

Combined Science - Chemistry - Key Stage 4

# Making Salts

Mr Campbell



# Periodic Table of Elements

Key:

relative atomic mass

1

H

hydrogen

1

Atomic symbol

Name

Atomic (proton number)

1 <b>H</b> hydrogen 1																	4 <b>He</b> helium 2
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4											11 <b>B</b> boron 5	12 <b>C</b> carbon 6	14 <b>N</b> nitrogen 7	16 <b>O</b> oxygen 8	19 <b>F</b> fluorine 9	20 <b>Ne</b> neon 10
23 <b>Na</b> sodium 11	24 <b>Mg</b> magnesium 12											27 <b>Al</b> aluminium 13	28 <b>Si</b> silicon 14	31 <b>P</b> phosphorus 15	32 <b>S</b> sulfur 16	35.5 <b>Cl</b> chlorine 17	40 <b>Ar</b> argon 18
39 <b>K</b> potassium 19	40 <b>Ca</b> calcium 20	45 <b>Sc</b> scandium 21	48 <b>Ti</b> titanium 22	51 <b>V</b> vanadium 23	52 <b>Cr</b> chromium 24	55 <b>Mn</b> manganese 25	56 <b>Fe</b> iron 26	59 <b>Co</b> cobalt 27	59 <b>Ni</b> nickel 28	63.5 <b>Cu</b> copper 29	65 <b>Zn</b> zinc 30	70 <b>Ga</b> gallium 31	73 <b>Ge</b> germanium 32	75 <b>As</b> arsenic 33	79 <b>Se</b> selenium 34	80 <b>Br</b> bromine 35	84 <b>Kr</b> krypton 36
85 <b>Rb</b> rubidium 37	88 <b>Sr</b> strontium 38	89 <b>Y</b> yttrium 39	91 <b>Zr</b> zirconium 40	93 <b>Nb</b> niobium 41	96 <b>Mo</b> molybdenum 42	[97] <b>Tc</b> technetium 43	101 <b>Ru</b> ruthenium 44	103 <b>Rh</b> rhodium 45	106 <b>Pd</b> palladium 46	108 <b>Ag</b> silver 47	112 <b>Cd</b> cadmium 48	115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	122 <b>Sb</b> antimony 51	128 <b>Te</b> tellurium 52	127 <b>I</b> iodine 53	131 <b>Xe</b> xenon 54
133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56	139 <b>La*</b> lanthanum 57	178 <b>Hf</b> hafnium 72	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	195 <b>Pt</b> platinum 78	197 <b>Au</b> gold 79	201 <b>Hg</b> mercury 80	204 <b>Tl</b> thallium 81	207 <b>Pb</b> lead 82	209 <b>Bi</b> bismuth 83	[209] <b>Po</b> polonium 84	[210] <b>At</b> astatine 85	[222] <b>Rn</b> radon 86
[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88	[227] <b>Ac*</b> actinium 89	[267] <b>Rf</b> rutherfordium 104	[270] <b>Db</b> dubnium 105	[269] <b>Sg</b> seaborgium 106	[270] <b>Bh</b> bohrium 107	[270] <b>Hs</b> hassium 108	[278] <b>Mt</b> meitnerium 109	[281] <b>Ds</b> darmstadtium 110	[281] <b>Rg</b> roentgenium 87	[285] <b>Cn</b> copernicium 112	[286] <b>Nh</b> nihonium 113	[289] <b>Fl</b> flerovium 114	[289] <b>Mc</b> moscovium 115	[293] <b>Lv</b> livermorium 116	[293] <b>Ts</b> tennessine 117	[294] <b>Og</b> oganesson 118

Source: Oak



# Independent task

A student wanted to make copper chloride crystals, they reacted solid copper carbonate and hydrochloric acid. Sequence the steps below into the correct order.

A Filter to remove the unreacted copper carbonate.

B Add copper carbonate to hydrochloric acid, stirring after each addition.

C Heat gently to evaporate the water from the copper chloride solution.

D Add copper carbonate until it is excess, solid copper carbonate will remain.

E When about two thirds of the solution has evaporated, place the evaporating dish in a drying oven.

F Pour the filtrate into an evaporating basin.



# Independent task answers

A student wanted to make copper chloride crystals, they reacted solid copper carbonate and hydrochloric acid. Sequence the steps below into the correct order.

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D Add copper carbonate until it is excess, solid copper carbonate will remain.

A Filter to remove the unreacted copper carbonate.

F Pour the filtrate into an evaporating basin.

C Heat gently to evaporate the water from the copper chloride solution.

E When about two thirds of the solution has evaporated, place the evaporating dish in a drying oven.



# Independent task

A student wanted to make magnesium nitrate crystals, they reacted solid magnesium oxide and nitric acid. order.

Step in method	Why is it done?
The magnesium oxide is added in excess.	This is to make sure all the _____ has reacted.
The mixture of solid magnesium oxide and magnesium nitrate solution is filtered.	This separates the _____ from the _____.
The magnesium nitrate solution is heated (crystallisation).	This causes the _____ to evaporate leaving the _____ crystals.
The magnesium nitrate solution is heated gently.	This prevents the crystals from _____.



# Independent task answers

Step in method	Why is it done?
The magnesium oxide is added in excess.	This is to make sure all the acid has reacted.
The mixture of solid magnesium oxide and magnesium nitrate solution is filtered.	This separates the magnesium oxide from the magnesium nitrate solution.
The magnesium nitrate solution is heated (crystallisation).	This causes the water to evaporate leaving the magnesium nitrate crystals.
The magnesium nitrate solution is heated gently.	This prevents the crystals from breaking down.



# Independent task

A student plans to make a pure dry sample of copper nitrate crystals.

The student's plans the method below:

1. Add a small amount of potassium carbonate to dilute hydrochloric acid in a beaker.
2. Stir until all the potassium carbonate disappears, then heat the solution with a Bunsen burner until all the liquid is gone.

This method contains a number of errors and **will not** produce copper nitrate crystals.

**Identify** and **explain** the errors and give the improvements that would allow the student to make crystals of copper nitrate.



# Independent task

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The student's plans the method below:

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2. Stir until all the potassium carbonate disappears, then heat the solution with a Bunsen burner until all the liquid is gone.

Error = Used potassium carbonate

Why it's an error? = This will produce a potassium salt not copper

Improvement = Use copper carbonate or copper oxide



# Independent task answers

Error = Used potassium carbonate

Why it's an error? = This will produce a potassium salt not copper

Improvement = Use copper carbonate or copper oxide

Error = Used hydrochloric acid

Why it's an error? = This will make a chloride salt

Improvement = Use nitric acid

Error = Only added a small amount of carbonate

Why it's an error? = This means some acid will remain

Improvement = Should be added in excess



# Independent task answers

Error = Did not filter

Why it's an error? = Any unreacted carbonate will remain

Improvement = Filter to remove excess carbonate

Error = Heat solution strongly

Why it's an error? = This could cause the salt to breakdown

Improvement = Heat gently, then allow to evaporate naturally or in drying oven

