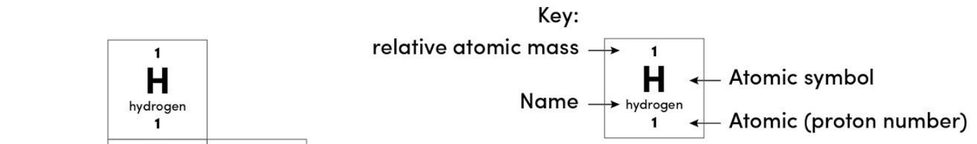
Purity and Formulations Worksheet

Combined Science - Chemistry - Key Stage 4

C8 Analytical Chemistry

Mr Robbins

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 copemicium 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.

1. A student pours some mineral water into a glass. Is it a pure or impure substance?
2. A student receives a bottle of pure ethanol. In their textbook it says that ethanol's boiling point is 78°C. What temperature will they have to heat it to in order to turn it into a gas?
3. They find that it starts to turn into a gas at 81 °C. What can they conclude about the ethanol's purity?
4. Ethanol is a simple molecular substance. Does it conduct electricity?
5. Explain your answer to the previous question.
6. A student wants to make a formulation of liquid chemicals X, Y and Z. First they take a small amount of Y and add it to X. Explain how the student could use the mixture's boiling point to prove that it is an impure substance.
7. There is a naturally occurring mixture of Y and Z that can be extracted from trees. A different student says that because it is natural it is a pure substance. Explain why the student is incorrect.
8. Explain why it is important that the student measures the volumes of X, Y and Z when mixing them together.
9. The resulting mixture can be separated back into X, Y and Z. Which process can be used for this separation?
10. Alloys can be considered as formulations. What is an alloy?
11. Explain why alloys are harder than pure metals.
12. A scientist wishes to make an alloy of iron and carbon for use as a car body. Explain why it is important that the scientist uses precise amounts of carbon when making the alloy.

1. Impure as it is a mixture of water and dissolved minerals
2. 78 °C
3. It is impure
4. No
5. No delocalised electrons or ions to flow
6. Its boiling point will be higher than pure X
7. It is wrong because it is a mixture s cannot be pure
8. To ensure they get the correct quantities for the formulation
9. Distillation
10. A mixture of a metal with another metal or carbon
11. The rows of metal ions are disrupted so they cannot slide past each other
12. Too much or too little will affect the malleability/ability to shape/properties of the metal

Quick check

1. What happens to the boiling point of an impure substance?
2. What happens to the melting point of an impure substance?

Independent task

1. Which of the halogens are liquid at room temperature (25 °C)?
2. Which are gases at room temperature?
3. Describe how we could determine the purity of a sample of iodine
4. Sketch a graph to show what will happen to the temperature of a pure sample of Astatine when it is heated from a starting temperature of 250 °C. Label the values of the melting and boiling point.

Halogen	Melting Point (˚C)	Boiling Point (˚C)
Fluorine	-220	-188
Chlorine	-101	-35
Bromine	-7.2	58.8
Iodine	114	184
Astatine	302	337

Independent task

1. What is a formulation?
2. What is the main reason for a product having a formulation?
3. Why do some cleaning products have flavourings or colourings added?
4. Why are some pills covered in sugar?