**Back to Basics**

**Please complete the following questions and bring them to your first Chemistry lesson in September**

**Atomic Number, Mass Number and Isotopes**

Complete the following passages and the table:

**Atomic number**= number of …………………..

**Mass number**= number of ………………….. + number of …………………….

The number of protons, neutrons and electrons in an atom can be worked out using the atomic number and mass number.

Number of protons = ……………………………………………………………………..………………

Number of neutrons = ……………………………………………………………………………………

Number of electrons = ……………………………………………………………………………………

Atoms of the same element have the same number of ………….......... . In fact, it is the number of ………………… that determines what type of atom it is (e.g. all atoms with 6 protons are carbon atoms). Atoms of different elements have different numbers of …………………. . **Isotopes** are atoms with the same number of ………………. but a different number of ………………… . This means they are atoms of the same …………………….. with the same ………………. number but a different ……………… number.



**Structure and Bonding**

Key ideas from structure and bonding at GCSE will be revised and developed in term 1. Make sure you are confident with concepts from GCSE.

Make a summary of the different types of bonding and structure in the table below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Monatomic | Simple Molecular | Giant Covalent | Ionic | Metallic |
| Type of substancesAnd examples | Group 0 elements e.g. He, Ar, Ne |  |  |  |  |
| Type of bonding present | None |  |  |  |  |
| Description of structure | Individual atoms with very weak forces between them |  |  |  |  |
| LabelledDiagram to represent the structure |  |  |  |  |  |
| Name of particles | Atoms |  |  |  |  |
| Properties | Very low Boiling pointsNon-conductorsInsoluble |  |  |  |  |

Draw dot and cross diagrams to represent the covalent bonding in the following molecules:

1. CH4
2. NH3
3. HCl
4. O2
5. CO2
6. Draw diagrams to show how a magnesium atom reacts with an oxygen atom to form magnesium oxide, MgO Your diagram should show the electron transfer process.
7. Draw diagrams to show how a calcium atom reacts with chlorine atoms to form magnesium oxide, CaCl2. Your diagram should show the electron transfer process.

**Balancing Equations**

Balance the following equations:



**Essential Maths skills for A Level chemistry**

**Significant figures**

A significant figure is any digit which you are confident is correct. A non-significant figure is any digit that you can’t be sure about. It’s important to recognise how many significant figures a value has been quoted to and how to round your own data to an appropriate number of significant figures.

Remember:

· Count the number of significant figures from the first non-zero digit.

· Zeros at the start of a number are not significant.

So: 187.23 is given to 5 s.f.

0.038 is given to 2 s.f.

448 000 is given to 3 s.f.

· The rule for significant figures in calculations is to give your final answer to the same number of significant figures as the data value with the fewest significant figures used in the calculation.

1. How many significant figures are each of these values given to?

a) 221 985 Pa ……………………………………………..

b) 15 200 g ……………………………………………..

c) 39.00 K ………………………………………………

d) 0.00186 mol …………………………………………..

2. Write each of the following to the number of significant figures shown:

a) 345789 4 sig figs ………………………… d) 6.0961 3 sig figs …………………………...

b) 297300 3 sig figs ……………………….. e) 0.001563 3 sig figs ……………………….

c) 0.07896 3 sig figs ………………… ……. f) 0.010398 4 sig figs …………………. ……

3. Complete the following sums and give the answers to the appropriate number of significant figures.

a) 6125 x 384 ………………………………………………………………………………………………...

b) 25.00 x 0.01 0 …………………………………………………………………………………………..

c) 13.5 + 0.18 ………………………………………………………………………………………………

4. 0.175 moles of sodium chloride were dissolved in 1.2 dm3 of water.

Use the formula concentration (mol dm-3) = moles/volume (dm3) to calculate the concentration of the solution, and quote your answer to the correct number of significant figures.

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**Standard form**

Standard form tidies up very big or very small numbers in calculations.

For example, there are 602 000 000 000 000 000 000 000 particles in 1 mole. This is much easier to write as 6.02 x 1023

Or 0.0051 m3 is easier to write as 5.1 x 10-3 m3

Write the following in standard form:

1. 0.000 035 mol.dm-3 ………………………………………………………………………….

2. 201500 Pa ………………………………………………………………………….

3. 0.0167 moles ……………………………………………………………………….…

4. 6850000000 dm3 ………………………………………………………………………….

5. 0.000000382 g ………………………………………………………………………….

Complete the following calculations and give the answers to the appropriate number of significant figures.

a) 6.125 x 10-3 x 3.5 ……………………………………………………………………………………...

b) 4.3 x 10-4 / 7.00 ………………………………………………………………………………………..

c) 4.0 x 108 + 35000 ……………….........................................................................

d) 0.00156 + 2.4 x 103 …………………………………………………………. …………………….

e) 6.10 x 10-2 – 3.4 x 10-5 …………………………………………………………………………..

f) 8.00 x 10-3 x 0.100 x 10-3 ……………………………………………………………………….

**Converting units**

Convert the following units :

1. 10 kg into g ………………………………………….

2. 360 mg into g …………………………………………

3. 360 cm into m ………………………………………….

4. 360 cm3 into m3 ………………………………………..

5. 250 cm3 into dm3 ………………………………………….

6. 2 dm3 into mm3 …………………………………………

7. 42357 g into mg …………………………………………

8. 4.1 kJ mol-1 to J mol-1 …………………………………………….

9. During a titration, 31 cm3 of an alkali is needed to neutralise 0.025 dm3 of an acid. What is the total volume of the acid and alkali in cm3? ………………………………………………

10. What is the total mass, in grams, of 137 mg, 4g and 32kg? …………………………………………………………………………………………………………………………

**Using Formulae**

Formulae are used often in chemistry, as they give a relationship between two or more quantities. It is an essential skill that you need to be able to rearrange formulae, substitute values, converting to the correct units if needs be.

You should be familiar with these formulae:

Number of moles = mass of substance (in g)

Relative molecular mass, Mr

Concentration (mol dm-3) = number of moles / Volume of solution (dm3)

You should always show your working and always give the correct units with your answer.

Show your working for each of these calculations.

1. The Mr of CO2 is 44. Calculate the number of moles in 125g of CO2

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2. 5.0 moles of CaCl2 is dissolved in 750 cm3 of water. What is the concentration in mol.dm-3?

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3. 2.0 g of NaOH were dissolved in 250 cm3 of water in a flask.

a) How many moles of NaOH are in this solution?

b) What is the concentration of the solution in mol.dm-3?

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