

Science – 18th May – 22nd May - Periodic Table

Topic area 1 – The Periodic Table – elements and compounds

Column 1	Column 2											Column 3	Column 4	Column 5	Column 6	Column 7	Column 8					
1 Hydrogen H		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Key Atomic Number Name of Element Symbol </div>																				2 Helium He
3 Lithium Li	4 Beryllium Be																					
11 Sodium Na	12 Magnesium Mg	TRANSITION METALS										13 Aluminium Al	14 Silicon Si	15 Phosphorus P	16 Sulfur S	17 Chlorine Cl	18 Argon Ar					
19 Potassium K	20 Calcium Ca	21 Scandium Sc	22 Titanium Ti	23 Vanadium V	24 Chromium Cr	25 Manganese Mn	26 Iron Fe	27 Cobalt Co	28 Nickel Ni	29 Copper Cu	30 Zinc Zn	31 Gallium Ga	32 Germanium Ge	33 Arsenic As	34 Selenium Se	35 Bromine Br	36 Krypton Kr					
37 Rubidium Rb	38 Strontium Sr	39 Yttrium Y	40 Zirconium Zr	41 Niobium Nb	42 Molybdenum Mo	43 Technetium Tc	44 Ruthenium Ru	45 Rhodium Rh	46 Palladium Pd	47 Silver Ag	48 Cadmium Cd	49 Indium In	50 Tin Sn	51 Antimony Sb	52 Tellurium Te	53 Iodine I	54 Xenon Xe					
55 Caesium Cs	56 Barium Ba	57 Lanthanum La	58-71 ●	72 Hafnium Hf	73 Tantalum Ta	74 Tungsten W	75 Rhenium Re	76 Osmium Os	77 Iridium Ir	78 Platinum Pt	79 Gold Au	80 Mercury Hg	81 Thallium Tl	82 Lead Pb	83 Bismuth Bi	84 Polonium Po	85 Astatine At	86 Radon Rn				
87 Francium Fr	88 Radium Ra	89 Actinium Ac	90-103 ■	104 Rutherfordium Rf	105 Dubnium Db	106 Seaborgium Sg	107 Bohrium Bh	108 Hassium Hs	109 Meitnerium Mt	110 Darmstadtium Ds	111 Roentgenium Rg	112 Copernicium Cn	114 Flerovium Fl		116 Livermorium Lv							
58 Cerium Ce	59 Praseodymium Pr	60 Neodymium Nd	61 Promethium Pm	62 Samarium Sm	63 Europium Eu	64 Gadolinium Gd	65 Terbium Tb	66 Dysprosium Dy	67 Holmium Ho	68 Erbium Er	69 Thulium Tm	70 Ytterbium Yb	71 Lutetium Lu									
90 Thorium Th	91 Protactinium Pa	92 Uranium U	93 Neptunium Np	94 Plutonium Pu	95 Americium Am	96 Curium Cm	97 Berkelium Bk	98 Californium Cf	99 Einsteinium Es	100 Fermium Fm	101 Mendelevium Md	102 Nobelium No	103 Lawrencium Lr									

The periodic table is a list of all the different **elements** that we know about. The one above (from the SQA) is a little out of date and a few more have been added.

An element is a substance that cannot be broken down into something simpler ie it is made up only of its own kind of atom. Eg Iron is an element and is made up of ONLY iron atoms. Water is NOT an element and is made up of a few different types of atoms joined (hydrogen and oxygen).

All the different substances that exist in the world are made up of the elements above (just combined in lots of weird and wonderful ways), much like all the words in English are made up of the same 26 letters.

IMPORTANT FACTS:

If it is not in the periodic table, then it is not an element!

If it is not an element, then it must be a compound or a mixture!

ELEMENTS: A substance that has only ONE type of atoms present.

COMPOUND: Two or more different types of atom, chemically bonded together.

MIXTURE: Different types of substances not chemically bonded together.

For more info on elements compounds and mixtures, you may wish to work through PowerPoint 1.

Topic area 1 task

Copy and complete (or print and write on) the following table to sort the following substances into elements or compounds/mixtures (read the periodic table and important facts on pg1 to help you):

'Water' 'Rust' 'Helium' 'Oxygen' 'Calcium' 'Chalk' 'Air'

'Argon' 'Mercury' 'Copper' 'Gold' 'Silver' 'Tungsten' 'Rubber'

'Potassium' ' Soap' ' Fat' 'Alcohol' 'Vanadium' 'Osmium' 'Carbon dioxide'

'Copper oxide' 'Calcium carbonate' 'Einsteinium' 'Aluminium' 'Fluorine'

<u>Elements</u>	<u>Compound or Mixtures</u>
<u>helium</u>	<u>Water</u>
<u>Oxygen</u>	<u>Rust</u>
<u>Calcium</u>	<u>Chalk</u>
<u>Argon</u>	<u>Air</u>
<u>Mercury</u>	<u>Rubber</u>
<u>Copper</u>	<u>Soap</u>
<u>Gold</u>	<u>Fat</u>
<u>Silver</u>	<u>Alcohol</u>
<u>Tungsten</u>	<u>Carbon dioxide</u>
<u>Potassium</u>	<u>Copper oxide</u>
<u>Vanadium</u>	<u>Calcium carbonate</u>
<u>Osmium</u>	
<u>Einsteinium</u>	
<u>Aluminium</u>	
<u>Fluorine</u>	

Topic area 2 – Symbols and Atomic Numbers

Every element in the periodic table has its own type of atom. Chemists can refer to atoms in one of three easy ways:

1. Its name
2. Its atomic symbol
3. Its atomic number

If you look at the periodic table on page 1 you will see all three pieces are given for each element.

Eg

1

Hydrogen

H

Most periodic tables come with a key. This is the one from page 1:

Key
Atomic Number
Name of Element
Symbol

This key can be used (along with the periodic table on page 1) to find this information for each element.

Formatting of symbols: It is very important to get the formatting of symbols right. They are either an uppercase letter on its own or an upper case and a lowercase.

Eg Carbon is C (uppercase) never c (lowercase)

Lithium is Li never LI or li

Argon is Ar never AR or ar

It matters! DON'T GET IT WRONG!!

Topic area 2 task 1 – Use the key and periodic table to complete the following table (copy or print table)

Atomic Number	Name of Element	Symbol
1	Hydrogen	H
2	Helium	He
14	Silicon	Si
6	Carbon	C
52	Tellurium	Te
26	Iron	Fe
29	Copper	Cu
74	Tungsten	W
82	Lead	Pb
50	Tin	Sn

Topic area 2 Task 2 – Secret Codes

A good task to get used to using the symbols in the correct format is to decode some atomic number puzzles. Convert the atomic number given into the symbol and it will always spell out a word (keep the correct formatting!). Commas will separate letters and dashes mean spaces.

Example: 16,79,16,47,99/ 85, 73, 6, 19

SAuSAGes / AtTaCK (see how the formatting is correct)

Decode the following:

- 4, 85,8,7 / 88,7 / 85 / 6,8,74,16
- 3,7,10,7 / 53, 16 / 15,68, 26, 6, 22, 8, 7
- 17,18,19 / 16,22,7,19,16 / 7,9 / 6,85 / 9,8,8,110

You will know if you have these right!!

Try to make up your own and ask someone in your house to decode them!

Topic area 3 – Metals and non-metals

The last few topic areas are supported by PowerPoint 2 but if you cannot access that then here is a quick run-down.

The periodic table looks quite unusual for a list and it is designed this way to help classify the elements into lots of different areas that have something in common.

The largest classification is separating the elements into METALS and NON-METALS.

Column 1	Column 2	TRANSITION METALS										Column 3	Column 4	Column 5	Column 6	Column 7	Column 0	
1 Hydrogen H																		2 Helium He
3 Lithium Li	4 Beryllium Be												5 Boron B	6 Carbon C	7 Nitrogen N	8 Oxygen O	9 Fluorine F	10 Neon Ne
11 Sodium Na	12 Magnesium Mg											13 Aluminium Al	14 Silicon Si	15 Phosphorus P	16 Sulfur S	17 Chlorine Cl	18 Argon Ar	
19 Potassium K	20 Calcium Ca	21 Scandium Sc	22 Titanium Ti	23 Vanadium V	24 Chromium Cr	25 Manganese Mn	26 Iron Fe	27 Cobalt Co	28 Nickel Ni	29 Copper Cu	30 Zinc Zn	31 Gallium Ga	32 Germanium Ge	33 Arsenic As	34 Selenium Se	35 Bromine Br	36 Krypton Kr	
37 Rubidium Rb	38 Strontium Sr	39 Yttrium Y	40 Zirconium Zr	41 Niobium Nb	42 Molybdenum Mo	43 Technetium Tc	44 Ruthenium Ru	45 Rhodium Rh	46 Palladium Pd	47 Silver Ag	48 Cadmium Cd	49 Indium In	50 Tin Sn	51 Antimony Sb	52 Tellurium Te	53 Iodine I	54 Xenon Xe	
55 Caesium Cs	56 Barium Ba	57 Lanthanum La	58-71 Lanthanides	72 Hafnium Hf	73 Tantalum Ta	74 Tungsten W	75 Rhenium Re	76 Osmium Os	77 Iridium Ir	78 Platinum Pt	79 Gold Au	80 Mercury Hg	81 Thallium Tl	82 Lead Pb	83 Bismuth Bi	84 Polonium Po	85 Astatine At	86 Radon Rn
87 Francium Fr	88 Radium Ra	89 Actinium Ac	90-103 Actinides	104 Rutherfordium Rf	105 Dubnium Db	106 Seaborgium Sg	107 Bohrium Bh	108 Hassium Hs	109 Meitnerium Mt	110 Darmstadtium Ds	111 Roentgenium Rg	112 Copernicium Cn	114 Flerovium Fl		116 Livermorium Lv			
		58 Cerium Ce	59 Praseodymium Pr	60 Neodymium Nd	61 Promethium Pm	62 Samarium Sm	63 Europium Eu	64 Gadolinium Gd	65 Terbium Tb	66 Dysprosium Dy	67 Holmium Ho	68 Erbium Er	69 Thulium Tm	70 Ytterbium Yb	71 Lutetium Lu			
		90 Thorium Th	91 Protactinium Pa	92 Uranium U	93 Neptunium Np	94 Plutonium Pu	95 Americium Am	96 Curium Cm	97 Berkelium Bk	98 Californium Cf	99 Einsteinium Es	100 Fermium Fm	101 Mendelevium Md	102 Nobelium No	103 Lawrencium Lr			

There is a thick black line that separates the metals from the non-metals. The metals are to the left of this line and the non-metals on the right. Eg Lithium, cadmium and uranium are all metals as they are on the left of the line. Astatine, krypton and nitrogen are all non-metals.

If you look very closely you will see that hydrogen is NOT on the metal side of the line even though it likes to hang around all the way over on the left. This means that it is a non-metal.

Metals are usually very easy to tell apart from non-metals by sight and touch as they are shiny when polished, bend instead of shatter and are excellent heat and electrical conductors.

Topic area 3 – task 1

Look at the periodic table on page 5, copy and complete the following table:

Type of Element	Number of elements in periodic table
Metal	92
Non-metal	22

Topic area 3 – task 2

The page 5 periodic table shows 114 elements in total. Use your table in task 1 to complete the following table:

Type of Element	% of elements in the periodic table
Metal	$92/114 \times 100 = 81\%$ (or 80.7%)
Non-Metal	$22/114 \times 100 = 19\%$ (or 19.3%)

Help for % calcs: $\% = (\text{sample number} / \text{total number available}) \times 100$

Topic area 3 – task 3

Convert either your task 1 or task 2 table into a bar graph.

Topic area 4 – Groups and Periods

This topic area is also covered in more detail in PowerPoint 2.

The periodic table is further broken down into two special classifications; groups and periods.

Groups are the vertical columns in the periodic table and are placed like this because they have SIMILAR CHEMICAL PROPERTIES(ie they have similar chemical reactions with other substances).

Periods are the horizontal rows and are placed like this because of the structure of their atoms (you will learn more about this in S3 but don't need to know much more at the moment).

Some of the groups are so unique that most chemistry courses ask you to remember their names.

Group 1 is the most reactive group of METALS and is called the ALKALI METALS.

Group 7 is the most reactive group of NON-METALS and is called the HALOGENS.

Group 0 is an almost completely unreactive group and is called the NOBLE GASES.

The middle section is called the TRANSITION METALS.

The image shows a periodic table with several groups highlighted and labeled. The labels are: Alkali Metals (Group 1), Alkaline Earth (Group 2), Transition Metals (Groups 3-10), Halogens (Group 17), and Noble Gases (Group 18). The elements are color-coded: Group 1 is red, Group 2 is orange, Groups 3-10 are yellow, Group 11 is light green, Group 12 is light blue, Groups 13-16 are purple, and Group 18 is pink. The elements are arranged in rows and columns, with the first row containing H and He, and the last row containing Fr, Ra, Ac, Rf, Db, Sg, Bh, Hs, Mt, Uun, Uuu, and Uub.

H																			He
Li	Be										B	C	N	O	F				Ne
Na	Mg										Al	Si	P	S	Cl				Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br			Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I			Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At			Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub								

Topic area 4 –Task 1

Watch the following videos on each of the groups that have been listed on page 7.

<https://www.youtube.com/watch?v=uixxJtJPVXk> (or just search alkali metals in water on youtube)

<https://www.youtube.com/watch?v=uixxJtJPVXk> (or search halogen reactivity)

<https://www.youtube.com/watch?v=QLrofyj6a2s> (noble gases)

Doing some searches for the groups will produce a lot of different and unusual videos

Topic area 4 –Task 2

Work through power point 2 and try to answer all the questions before the answers appear.

Topic area 5 – Getting to know some elements

The uses and properties of the elements is so diverse even the science staff at Cumbernauld Academy do not know everything there is to know about all of the elements. This website is fun to click through and find out a bit more about some of the elements!

<http://www.periodicvideos.com/>