

Using the periodic table

During A-level Chemistry you will need to become familiar with the periodic table of the elements and be able to use information from the table to answer questions.

Here is a copy of the periodic table that you will be given to use in your exams.

The Periodic Table of the Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	0																											
(1) 6.9 Li lithium 3	(2) 9.0 Be beryllium 4	(3) 45.0 Sc scandium 21	(4) 47.9 Ti titanium 22	(5) 50.9 V vanadium 23	(6) 52.0 Cr chromium 24	(7) 54.9 Mn manganese 25	(8) 55.8 Fe iron 26	(9) 58.9 Co cobalt 27	(10) 58.7 Ni nickel 28	(11) 63.5 Cu copper 29	(12) 65.4 Zn zinc 30	(13) 10.8 B boron 5	(14) 12.0 C carbon 6	(15) 14.0 N nitrogen 7	(16) 16.0 O oxygen 8	(17) 19.0 F fluorine 9	(18) 4.0 He helium 2	0																											
23.0 Na sodium 11	24.3 Mg magnesium 12	39.1 K potassium 19	87.6 Sr strontium 38	92.9 Nb niobium 41	96.0 Mo molybdenum 42	[97] Tc technetium 43	101.1 Ru ruthenium 44	102.9 Rh rhodium 45	106.4 Pd palladium 46	107.9 Ag silver 47	112.4 Cd cadmium 48	27.0 Al aluminium 13	28.1 Si silicon 14	31.0 P phosphorus 15	32.1 S sulphur 16	35.5 Cl chlorine 17	39.9 Ar argon 18	0																											
85.5 Rb rubidium 37	87.6 Sr strontium 38	88.9 Y yttrium 39	91.2 Zr zirconium 40	92.9 Nb niobium 41	96.0 Mo molybdenum 42	101.1 Ru ruthenium 44	102.9 Rh rhodium 45	106.4 Pd palladium 46	107.9 Ag silver 47	112.4 Cd cadmium 48	114.8 In indium 49	118.7 Sn tin 50	121.8 Sb antimony 51	126.9 I iodine 53	127.6 Te tellurium 52	126.9 I iodine 53	131.3 Xe xenon 54	0																											
132.9 Cs caesium 55	137.3 Ba barium 56	138.9 La * lanthanum 57	178.5 Hf hafnium 72	180.9 Ta tantalum 73	183.8 W tungsten 74	186.2 Re rhenium 75	190.2 Os osmium 76	192.2 Ir iridium 77	195.1 Pt platinum 78	197.0 Au gold 79	200.6 Hg mercury 80	204.4 Tl thallium 81	207.2 Pb lead 82	209.0 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86	0																											
[223] Fr francium 87	[226] Ra radium 88	[227] Ac † actinium 89	[267] Rf rutherfordium 104	[270] Db dubnium 105	[269] Sg seaborgium 106	[270] Bh bohrium 107	[270] Hs hassium 108	[278] Mt meitnerium 109	[281] Ds darmstadtium 110	[281] Rg roentgenium 111	[285] Cn copernicium 112	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[294] Ts tennessine 117	[294] Og oganeson 118	0																											
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† 90 – 103 Actinides																																													
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Activity 2 Atoms

1. Give the atomic number of:
 - a. Osmium
 - b. Lead
 - c. Sodium
 - d. Chlorine
2. Give the relative atomic mass (A_r) of:
 - a. Helium
 - b. Francium
 - c. Barium
 - d. Oxygen
3. What is the number of neutrons in each of the following elements?
 - a. Fluorine
 - b. Beryllium
 - c. Gold

Activity 3 Formulae of common compounds

Give the formulae of the following compounds:

1. Methane
2. Sulfuric acid
3. Potassium manganate (VII)
4. Water
5. Ammonia
6. Nitric acid
7. Ethane
8. Ethene
9. Ethanol
10. Phosphoric acid

Activity 4 Ions and ionic compounds

The table below lists the formulae of some common ions.

Positive ions		Negative ions	
Name	Formula	Name	Formula
Aluminium	Al^{3+}	Bromide	Br^-
Ammonium	NH_4^+	Carbonate	CO_3^{2-}
Barium	Ba^{2+}	Chloride	Cl^-
Calcium	Ca^{2+}	Fluoride	F^-
Copper(II)	Cu^{2+}	Iodide	I^-
Hydrogen	H^+	Hydroxide	OH^-
Iron(II)	Fe^{2+}	Nitrate	NO_3^-
Iron(III)	Fe^{3+}	Oxide	O^{2-}
Lead	Pb^{2+}	Sulfate	SO_4^{2-}
Lithium	Li^+	Sulfide	S^{2-}
Magnesium	Mg^{2+}		
Potassium	K^+		
Silver	Ag^+		
Sodium	Na^+		
Zinc	Zn^{2+}		

Use the table to write the formulae for the following ionic compounds.

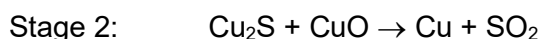
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|-----------------------|-----------------------|
| 1. Magnesium bromide | 6. Aluminium bromide |
| 2. Barium oxide | 7. Calcium nitrate |
| 3. Zinc chloride | 8. Iron (II) sulfate |
| 4. Ammonium chloride | 9. Iron (III) sulfate |
| 5. Ammonium carbonate | |

Activity 5 Balancing equations

- Write balanced symbol equations for the following reactions, using the information on the previous pages to work out the formulae of the compounds. Remember some of the elements may be diatomic molecules.
 - Aluminium + oxygen \rightarrow aluminium oxide
 - Methane + oxygen \rightarrow carbon dioxide + water
 - Calcium carbonate + hydrochloric acid \rightarrow calcium chloride + water + carbon dioxide
- Chalcopyrite is an important copper ore mineral with formula CuFeS_2 . Copper can be produced from rock that contains CuFeS_2 in two stages.

Balance the equations for the two stages in this process.

Hint: remember that fractions can be used to balance equations.



- Balance the following equations:
 - $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
 - $\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_3$
 - $\text{HgO} \rightarrow \text{Hg} + \text{O}_2$
 - $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
 - $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
 - $\text{C}_{10}\text{H}_{16} + \text{Cl}_2 \rightarrow \text{C} + \text{HCl}$
 - $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$
 - $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - $\text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$
 - $\text{Al} + \text{FeO} \rightarrow \text{Al}_2\text{O}_3 + \text{Fe}$

Activity 6 Moles

The amount of a substance is measured in moles. The mass of one mole of a substance in grams is numerically equal to the relative formula mass of the substance. One mole of a substance contains the same number of particles – atoms, molecules or ions - as one mole of any other substance. The number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant. The value of the Avogadro constant is 6.02×10^{23} particles per mole.

1. Complete the table. Use the periodic table to help you.

Substance	Mass of substance in grams	Amount in moles	Number of particles
Helium			18.12×10^{23}
Chlorine (Cl)	14.2		
Methane		4	
Sulfuric acid	4.905		

2. Answer the following questions on moles.

- How many moles of phosphorus pentoxide (P_4O_{10}) are in 85.2g?
- How many moles of potassium are in 73.56g of potassium chlorate (V) ($KClO_3$)?
- How many moles of water are in 249.6g of hydrated copper(II) sulfate ($CuSO_4 \cdot 5H_2O$)? For this one, you need to be aware the dot followed by $5H_2O$ means that the molecule comes with 5 water molecules, so these have to be counted in as part of the formula mass.
- What is the mass of 0.125 moles of tin sulfate ($SnSO_4$)?
- If I have 2.4g of magnesium, how many g of oxygen (O_2) will I need to react completely with the magnesium? $2Mg + O_2 \rightarrow MgO$

3. Answer the following questions.

- What is the concentration (in $mol\ dm^{-3}$) of 9.53g of magnesium chloride ($MgCl_2$) dissolved in $100cm^3$ of water?
- What is the concentration (in $mol\ dm^{-3}$) of 13.248g of lead nitrate ($Pb(NO_3)_2$) dissolved in $2dm^3$ of water?
- If I add $100cm^3$ of $1.00\ mol\ dm^{-3}$ HCl to $1.9\ dm^3$ of water, what is the concentration of the new solution?
- What mass of silver is present in $100cm^3$ of $1\ mol\ dm^{-3}$ silver nitrate ($AgNO_3$)?
- The Dead Sea, between Jordan and Israel, contains $0.0526\ mol\ dm^{-3}$ of Bromide ions (Br). What mass of bromide ions is in $1\ dm^3$ of Dead Sea water?

Continue on separate paper if you need to...