**ANSWERS: Mole calculations**

Set your answers out clearly during these calculations.

Molar mass values: use your periodic table to find the molar mass of elements (round to nearest whole or .5)

1. Cu(s) + 2AgNO3(aq) → Cu(NO3)2(aq) + 2Ag(s)

0.294g

*What mass of Cu should be added to silver nitrate solution to precipitate exactly 1.00 g of silver?*

1. C3H8(g)+ 7O2(g) → 3CO2(g) + 4H2O(g)

1636g or 1640g

*What mass of water is produced by burning 1.00 kg of propane (C3H8)?*

1. **5.29g** of aluminium is completely oxidised to form **10.0g** of aluminium oxide. From these measurements verify that the empirical formula of aluminium oxide is **Al2O3.**

0.1959 mol/0.1959 = 1

0.294 mol/0.1858 = 1.5

Therefore Al2O3

n(O) = m/M

= 10-5.29g/16gmol-1

=0.294 mol

n(Al) = m/M

= 5.29g/27gmol-1

=0.1959 mol

1. A hydrocarbon contains **92.3%** carbon and **7.7%** hydrogen by mass.

Its molar mass is **78 g mol-1**. Determine both its empirical formula and its molecular formula.

EF = CH

MF = C6H6

1. A sample of an organic compound is analysed and found to contain exactly **2.40g** carbon, **0.40g** hydrogen and **3.20g** oxygen. Its molar mass is **60 g mol-1**. Determine both its empirical and molecular formulae.

EF = CH2O

MF = C2H4O2

1. Calculate the percentage (by mass) of the underlined element present in each of the compounds listed below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Formula** | **(gmol-1)** | **Calculation of percentage by mass** |
| (a) | CH3CH2**O**H |  | 16/46 x 100/1 = 34.8% |
| (b) | Ca**C**O3 |  | 12/100 x 100/1 = 12.0% |
| (c) | Al**P**O4 |  | 31/122 x 100/1 = 25.4% |
| (d) | Mg(**N**O3)2 |  | 28/148 x 100/1 = 18.9% |

1. **3.00g** of magnesium is burnt in a controlled way in oxygen and produces exactly **5.00g** of magnesium oxide. From these measurements verify that the empirical formula of magnesium oxide is **MgO.**