

Combined Science - Chemistry - Key Stage 4

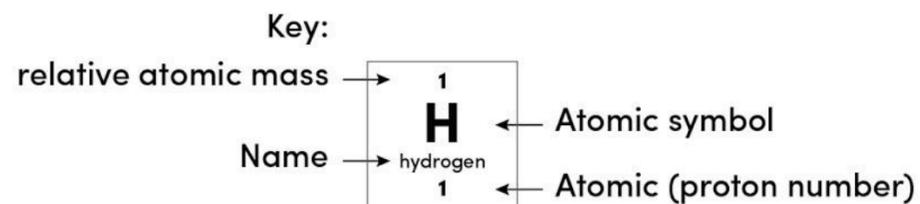
Quantitative Chemistry

Relative Formula Mass - Higher

Mrs. Begum



Periodic Table of Elements



1 H hydrogen 1																	4 He helium 2				
7 Li lithium 3	9 Be beryllium 4															11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12															27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36				
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[97] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54				
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86				
[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 87	[285] Cn copernicium 112	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[293] Ts tennessine 117	[294] Og oganesson 118				



Percentage composition questions

1. Calculate the percentage composition for the named element in these compounds:
- a) Aluminium in Al_2O_3
 - b) Oxygen in K_2SO_4
 - c) Hydrogen in $\text{Al}(\text{OH})_3$
 - d) Nitrogen in $\text{Mg}(\text{NO}_3)_2$

Relative atomic masses:

- Al = 27
- H = 1
- K = 39
- Mg = 24
- N = 14
- O = 16
- S = 32
- Cu = 63.5



Relative formula mass question

2. The relative formula mass of a Group 1 sulphate is 174.

The formula is X_2SO_4 .

Relative atomic masses (A_r): S = 32 O = 16

- Calculate the relative atomic mass of the Group 1 metal.
- Name the metal.



Exam Question 1

3. Potassium nitrate is another nitrogen compound. It is used in fertilisers. It has the formula **KNO₃**.

The **M_r** of potassium nitrate is **101**.

Calculate the percentage of **oxygen** by mass in potassium nitrate.

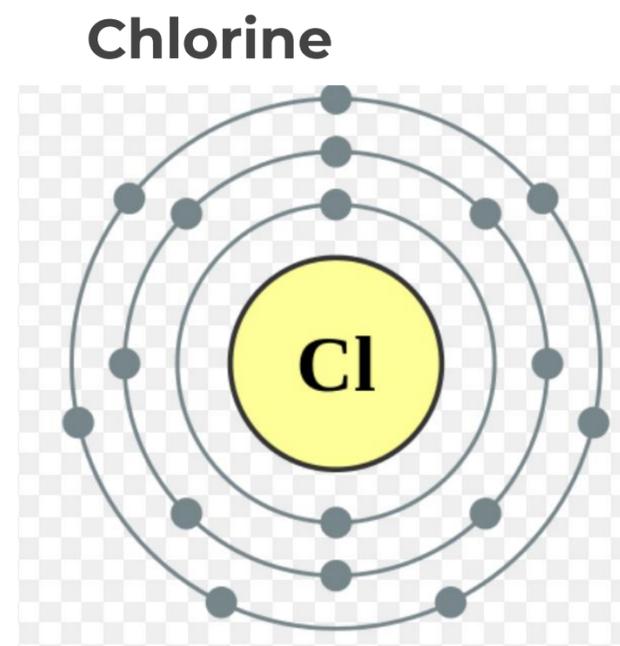
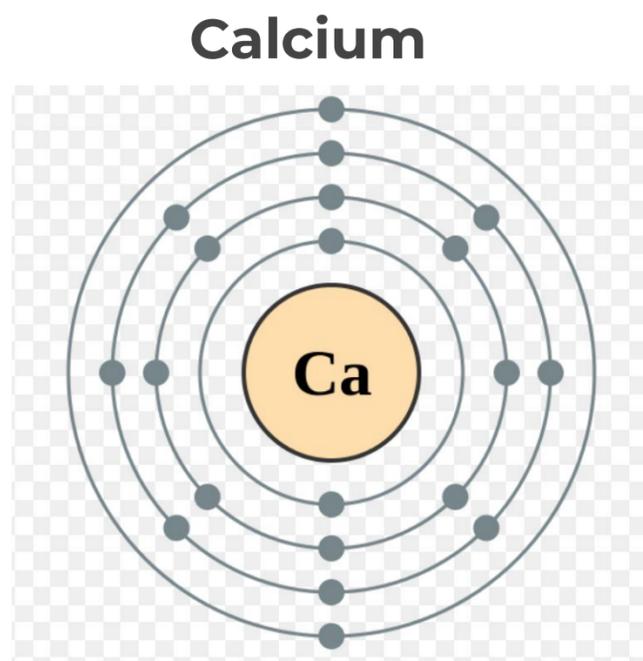
Relative atomic mass: O = 16.

Percentage of oxygen = _____ %
(2)



Exam Question 2

4. (a) The diagram shows an atom of calcium and an atom of chlorine.



(b) Calculate the relative formula mass (M_r) of calcium chloride (CaCl_2).

Relative atomic masses (A_r):
calcium = 40; chlorine = 35.5

Relative formula mass (M_r) = _____
(2)

Describe, in terms of electrons, how calcium atoms and chlorine atoms change into ions to produce calcium chloride (CaCl_2).
(4)

Credit - Calcium and chlorine atom by Pumbaa, Wikimedia Commons.



Exam Question 3

5.

- (a) The percentage by mass of oxygen in carbon dioxide (CO_2) is calculated by the equation:

$$\text{percentage by mass} = \frac{\text{number of atoms of O} \times \text{Relative atomic mass of oxygen (O)}}{\text{relative molecular mass of carbon dioxide (CO}_2\text{)}} \times 100$$

Relative atomic masses (A_r): C = 12 O = 16

Calculate the percentage by mass of oxygen in carbon dioxide (CO_2). **(2)**



Answers

1. a) 52.9%
b) 45.1%
c) 3.8%
d) 18.9%

2. a) 39
b) Potassium

3. 47.5%

4. a) Calcium loses two electrons
two atoms of chlorine gain one electron each

$$b) 40 + (2 \times 35.5) = 111$$

5. a) $M_r = 12 + (2 \times 16)$

$$M_r = 44$$

$$\text{Mass of oxygen} = 2 \times 16 = 32$$

$$32/44 \times 100 = 72.7\%$$

