Preparing for A Level Chemistry – Induction Activity

There are many concepts that are taught in A Level Chemistry that are extensions / developments from GCSE. To help bridge the gap, it is important to understand some key concepts.

There are fundamental Maths and processing skills you need. For each task, please read / watch the linked document, followed by answering the questions.

You need to bring this document with you for the first lesson in September for it to be submitted and marked.

Standard form https://www.youtube.com/watch?v=H3ewmorcYjU

1 Change the following values to standard form.
a boiling point of sodium chloride: 1413 °C
b largest nanoparticles: 0.0 001×10^{-3} m
c number of atoms in 1 mol of water: 1806×10^{21}

2 Change the following values to ordinary numbers.
a 5.5×10^{-6} **b** 2.9×10^{2} **c** 1.115×10^{4} **d** 1.412×10^{-3} **e** 7.2×10^{1}

Significant figures and decimal places https://www.youtube.com/watch?v=gtwyWKnnm_I

3 Give the following values in the stated number of significant figures (s.f.).
a 36.937 (3 s.f.) **b** 258 (2 s.f.) **c** 0.043 19 (2 s.f.) **d** 7 999 032 (1 s.f.)

4 Use the equation:
number of molecules = number of moles × 6.02 × 10^{23} molecules per mole
to calculate the number of molecules in 0.5 moles of oxygen. Write your answer in standard form to 3 s.f.

5 Give the following values in the stated number of decimal places (d.p.).
a 4.763 (1 d.p.) **b** 0.543 (2 d.p.) **c** 1.005 (2 d.p.) **d** 1.9996 (3 d.p.)

Converting units https://www.youtube.com/watch?v=R00HJXPtEGE

6 Calculate the following unit conversions.
a 300 μm to m
b 5 MJ to mJ
c 10 GW to kW

Balancing an equation https://www.youtube.com/watch?v=qMYo61jBPU8

1 Balance the following equations.
a $C + O_2 \rightarrow CO$
b $N_2 + H_2 \rightarrow NH_3$
c $C_2H_4 + O_2 \rightarrow H_2O + CO_2$

2 Balance the equations below.
a $C_6H_{14} + O_2 \rightarrow CO_2 + H_2O$
b $NH_2CH_2COOH + O_2 \rightarrow CO_2 + H_2O + N_2$

3 Balance the equations below.
a $Mg(OH)_2 + HNO_3 \rightarrow Mg(NO_3)_2 + H_2O$
b $Fe(NO_3)_2 + Na_3PO_4 \rightarrow Fe_3(PO_4)_2 + NaNO_3$

Rearranging equations https://www.youtube.com/watch?v=WboGuFHD3to

4 Rearrange the equation $c = \frac{n}{V}$ to make:

a n the subject of the equation

b V the subject of the equation.

5 Rearrange the equation $PV = nRT$ to make:

a n the subject of the equation

b T the subject of the equation.

Calculating concentration https://www.youtube.com/watch?v=x4QxYDyHst0

6 Calculate the concentration, in mol dm^{-3}, of a solution formed when 0.2 moles of a solute is dissolved in 50 cm^3 of solution.

7 Calculate the concentration, in mol dm^{-3}, of a solution formed when 0.05 moles of a solute is dissolved in 2.0 dm^3 of solution.

8 Calculate the number of moles of NaOH in an aqueous solution of 36 cm^3 of 0.1 mol dm^{-3}.

Calculating masses and gas volumes https://www.youtube.com/watch?v=cUbW_gAk7AY

9 In a reaction, 0.486 g of magnesium was added to oxygen to produce magnesium oxide.

$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$

a Calculate the amount, in moles, of magnesium that reacted.

b Calculate the amount, in moles, of magnesium oxide made.

c Calculate the mass, in grams, of magnesium oxide made.

10 Oscar heated 4.25 g of sodium nitrate. The equation for the decomposition of sodium nitrate is:

$2NaNO_3(s) \rightarrow 2NaNO_2(s) + O_2(g)$

a Calculate the amount, in moles, of sodium nitrate that reacted.

b Calculate the amount, in moles, of oxygen made.

11 0.500 kg of magnesium carbonate decomposes on heating to form magnesium oxide and carbon dioxide. Give your answers to 3 significant figures.

$MgCO_3(s) \rightarrow MgO(s) + CO_2(g)$

a Calculate the amount, in moles, of magnesium carbonate used.

b Calculate the amount, in moles, of carbon dioxide produced.

Calculating percentage yield https://www.youtube.com/watch?v=jtAj0s203CI

12 Calculate the percentage yield of a reaction with a theoretical yield of 4.75 moles of product and an actual yield of 3.19 moles of product. Give your answer to 3 significant figures.

13 Calculate the percentage yield of a reaction with a theoretical yield of 12.00 moles of product and an actual yield of 6.25 moles of product. Give your answer to 3 significant figures.