

AS Level Chemistry A)
H032/01 Breadth in chemistry

Question Set 11

1. Ethanoic acid, CH_3COOH , is the main dissolved acid in vinegar.
- (a) Ethanoic acid is a weak acid.
What is meant by *acid* and *weak acid*? [1]
- (b) Aluminum is reacted with ethanoic acid.
(i) The unbalanced equation for the reaction is shown below.
Balance the equation.

$$\dots\dots \text{Al}(\text{s}) + \dots\dots \text{CH}_3\text{COOH}(\text{aq}) \rightarrow \dots\dots (\text{CH}_3\text{COO})_3\text{Al}(\text{aq}) + \dots\dots \text{H}_2(\text{g})$$
 [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. [2]
- (c) A student plans to determine the concentration, in mol dm^{-3} , of CH_3COOH in a bottle of vinegar. The student will carry out a titration with aqueous barium hydroxide, $\text{Ba}(\text{OH})_2(\text{aq})$.
The student's method is outlined below.
- Dilute 10.0 cm^3 of vinegar from the bottle with distilled water and make the solution up to 250.0 cm^3 .
 - Add the diluted vinegar to the burette.
 - Titrate 25.0 cm^3 volumes of $0.0450 \text{ mol dm}^{-3}$ $\text{Ba}(\text{OH})_2$ with the diluted vinegar.
- The mean titre of the diluted vinegar is 25.45 cm^3 .
The reaction in the student's titration is shown below.

$$2\text{CH}_3\text{COOH}(\text{aq}) + \text{Ba}(\text{OH})_2(\text{aq}) \rightarrow (\text{CH}_3\text{COO})_2\text{Ba}(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$$
- (i) Calculate the concentration, in mol dm^{-3} , of CH_3COOH in the original bottle of vinegar.
Show your working. [4]
- (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_3COOH if the assumption were **not** correct. [2]

Total Marks for Question Set 11: 10

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