Ba(OH)}_2\text{(aq)}$ .

The student's method is outlined below.

- Dilute  $10.0 \text{ cm}^3$  of vinegar from the bottle with distilled water and make the solution up to  $250.0 \text{ cm}^3$ .
- Add the diluted vinegar to the burette.
- Titrate  $25.0 \text{ cm}^3$  volumes of  $0.0450 \text{ mol dm}^{-3}$   $\text{Ba(OH)}_2$  with the diluted vinegar.

The mean titre of the diluted vinegar is  $25.45 \text{ cm}^3$ .

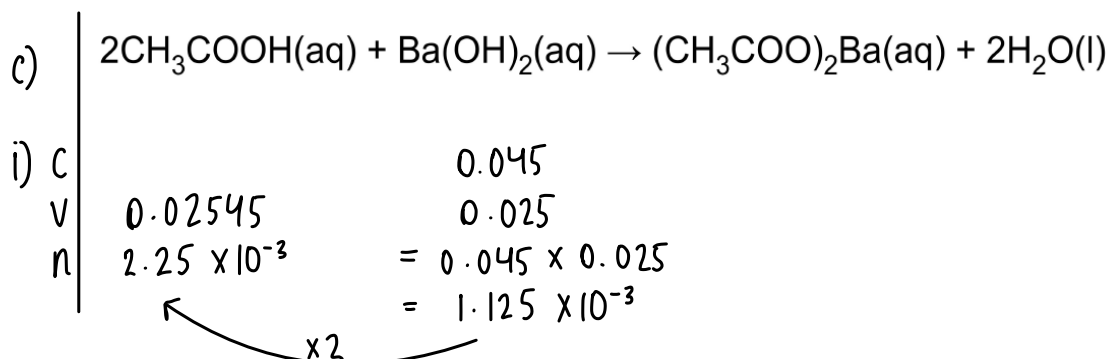
The reaction in the student's titration is shown below.



- (i) Calculate the concentration, in mol dm<sup>-3</sup>, of CH<sub>3</sub>COOH in the original bottle of vinegar.

Show your working.

[4]



$$[\text{CH}_3\text{COOH}] = \frac{2.25 \times 10^{-3}}{0.02545} = 0.0884086$$

$$= \underline{\underline{0.0884 \text{ mol dm}^{-3}}}$$

- (ii) Suggest **one** assumption that the student has made that might mean that their calculated concentration of ethanoic acid in the vinegar is invalid.

Predict, with a reason, how the experimental result would differ from the actual concentration of CH<sub>3</sub>COOH if the assumption were **not** correct.

[2]

- ii) an assumption is that the vinegar contains no other acids  
 → experimental result would be smaller than the calculated result if not true.

**Total Marks for Question Set 11: 10**



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