

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Q1.

Compound **L** ($M_r = 88.0$) contains carbon, hydrogen and oxygen only.

A 6.56×10^{-4} mol sample of **L** burns completely in air to form 2.62×10^{-3} mol of water and 2.62×10^{-3} mol of carbon dioxide.

Deduce the formula of **L**.

Show your working.

Formula of **L** _____
(Total 4 marks)

Q2.

The concentration of dilute hydrochloric acid can be found by titration using a standard solution of barium hydroxide.

- (a) Calculate the mass, in g, of solid barium hydroxide ($M_r = 171.3$) needed to prepare 250 cm^3 of $0.100 \text{ mol dm}^{-3}$ barium hydroxide solution.

Mass _____ g

(1)

- (b) The mass of barium hydroxide from part (a) is dissolved in a beaker containing 150 cm^3 of distilled water.

Describe how this solution is used to make 250 cm^3 of the $0.100 \text{ mol dm}^{-3}$ barium hydroxide solution.

(3)

- (c) Before the first titration, the 25 cm^3 pipette is rinsed with a small volume of the $0.100 \text{ mol dm}^{-3}$ barium hydroxide solution.

State why it is good practice to rinse the pipette in this way.

(1)

- (d) Hydrochloric acid is added to the burette using a funnel.

State why it is good practice to remove the funnel from the burette before the titration.

(1)

- (e) In a different experiment, 0.952 g of solid barium hydroxide is used to make 250 cm³ of standard barium hydroxide solution.

25.0 cm³ of this barium hydroxide solution reacts with exactly
24.50 cm³ of hydrochloric acid.

Calculate the concentration of the hydrochloric acid.

Concentration _____ mol dm⁻³

(3)

- (f) The uncertainty in the 25.0 cm³ of solution from the pipette is ± 0.05 cm³

The total uncertainty in the 24.50 cm³ of solution from the burette is ± 0.15 cm³

Calculate the total percentage error in using the pipette and burette.

Percentage error _____

(1)

(Total 10 marks)

Q3.

A gas syringe that does not have any graduations is calibrated using a known mass of propanone (boiling point = 56.2 °C).

The sealed gas syringe contains 0.146 g of propanone ($M_r = 58.0$) at a temperature of 95 °C and a pressure of 103 kPa

- (a) Calculate the volume, in cm^3 , of propanone in the gas syringe.

The gas constant, $R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$

Volume of propanone _____ cm^3

(4)

- (b) The gas syringe is then cooled to 75 °C, without changing the pressure.

Calculate the decrease in volume.

(If you were unable to calculate the volume in part (a), you should use the volume 89 cm^3 . This is not the correct answer.)

Decrease in volume _____ cm^3

(2)

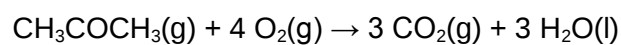
- (c) The total uncertainty in using the balance to measure the mass of propanone in part (a) is $\pm 0.001 \text{ g}$

Calculate the uncertainty that this causes in the volume, in cm^3 , of propanone calculated in part (a).

(If you were unable to calculate the volume in part (a), you should use the volume 89 cm^3 . This is not the correct answer.)

Uncertainty _____ cm³ (2)

- (d) A 600 cm³ sample of propanone is mixed with 2800 cm³ of oxygen in a container at 60 °C and 100 kPa. The mixture is ignited.
When the reaction is complete, the remaining mixture of gases is cooled to 60 °C at 100 kPa



Calculate the total volume of the remaining gas mixture.

Volume _____ cm³ (2)
(Total 10 marks)