1. **Mole:** the amount of any substance that contains 6.02 x 10^{23} particles

NOTE: concentration in g/dm3 = mass of that many number of moles/dm3
Eg. Calculate the concentration of 0.0400 mol/dm3 NaOH in g/dm3
0.04 x 40 = 1.6g/dm3

2.

The Haber process is a reversible reaction.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

The reaction has a 30% yield of ammonia.

Which volume of ammonia gas, NH_3, measured at room temperature and pressure, is obtained by reacting 0.75 moles of hydrogen with excess nitrogen?

A 3600 cm^3 **B** 5400 cm^3 **C** 12 000 cm^3 **D** 18 000 cm^3

Answer: A

NOTE: In calculations, explicitly show that Mr = (calculated value). Do not directly add up relative atomic masses.

3. **Fluorine reacts with sulphur to form a compound which has 25.2% sulphur by mass and a relative molecular mass of 254. Determine the molecular formula of this compound.**

Method 1
M1 S 25.2 / 32 **or** 0.78/0.79 …
and
F 74.8 / 19 **or** 3.93 / 3.94…

M2 ÷ both by 0.7875 = 1 : 5 **or** SF_5

M3 (254 ÷ 127 = 2 and) S_2F_{10}

Method 2
M1 254 × 25.2/100 **and** 254 × 74.8 / 100 **OR** '64' **and** '190'

M2 64 / 32 **and** 190 / 19

M3 (2 and 10) to give S_2F_{10}

4. **Naturally occurring atoms of silver are ^{107}Ag and ^{109}Ag. A sample of silver has a relative atomic mass of 108.0. Deduce the percentage of ^{107}Ag present in this sample.**
50%

5.

Complete the equation for the decomposition of hydrated iron(II) sulfate.

$$.....FeSO_4 \cdot 7H_2O \rightarrow Fe_2O_3 + SO_2 + SO_3 + ...H_2O$$

Answer:

2FeSO4 * 7H2O; 14H2O

6.

Complete the equation for the decomposition of hydrated zinc nitrate.

$$2Zn(NO_3)_2 \cdot 6H_2O \rightarrow .....ZnO + ...NO_2 + O_2 + ...H_2O$$

Answer:

2ZnO; 4NO2; 12H2O