Amount of substance – 2021/20 GCE AS Chemistry A

1. Nov/2021/Paper_H032/01/No.5

   Which gas sample has the greatest mass at RTP?

   A 50 cm^3 of Ar(g)

   B 100 cm^3 of O_2(g)

   C 150 cm^3 of N_2(g)

   D 200 cm^3 of Ne(g)

   Your answer ☐   **[1]**

2. Nov/2021/Paper_H032/01/No.6

   A student mixes 250.0 cm^3 of 0.100 mol dm^{-3} KOH with 750.0 cm^3 of 0.100 mol dm^{-3} Ca(OH)$_2$.
   What is the OH$^-$ concentration, in mol dm^{-3}, in the resulting mixture?

   A 0.0250

   B 0.100

   C 0.150

   D 0.175

   Your answer ☐   **[1]**

3. Nov/2021/Paper_H032/01/No.25(b)

(b) A gas cylinder has a gas volume of $9.39\,dm^3$.
The gas cylinder holds 1.69 kg of a gas at a pressure of $1.37 \times 10^7\,Pa$ at 20 °C.

Determine the molar mass and possible identity of the gas.

molar mass = ... $g\,mol^{-1}$

identity of gas = ...

[5]

2

4. Nov/2020/Paper_H032/01/No.8

The unbalanced equation for the reaction of copper with concentrated nitric acid is shown below.

.........Cu + ...HNO$_3$ → ....Cu(NO$_3$)$_2$ + ...NO$_2$ + ...H$_2$O

What is the number of moles of HNO$_3$ that react with 1 mole of Cu?

A   2

B   3

C   4

D   6

Your answer ☐   [1]

5. Nov/2020/Paper_H032/01/No.9

$2.0\,dm^3$ of Cl_2 gas reacts with $2.0\,dm^3$ of ClF_3 gas to form $6.0\,dm^3$ of a gaseous compound. The reaction has 100% atom economy and all volumes are measured at the same temperature and pressure.

What is the molecular formula of the compound formed?

A ClF

B Cl_2F_3

C Cl_3F_2

D Cl_3F_3

Your answer ☐   [1]

6. Nov/2020/Paper_H032/01/No.10
Which sample contains the greatest number of molecules?

A   1g of methanol, CH_3OH

B   2g of nitrogen dioxide, NO_2

C   3g of phosphorus, P_4

D   4g of iodine, I_2

Your answer ☐   [1]

7. Nov/2020/Paper_H032/01/No.22(c)

(c) Bromine reacts with fluorine to form compound **A**.

Compound **A** is a liquid at room temperature and pressure but can easily be vaporised.

When vaporised, 0.428 g of **A** produces 76.0 cm^3 of gas at 1.00×10^5 Pa and 100 °C.

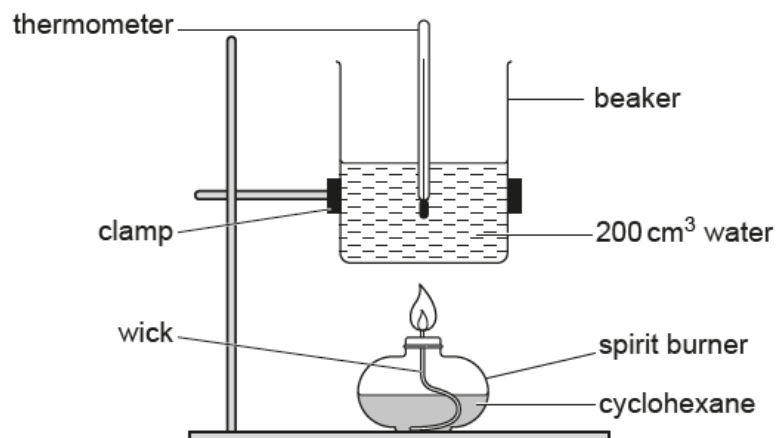Determine the molar mass and molecular formula of compound **A**.

molar mass of **A** = ... g mol^{-1}

molecular formula of **A** = ...

[5]

8. Nov/2020/Paper_H032/02/No.1(b)

(b) A student carries out an experiment to determine the enthalpy change of combustion of cyclohexane, C_6H_{12}, using the apparatus shown in the diagram.

In the experiment, 0.525 g of cyclohexane are burnt, and the temperature of the 200 cm³ of water changes from 21.0 °C to 41.0 °C.

Calculate the enthalpy change of combustion, Δ_cH, of cyclohexane in kJ mol⁻¹.

Give your answer to **3** significant figures.

$\Delta_cH =$ .... kJ mol⁻¹ **[4]**