1.2 Reacting Masses & Volumes
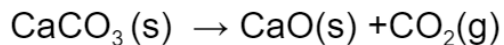
Question Paper

Course	DP IB Chemistry
Section	1. Stoichiometric Relationships
Topic	1.2 Reacting Masses & Volumes
Difficulty	Easy

Time allowed: 20

Score: /10

Percentage: /100

Question 1

When calcium carbonate is heated it decomposes according to the following equation

$$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$$

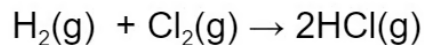If 6.00g of calcium carbonate is heated and produces 2.73g of calcium oxide, what is the percentage yield of calcium oxide? (M_r $CaCO_3$ = 100; CaO = 56)

A $\dfrac{56 \times 6.00 \times 100}{2.73}$

B $\dfrac{2.73 \times 100 \times 100}{56 \times 6.00}$

C $\dfrac{56 \times 6.00 \times 100}{2.73 \times 100}$

D $\dfrac{2.73 \times 100}{56 \times 6.00}$

[1 mark]

Question 2

Hydrogen and chlorine react according to the following equation

$$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$$

When 1.5 moles of chlorine reacts with 2.0 moles of hydrogen, what will be the result?

A   3.5 mol of HCl

B   1.5 mol of HCl and 0.5 mol of H_2

C   2.0 mol of HCl and 0.5 mol of Cl_2

D   3.0 mol of HCl and 0.5 mol of H_2

[1 mark]

Question 3

25.0 cm^3 of hydrochloric acid solutions reacts with 36.2 cm^3 of 0.225 mol dm^{-3} sodium hydroxide solution. The concentration of the acid is

A $\dfrac{36.2 \times 0.225}{25.0}$

B $\dfrac{25.0 \times 0.225}{36.2}$

C $\dfrac{25.0 \times 0.225}{1000 \times 36.2}$

D $\dfrac{36.2 \times 0.225}{1000 \times 25.0}$

[1 mark]

Question 4

Which amount of the following substances contains the smallest quantity of ions?

A   2 mol of KOH

B   1 mol of NH$_4$Br

C   2 mol of MgCl$_2$

D   1 mol of Fe$_2$O$_3$

[1 mark]

Question 5

A solution of sodium chloride is made by adding 300 cm^3 of water to a flask containing 200 cm^3 of 0.5 mol dm^{-3} sodium chloride. What is the concentration of the resulting solution?

    A   0.05 mol dm^{-3}

    B   0.1 mol dm^{-3}

    C   0.2 mol dm^{-3}

    D   0.3 mol dm^{-3}
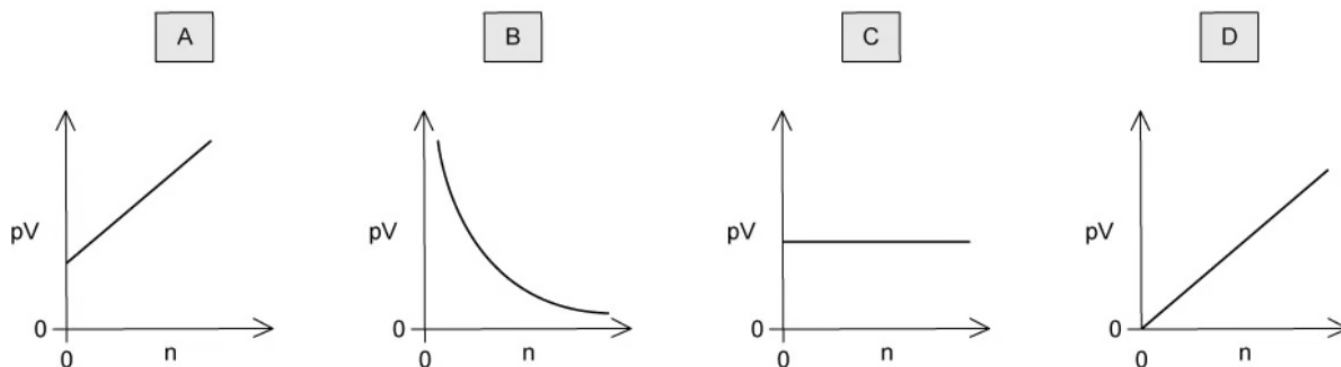
[1 mark]

Question 6

What is the number of molecules in 500 cm^3 of oxygen under standard conditions?

    A $6.02 \times 10^{23} \times 0.5$

    B $6.02 \times 10^{23} \times 500$

    C $\dfrac{22.7}{0.5} \times 6.02 \times 10^{23}$

    D $\dfrac{0.5}{22.7} \times 6.02 \times 10^{23}$

[1 mark]

Question 7

For an ideal gas at constant pressure and temperature, which diagram shows the correct graph of pV against n?

[1 mark]

Question 8

The M_r value of a gas can be calculated from the ideal gas equation.

Which expression will give the value of M_r for a sample of a gas of mass m in grams?

A $M_r = \dfrac{mRT}{pV}$ **B** $M_r = \dfrac{pV\,RT}{m}$ **C** $M_r = \dfrac{mpV}{RT}$ **D** $M_r = \dfrac{pV}{mRT}$

[1 mark]

Question 9

Which of the following least resembles an ideal gas at room temperature?

A   helium

B   ammonia

C   carbon dioxide

D   hydrogen

<div align="right">[1 mark]</div>

Question 10

The ideal gas equation below summarises the gas laws.

$$pV = nRT$$

Which statement below is correct?

A   there exist intermolecular forces of attraction between gas molecules

B   ideal gas molecules will collide inelastically upon impact with each other

C   one mole of an ideal gas occupies the same volume under the same conditions of temperature and pressure

D   the volume of a given mass of an ideal gas is doubled if its temperature is raised from 25 °C to 50 °C

<div align="right">[1 mark]</div>