Calculations Exam-Style Questions

Mass, moles and Mr

1. Calculate the number of moles in 29g of $Mg(OH)_2$ (Ar values – Mg = 24, O = 16, H = 1)

2. Calculate the mass of 0.4 moles of NaCl (Ar values – Na = 23, Cl = 35.5)

3. 0.5 moles of an element has a mass of 12g. What is the element?

Reacting masses

4. Calculate the maximum mass of NaCl that could be produced from 10.00g of $TiCl_4$ (Ar values – Na = 23, Ti = 48, Cl = 35.5)

   $TiCl_4$ + 4Na → Ti + 4NaCl

Percentage yield

5. The scientist actually made 9.62g. Calculate the percentage yield.

Empirical formula

6. Calculate the empirical formula of a substance that contains 5.85g K, 2.10g N and 4.80g O. (Ar values – K = 39, N = 14, O = 16)

Water of crystallisation

7. 1.302g of mercury nitrate, $Hg(NO_3)_2.xH_2O$, was heated to constant mass to remove the water of crystallisation. 1.172g remained. Calculate the value of x. (Ar values – Hg = 201, N = 14, O = 16)

Using experimental data

8. 1.24g of phosphorus was burned completely in oxygen to give 2.84g of phosphorus oxide. Calculate the empirical formula of phosphorus oxide. (Ar values – P = 31, 16 = 16)

Concentration calculations

9. Calculate the concentration of a solution containing 12g of NaOH in 250cm^3 of water. Give your answer to 2 decimal places. (Ar values – Na = 23, O = 16, H = 1)

Gas volume calculations

10. 0.24g of magnesium reacted in excess sulfuric acid. Calculate the volume of hydrogen formed from the reaction at r.t.p.
(Ar values – Mg = 24, H = 1)