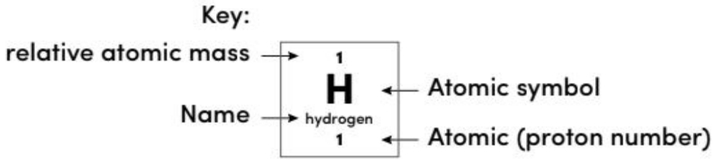
Combined Science - Chemistry - Key Stage 4

Quantitative Chemistry

Reacting Masses - 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 organesson 118

* The lanthanides (atomic numbers 58 - 71) and the Actinides (atomic numbers 90 - 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

Independent practice

1. What mass of magnesium oxide is formed when 96 g of magnesium reacts with oxygen?

   $2Mg + O_2 \longrightarrow 2MgO$

2. What mass of aluminium oxide is produced when 108 g of aluminium is burned in oxygen?

   $2Al + 3O_2 \longrightarrow Al_2O_3$

3. What mass of hydrogen is produced when 6 g of magnesium is reacted with hydrochloric acid?

   $Mg + 2HCl \longrightarrow MgCl_2 + H_2$

Independent task

3. What mass of oxygen is needed to react with 8.5 g of hydrogen sulphide (H_2S)?

   $2H_2S + 3O_2 \longrightarrow 2SO_2 + 2H_2O$

4. What mass of potassium oxide is formed when 7.8 g of potassium is burned in oxygen?

   $4K + O_2 \longrightarrow 2K_2O$

5. What mass of aluminium oxide is produced when 135 g of aluminium is burned in oxygen?

   $4Al + 3O_2 \longrightarrow 2Al_2O_3$

Question 1

Some students investigated calcium oxide.

(a) Calcium oxide has the formula CaO.

(i) Calculate the relative formula mass (M_r) of calcium oxide.

Relative atomic masses: O = 16; Ca = 40.

_____

_____

Relative formula mass (M_r) = _____ **(1)**

(ii) Calculate the percentage by mass of calcium in calcium oxide.

_____

_____

Percentage by mass of calcium in calcium oxide = _____% **(1)**

Question 1

(iii) Calculate the mass of calcium needed to make 30 g of calcium oxide.

_____

Mass of calcium = _____ g

(1)

Question 2

(a) The formula of iron(II) sulfate is $FeSO_4$

Calculate the relative formula mass (M_r) of $FeSO_4$

Relative atomic masses: O = 16; S = 32; Fe = 56.

_____

The relative formula mass (M_r) = _____

(2)

(b) What is the mass of one mole of iron(II) sulfate?

_____ **(1)**

(c) What mass of iron(II) sulfate would be needed to provide 14 grams of iron?

Remember to give the unit.

_____ **(1)**

(Total 4 marks)

Question 3

A bag of fertiliser contains 18.56 kg of ammonium nitrate (NH_4NO_3).

Relative formula mass (M_r): NH_4NO_3 = 80

Calculate the number of moles of ammonium nitrate in the bag of fertiliser.

Give your answer in standard form to 2 significant figures.

_____

_____

_____

_____

Moles of ammonium nitrate = _____ mol

(4)

Question 1 answers

(a) (i) 40 + 16 = 56

(ii) 40 / 56 x 100% = 71%

(iii) 71 /100 x 30 = 21.3 g

Question 2 answers

(a) $56 + 32 + (4 \times 16) = 152$

(b) 152g

(c) $152 / 4 = 38$(g)

Question 3

Convert 18.56kg in to grams

mass = 18.56x 1000 = 18560 g

Moles = mass / Mr

= 18560 / 80

= 232 mol

= 2.3×10^2 mol