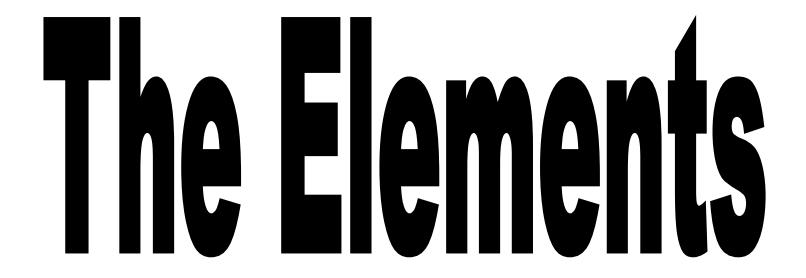




Today's objectives

- You should know the following by the end of today's class...
- History of the idea of elements including the contributions of the Greeks, Boyle and Davy and Moseley
- Symbols of elements 1–36.
- History of the periodic table, including the contributions of Dobereiner and Newlands
- The differences between the first Periodic table and the modern table





• An element is a substance that cannot be broken down into a simpler substance. (Sume













Bromine (Br)

Gold (Au)



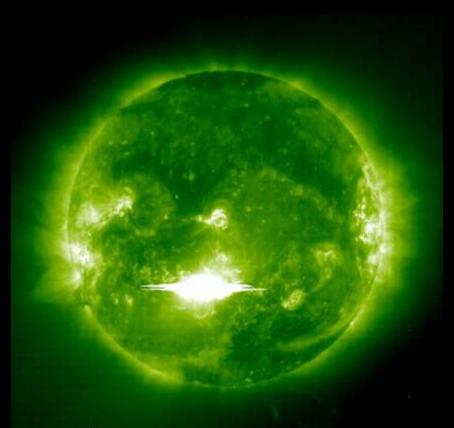


Aluminium (AI)

The most abundant metal in the Earth's crust

Silver (Ag)





2003/10/28 11:12

Chlorine (CI)







Tin (Sn)

Platinum (Pt)

Question?

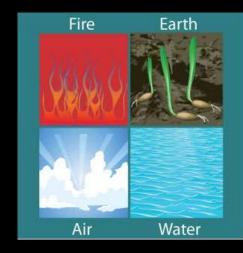
• But where did the idea of these "elements" first come from?

The Ancient Greeks

In particular Empedocles 490 – 435 BCE, had the idea that there were four basic building blocks (elements) from which everything was made:

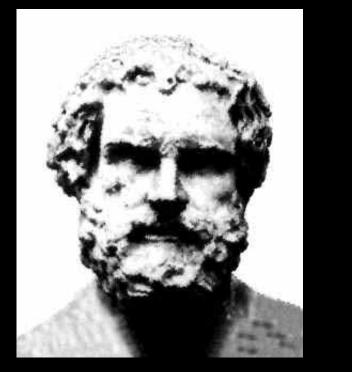


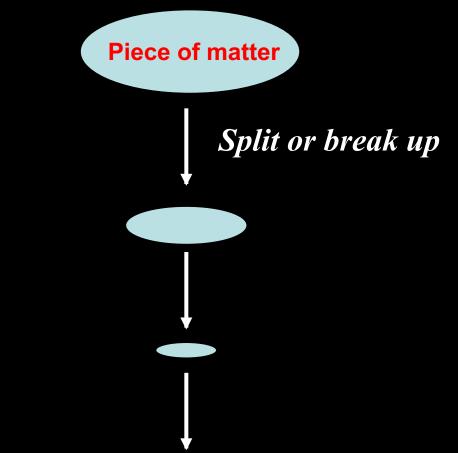
earth, fire, water and air



IDEA THAT MATTER IS COMPOSED OF ELEMENTS AND THAT DIFFERENT ELEMENTS COMBINE TO MAKE NEW THINGS

The Ancient Greeks





Democritus

Around 2500 years ago

Eventually I end up with something which cannot be broken up – called an element

Robert Boyle



Irish scientist, Robert Boyle, later defined what an element was:

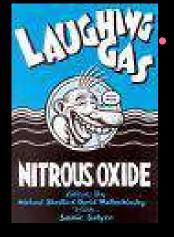
An <u>element</u> is a substance that cannot be broken down into any simpler substance

Robert Boyle

17th Century

Humphrey Davy





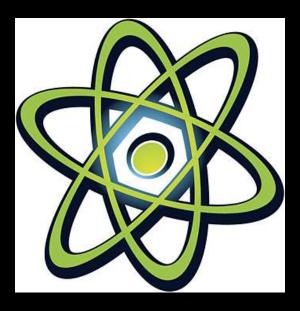
Davy was an English chemist who started out his research examining the medicinal effect of various gases



Humphry Davy



Davy used electricity to split up compounds to form elements



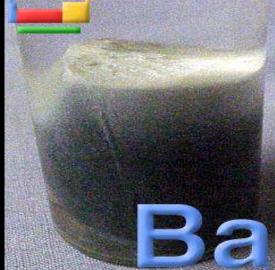
Humphry Davy 19th Century

Davy's Elemental Discoveries





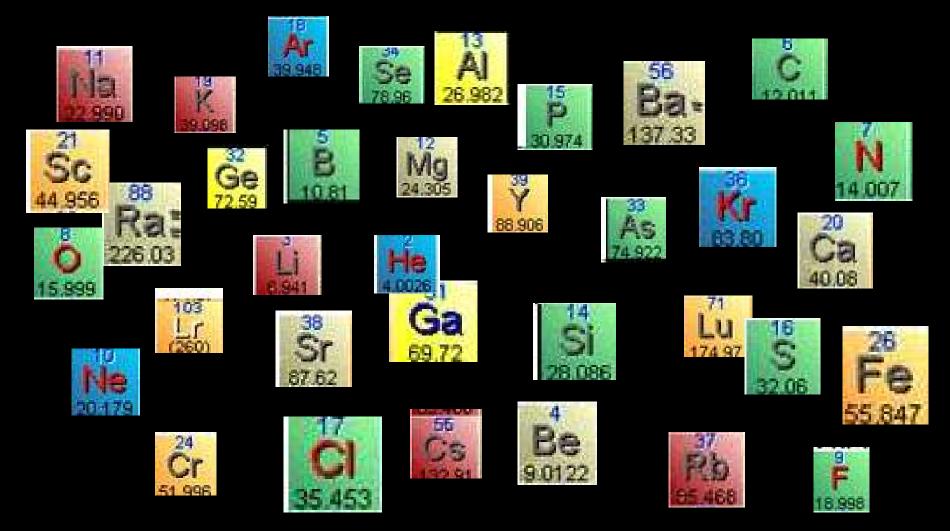








Elements are made up of only one type of atom.



Naming the elements

- After a planetmercury, uranium
- European mythological figures....Titanium after the Titans
- After its colour.... Gold
- After a physical property... Bromine= bad smell
- After a country.... francium = France
- After yourself....?
- After a scientist... Es = Einsteinium

The elements song

<u>http://youtu.be/aPq3SEteEJc - YouTube</u>

Recap

- What is an element?
- What did the ancient Greeks think
 materials were made of?
- Who was Robert Boyle?
- What contribution did Davy make to the knowledge of the elements?

The Periodic Table

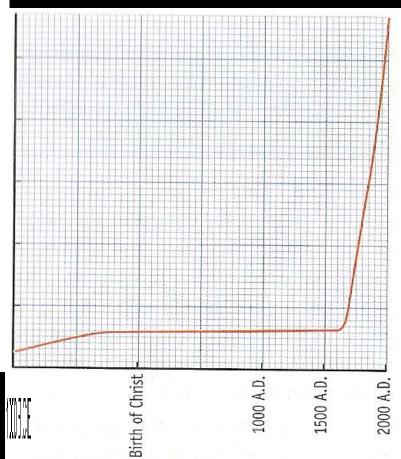
Arrangement of the elements

 All of the known elements of today are arranged onThe Periodic Table of Elements

Pictorial view of the Modern Periodic Table

											0 2 He							
2	3 Li	4 Be		of Elements										10 Ne				
3	11 Na	12 Mg	шв	Ι۷В	٧B	VIВ	VIIB		— VII –		IB	IB	13 Al	14 Si	15 P	16 S	17 CI	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 Y	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	⁴⁰ Zr	41 ND	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 	54 Xe
6	55 Cs	56 Ba	57 *La		73 Ta	74 ₩	75 Re	76 OS	77 Ir	78 Pt	79 Au	80 Hg	81 TI	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89 +AC	104 Rf	105 Ha	106 106	107 107	108 1 0 8	109 109	110 110								
_	antha eries	nide	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
	ctinid eries	e	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		
Legend - click to find out more																		
	H - gas Li - solid												Tc -	synt	hetic			
Non-Metals				Transition Metals					Rare Earth Metals			ls		Halo	gens			
Alkali Metals					Alkali Earth Metals						Other Metals							

Looking for a pattern in the elements



 In the 1800s over 50 elements had been discovered and more were being found!

 Chemists wanted to find if there was any pattern to the elements

Johann Dobereiner



Dobereiner

2005 Q. 4 (d) (6)

1829 - His theory of triads







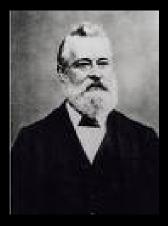
He noticed that certain elements in groups of 3 had similar physical & chemical properties with the atomic weight of the middle element being halfway between the other two.

He called such a group of elements a triad.



What contribution did Dobereiner make to the systematic arrangement of the elements?(6)

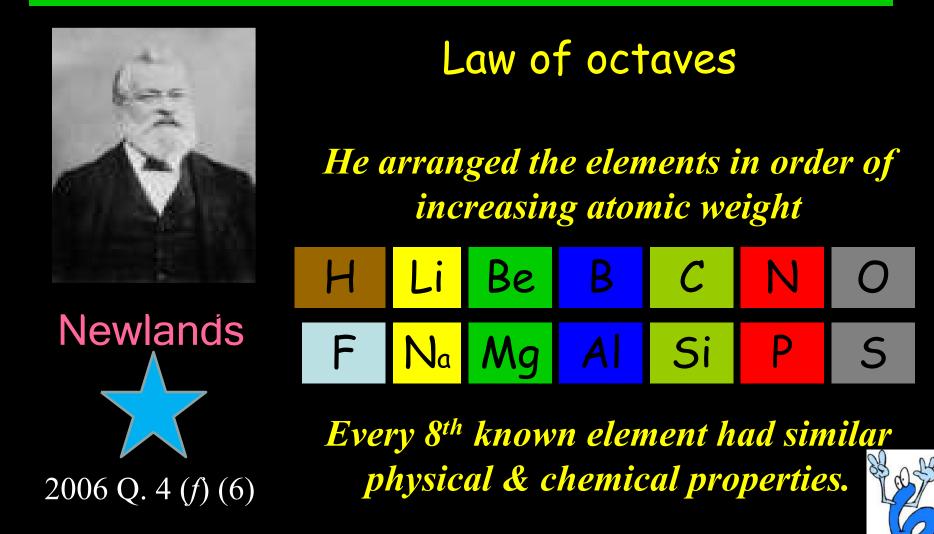
Higher level only Newlands -1864





Newland arranged all of the known elements in order of increasing atomic weight and he noticed the chemical and physical properties of the elements repeated with every 8th element.

John Newlands



What contribution did Newlands make to the systematic arrangement of the elements known to him?(6)

Higher level only Newlands Octaves

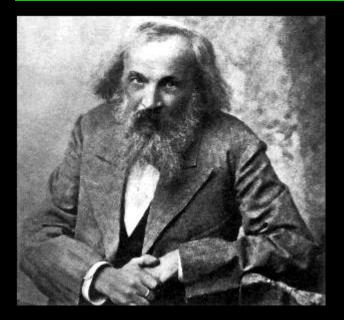
- The problem is that after Calcium the pattern starts to break down.
- Although Newland had the right idea, some of the elements hadn't been discovered yet and

н	Li	Be	В	С	Ν	0
F	Na	Mg	Al	Si	Ρ	S
Cl	К	Са	Cr	Тi	Mn	Fe

Mendeleev created the first periodic table by grouping together elements in a certain way.



Dmitri Mendeleev



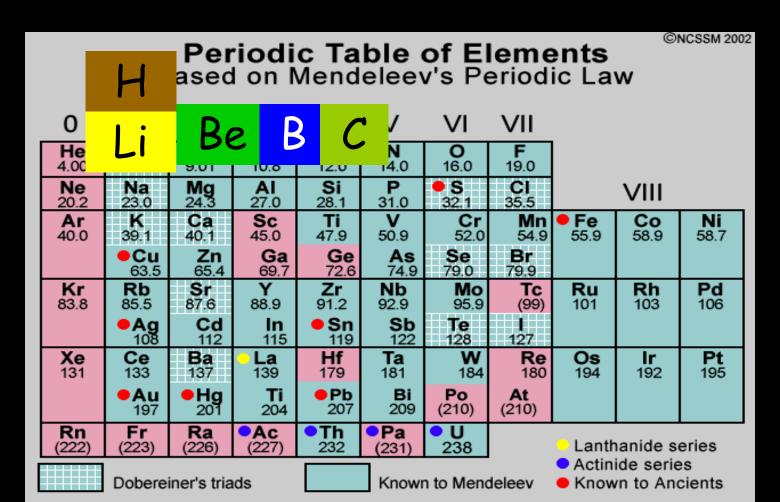
1869 – He drew up the first periodic table of the known elements of his time by arranging the elements in order of increasing atomic weight.

Mendeleev

He noticed repeating patterns which lead him to make very accurate predictions about undiscovered elements.

Mendeleev's Periodic Table

No Helitentiscovered



Mendeleev's Predictions

Α	Mendeleev	Prediction
	(187	1)

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	PREDICTED PROPERTIES Ekasilicon (Es)	ACTUAL PROPERTIES Germanium(Ge)
ATOMIC WEIGHT	72	72.59
DENSITY	5.5 g/cm ³	5.35 g/cm ³
VALENCE	4	4
MELTING POINT	high	937.4°C
COLOR OF METAL	dark gray	gray-white
FORM OF OXIDE	EsO ₂	GeO ₂
DENSITY OF OXIDE	4.7 g/cm ³	4.23 g/cm ³
FORM OF CHLORIDE	EsCl ₄	GeCl ₄
DENSITY OF CHLORIDE	1.9 g/cm ³	1.84 g/cm ³
B.P. OF CHLORIDE	<100°C	84°C

The differences in Mendeleev's table and the modern periodic table

1. Mendeleev's table was arranged in order of increasing atomic mass. Modern table is arranged in order of increasing atomic number.

2.In Mendeleev's table the noble gases are not included in the modern Table they are.

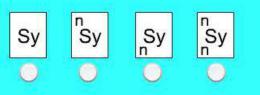
3. There are gaps in Medeleev's table but there are none in the modern periodic table as they have been discovered..

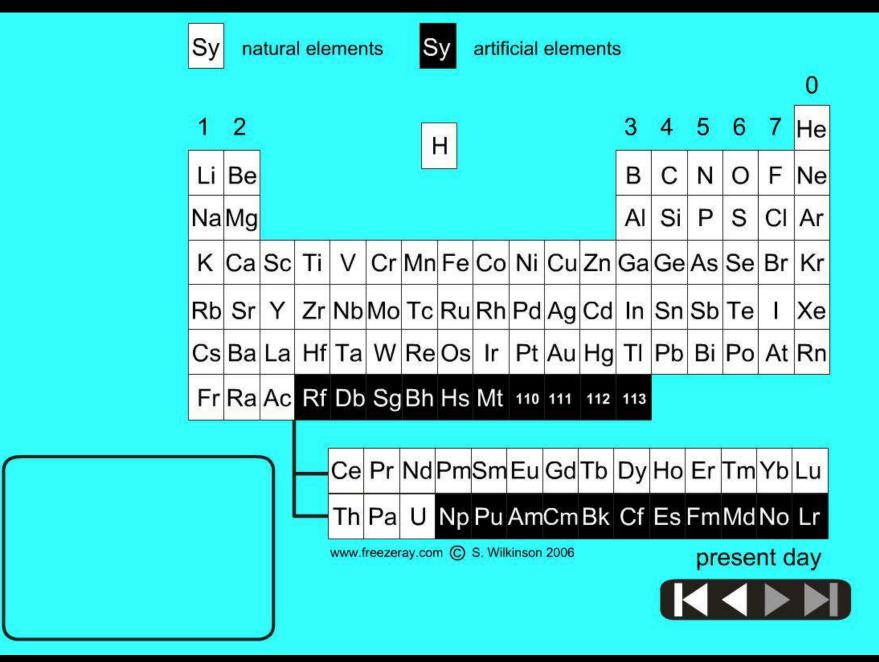
State two ways in which Mendeleev's periodic table of the elements differs from that of Moseley.

main groups



1	2	3	4	5	6	7
Н	Li	Be	В	С	N	0
F	Na	Mg	AI	Si	Ρ	S
CI	к	Ca	Cr	Ti	Mn	Fe





What have you learnt about..

Dobereiner

Mendeleev

Octaves



Newlands

Henry Moseley



Sseley

1913 – Henry Moseley discovered that the positive charge in the nucleus of an atom of any element is of a definite amount.

These units of positive charge became known as protons. The periodic table is now arranged in order of increasing atomic number.

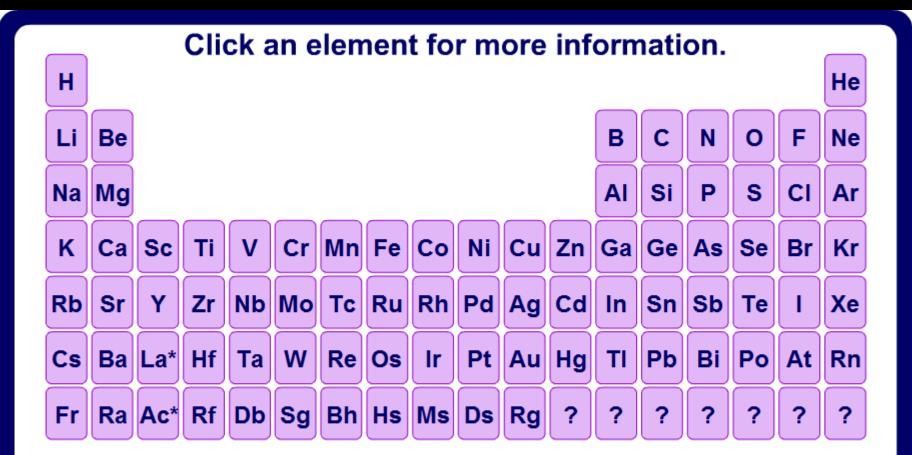


The <u>atomic number</u> of and element is the number of protons in the nucleus of an atom of that element

2008 Q. 4 (*b*) (6)

What contribution did Henry Moseley, the scientist shown in the photograph, make to the systematic arrangement of the elements in the periodic table?

The elements in the periodic table







How elements are alike

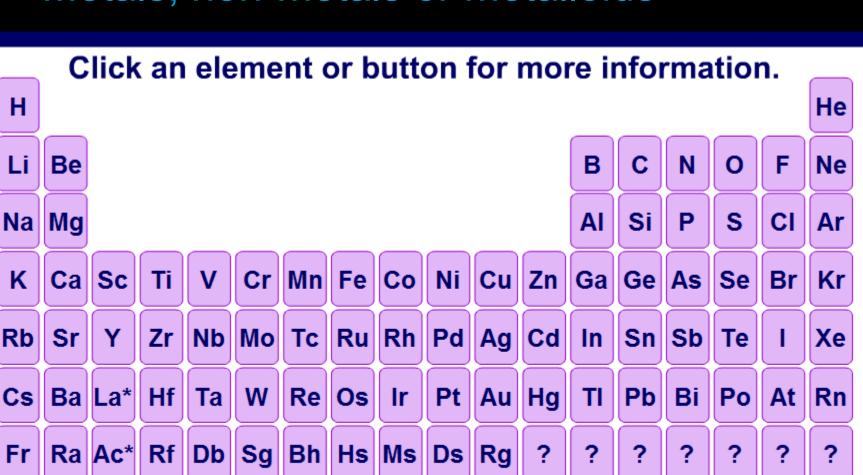
each other in

each main group

Today's objectives

• Learning about Group 1 in the Periodic Table – their properties and reactions.

Metals, non-metals or metalloids





н



Group 1 – The Alkali metals

							H 1.0079										VIIIA
IA	Be											B	IVA Č	VA	VIA	F	4.0026 Ne
	0122 12 VIG 4,305	IIIB	IVB	VB	VIB	VIIB		VIIIB		IB	IIB	10.81 13 AI 26.982	12.011 14 Si 28.086	14.007 15 P 30.974	15.999 16 S 32.06	18.998 17 Cl 35.453	20,179 18 Ar 39,948
13 K 19.098	20 Ca 10.08 38	Sc	47.90	50.941	24 Cr 51,996	Mn 54.938	55.847	27 Co 58,933	28 Ni 58.71	29 Cu 63,546	30 Zn 65.38	Ga 69.72	Ge 72.59	39 As 74,922	34 Se 78.96	35 Br 79.904	Kr 63.80
Rb 85,468	38 Sr 56	44.956 39 Y 88.906 71	40 Zr 91.22 72	41 Nb 92,906 73	42 Mo 95,94	43 丁:) (98) 75	44 Ru 101.07	45 Rh 102,91	46 Pd 106.4 78	47 Ag 107.87	48 Cd 112.41 80	49 In 114.82	50 Sn 118,69	Sb 121,75	52 Te 127,60		Xe 131.30
CS 132.91	Ba -	Lu 174.97	Hf 178.49	Ta 180.95	183.85	Re 186.21	76 OS 190.2	192.22	Pt 195.09	79 Au 196.97	Hg 200.59	81 204.37	Pb 207.2	121.75 83 Bi 206.98	Po (209)	85 At (210)	Rn (222)
Fr (223)	Ra:	(260)	(261)	(262)	(263)	*Name	Not Offic	ially Ass	ligned								
87 Fr (223)	88 Ra:	103 Lr	104*	105*	106*	*Name	Not Offic	ially Ass	ligned	190.51	200.00	204.51	201.2	200.00			

Lanthanide Series	138.91	140.12	140.91	144.24	(145)	150.4	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04	
Actinide Series	AC Se	Th 232.04	Pa	Ű	93 1\0	94 Pu	ee Am	Sm	BK.	98 C'i	Es	Fri	101 [V]c]	102 · 0) (259)	

Group 1 - The Alkali Metals



1. They are all shiny metals which are easily cut with a knife.





2. They all float on water

3. They are all extremely reactive and have to be stored in oil to prevent them from reacting with the oxygen in the air.

Demonstration - The reaction of the alkali metals with water

1 – The reaction of lithium with water

2 – The reaction of sodium with water

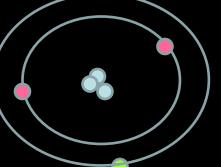
3 – The reaction of potassium with water

Explain, in terms of the structures of the atoms, the trend in reactivity down Group I (the alkali metal group) of the periodic table.

Why do the alkali metals increase in activity as you go down the group?

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Sodium





As you go down the group the atomic radius increases and the outermost electron is much further from the nucleus and is under less of an effect so that element is more reactive. This outer electron is also protected from the nucleus by an inner 'screening effect' of the inner electrons.

Balanced Equations

2Li	+	$2H_2O$	\rightarrow	$\frac{1}{2}H_{2}$	+	2 LiOH
Lithium		Water		Hydrogen		Lithium Hydroxide
2Na	+	$2H_2O$	\rightarrow	¹ ∕ ₂ H ₂	+	2 NaOH
Sodium		Water		Hydrogen		Sodium Hydroxide
<mark>2 K</mark>	+	$2H_2O$	\rightarrow	¹ ∕ ₂ H ₂	+	2 KOH
Potassium		Water		Hydrogen		Potassium Hydroxide

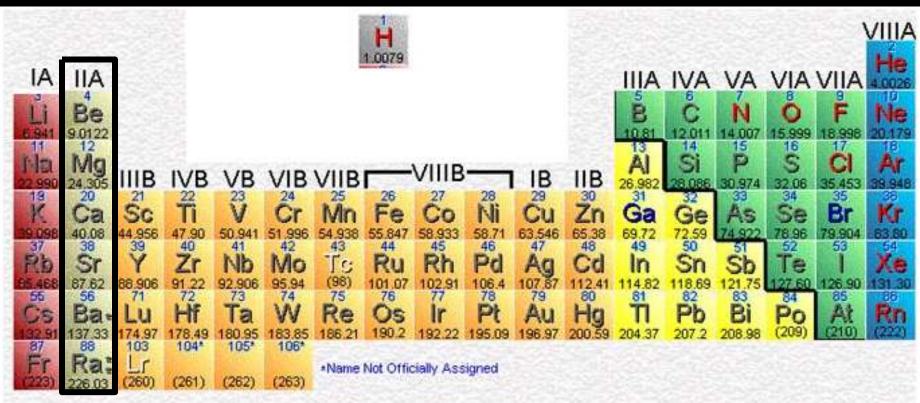
Check if you have learned..

- What group 1 in the Table is called?
- How many electrons are in the outer shell of group 1 elements?
- Some properties of group 1 metals?
- What happens when they are reacted with water?
- What is the reactivity trend as you go down the group?

In today's class

• We will look at the properties of the rest of the groups in the Periodic table.

Group 2 – The earth alkali metals



Lanthanide Series	138.91	140.12	140.91	144.24	(145)	150.4	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04	
Actinide Series	AC	Th	Pa	Ű	93 110 237.05	94 Pu	ee Am	ee mD	BK	98 C'i	Es	Frn	101 [V]c]	102 · 0) (259)	

Group 2 - The Alkaline Earth Metals

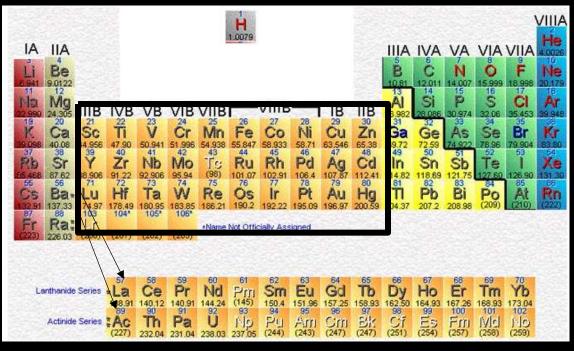




1. They all have 2 electrons in their outer shell

2. They are reactive but not as reactive as the alkali metals

Groups 3 -11 The d block metals



They are all metals and are usually brightly coloured and act as catalysts for chemical reactions

Includes the following elements: Scandium (Sc) Titanium (Ti) Vanadium (V) Chromium (Cr) Manganese (Mn) Iron (Fe) Cobalt (Co) Nickel (Ni) Copper (Co) Zinc (Zn) and others!

IA	IIA		Service Se				H 1.0079					шл	11.7.4	VA	VIA		
	Be										No.	5 B 0.81	6 C 12.011	N 14.007	8 0 15,999	VIIA F 18.998	4.0026 10 Ne 20.179
13151	12 Mg 24,305 20	IIIB	IVB	VB	VIB	VIIB	70	VIIIB		IB 29	IIB	AI 6.982	Si 18.086	15 P 30.974	16 S 32.06 34	CI	Ar 39.948
19 K 19 096	Ca	21 Sc 44.956 39	22 Ti 47.90 40	23 V 50.941 41	24 Cr 51,996 42	25 Mn 54.938 43	55.847	27 Co 58.933 45	28 Ni 58.71 46	Cu 63.546 47	30 Zn 65.38 48	Ga 99.72 49	32 Ge 72.59 50	AS 74.922	Se 78.96	35,453 35 Br 79,904 53	Kr 63.80
37 Rb 85.468 55	56	Y 88.906	2r 91.22 72	Nb 92,906 73	Mo 95.94 74	43 TC (98) 75	Ru 101.07 76	Rh 102.91	Pd 106.4 78	Ag 107.87 79	Cd 112.41	In 14.82	Sn	Sb 121,75	Te 127.60		63.80 54 Xe 131.30
132.91	Ba-	174.97	72 Hf 178.49 104*	73 Ta 180.95 105*	183.85	75 Re 186.21	76 OS 190.2	192.22	78 Pt 195.09	79 Au 196.97	Hg 200.59	81 11 04.37	18.69 82 Pb 207.2	121.75 Bi 208.98	Po (209)	At (210)	80 Rn (222)
87 Fr (223)	Ra:	103 Lſ (260)	(261)	105*	(263)	*Name	Not Offic	cially Ass	igned								
1910																	
<u>u</u> L	anthanide	Series	•La	Ce	Pr	Nd	61 Prri (145)	52 Sm	Eu Eu	Gd Gd	Тъ	66 Dy 162,50	Ho	Êr	69 Tm	Yb	
	Actinide	Series	138.91 89 AC (227)	140.12 90 Th 232.04	140.91 91 Pa 231.04	144.24 92 U 238.03	93 [·][) 237.05	150.4 94 121 (244)	151,96 95 Å[ʃʃ] (243)	157.25 98 CffJ (247)	158.93 97 5/1 (247)	162.50 98 07 (251)	164,93 99 E 5 (254)	167.26 100 Fffj (257)	168.93 101 [V][] (258)	173.04 102 · _() (259)	

All have 3 electrons on their outermost shell!



							H 1.0079										VIIIA
IA	IIA											111/	IVA	VA	VIA	VIIA	4.0026
i.	Be											B	ĉ	N	Ô	F	Ne
6.941	9.0122											10.8	12.011	4.007	15,999	18.998	20,179
(Jan	Ma											13	Si	15 P	16 S	CI	Ar
22 990	24,305	IIIB	IVB	VB		VIIB		VIIIB		IB	IIB 30	26,98	28.086	30.974	32.06	35,453	39.948
19 K	20 Ca	SC	22 Ti	23 V	Cr.	Min	Fe	27 Co	28 Mi	Cu Cu	30 7n	Ga	Ge	33	Se	Br	Kr
39.098	40.08	44,956	47.90	50.941	51,996	54.938	55.847	58.933	58.71	63,546	65.38	69.7	72.59	1.922	78.96	79.904	63.80
37 Rb	Sr.	39 V	40 7r	A1	42 Ma	43 TS	844 R11	Ph	Pd	47	48	49	Ŝ'n	20	Te	53	X-
65.468	87.62	88.906	91.22	92.906	95.94	(98)	101.07	102.91	106.4	107.87	112.41	114.8	2 118.69	121.75	127.60	126.90	131.30
55	56	71	72	73	74	75	76	77	78 Pt	79	112.41 80	81	82 Dh	Bi	84 De	85	88
132.91	137.33	174.97	178.49	180.95	183.85	Re 186.21	190.2	192.22	195.09	196.97	200.59	204.3	FU	208.98	P0 (209)	(210)	Rn (222)
87	88	103	104*	105*	106*	-	100		15.0							1300	
(223)	226.03	(260)	(261)	(262)	(263)	*Name	Not Offic	cially Ass	signed								

Lanthanide Series	138.91	140.12	140.91	144.24	(145)	150.4	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04
Actinide Series	AC 89	Th	Pa	92 U 238.03	93 Np	94 Pu	95 Am	96 Cffi (247)	BK	98 Cí (251)	Es.	100 Frri (257)	101 [V]c]	102 · 0) (259)

			CONTRACT OF			1	1 H 1 0079										VIIIA
IA	IIA											IIIA	Contraction of the second second	VA	VIA	VIIA	
Li	Be											B	C	Ň	Ö	F	Ne
6.941 11	9.0122											10.81	12.011	14.007	15.999 16	17	18
121 121	Mg 24,305	IIIB	IVB	VB	VIB	VIIB		VIIIB	5-1	IB	IIB	AI 26.982	Si 28.085	P 30.974	S 32.06	35,453	Ar
13 K	Ca	Sc	Ti	V V	24 Cr	25	Fe	Čo	28 Ni	Ĉu	Zn	Ga	28.086 32 Ge		34 Se	Br	Kr
19.098 37	40.08	44.956	47.90	50.941	51.996	54.938	55.847	58.933	58,71	63.546 47		69.72	72.59		and the second se	79.904 53	63.80
Rb	Sr	Y	Zr	Nb	Mo	43 TS	Ru	Rh	Pd	Ag	Cd	ln In	Sn	Sb	Te	1	Xe
65.468	87.62 56	88.906	91.22 72	92.906 	95.94 74	(98)	101.07	102.91	106.4 78	107.87 79	112.41	114.82 <u>81</u>	118.69 82 Pb	121.75 Bi	127.60 84	85	131.30
CS	Ba	Lu	Hf	Ta	W	Re	OS 190.2	Ir	Pt	AU 196.97	Hg	204.37	Pb 207.2	Bi	Po	At	Rn
87	137.33 88	174.97	178.49	180.95 105*	183.85			182.22		190.97	200.59	204.37	207.2	1775	(205)	Certo	(Addreed)
(223)	Ra: 226.03	(260)	(261)	(262)	(263)	*Name /	Not Offic	ially Ass	ligned								
192																	

66 Dy 162,50 98 Cf (251) E9 Tm Se Ce Nd Eu ТЪ Ho Êr Yb 57 Pr 61 62 Gd Prri (145) 93 110 237.05 =La Sm Lanthanide Series 140.91 91 Pa 150.4 94 151.96 95 157.25 96 158.93 97 164,93 99 E 5 (254) 167.26 100 138.91 89 168.93 101 140.12 144.24 173.04 92 U 90 102 Actinide Series #Ac Fin BK (247) Th PU (244) Arri (243) 10 Me Cm (257) (227) 238.03 (247) (258)(259)232.04 231.04

							H 1.0079										0.0	/IIIA
IA	IIA											IIIA	IVA	VA	VIA	V	IA	He 4.0026
Li	Be											B	Č	N	Ő	-		Ne
6.941	9.0122											10.81	12.011	14.0	15,999	11	998	20,179
引起	Mg	IIID	11 /D	1/D	VID		_	VIIIB		ID	UD	A	Si	P	S		1	Ar
22 990	24,305	IIIB 21	IVB	VB	24	VIIB	26	27	28	1B 29	IIB 30	26.982	28,086	30.9	1 32.06 34	3: 4	153	19.948
K	Ca	Sc	Ti	23 V	Cr	Min	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	B	r	Kr
39.098	40.08	44,956	47.90	50.941 41	51.996 42	54.938 43	55.847	58.933 45	58.71 46	63,546 47	65.38 48	69.72	72.59 50	74.9	78.96	75 5	904	63.80
37 Rb	Sr.	39 Y	Žr	Nb	Mo	Ťs	Ru	Rh	Pd	Åq	Čd	49 In	Sn	S	Te	Î		Xe
65.468	87.62	88,906	91.22	92.906	95.94	(98) 75	101.07	102,91	106.4	107.87	112.41	114.82	118.69	121.	127.60	1: 5	.90	191.30
55	56	71	72	73 Ta	74 W		76	Ir.	78 Pt	Au Au	80	81	Pb	B	Po		5	86 Do
132.91	137.33	174.97	178.49	180.95	183.85	Re 185.21	190.2	192.22	195.09	196.97	200.59	204.37	207.2	208.	(209)	0	10)	(222)
87	88	103	104*	105*	106*				100.00	100.01	200.00	204.01		200.				
Fr	226.03	(260)	(261)	(262)	(263)	*Name	Not Offic	ally Ass	signed									

All have 6 electrons on their outermost shell!

All of the group are metals except for which is metal? 70 olonium а Êr 69 Tn ٢b 20 (145) 150.4 94 158.93 97 164,93 99 ES 138.91 144.24 151.96 157.25 162.50 167.26 140.12 140.91 68.93 73.04 89 91 92 93 95 96 98 100 102 90 101 Frr 1 lo PU Bk Ci LAC n/A 1/10 10 Crr Actinide Series (244)(251)(254)(259)231.04 238.03 237.05 (243)(247)247 (257)(258)(227)232.04

Group 17 - The Halogens

IVA VA VIA They are **non metals** 8.99 16 All of the elements in group one 30 974 32.0 15 453 8.086 have seven electrons in their Br Ge As 79.90 outermost shell! Sb 18.6 They are **reactive -** They have a 84 tendency when reacting with outer compounds to gain one electron 70

Am

Actinide Series 2 A.C.

64.9

Ēε

BK

Cm

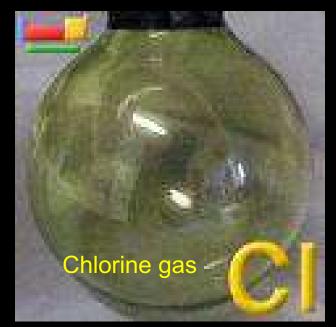
Ci

100

10

Group 17 - The Halogens







Group 18 - The Noble gases



Lanthanide

Actinide Series

138.91

140.12

140.91

91

They are all **non metals**

They are all odourless and colourless gases

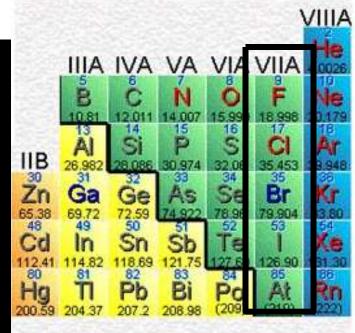
They are <u>very</u> <u>unreactive</u> as they have an outer shell full of electrons, which makes them chemically stable

144.24

(145)

150.4

94



70

65

158.93

97

62.50

64.9

99

100

151.96 157.25

Group 18 - The Noble gases







The odd one out.. Hydrogen

IA	IIA		SAN AND				H 1.0079					IIIA	11/4	VA		VIIA	
Li 6.941	4 8e 90122 12 Mg							.				B 10.81 13 Al	12.011 14 14	14.007 15 P	15.999 16 S	F 18,998	10 Ne 20.179
22.990 13	24,305 20 Ca		IVB 発			VIIBI	Fe	-VIIIB	28 Ni		IIB 30 Zn		28.086 32 Ge	11000	32.06 34 Se	35,453	
37 Rb	40.08 38 Sr	44.956 39	47.90 40 Zr	50,941 41	51,996 42 Mo	54.938 43 丁ご	55.847 44 Ru	58.933 45 Ph	58.71 46 Pd	63.546 47	65.38 48	69.72 49	72.59 50 Sn	74 922	and the second se	A REPORT OF THE PARTY OF THE PA	A CONTRACTOR OF A
65.468 55 CS	87.62 56 Bat	88.906 71 Lu		92.906 73 Ta		(98) 75 Re	101.07 76 OS	102,91	106.4 78 Pt	107.87 79 Au	112.41 80 Ha	114.82 81 TI	118.69 82 Pb	121.75 Bi	127.60 84 Po	126.90 85 At	Rn
132.91 87 Fr	137.33 88 Ra:	174.97 103	178.49 104*	180.95 105*	183.85 106*	186.21	190.2	192.22	195.09	196.97	200.59	204.37	207.2	208.98		(210)	(222)
(223)	226.03	(260)	(261)	(262)	(263)	*Name I	Not Offic	icially Ass	igned								

Lanthanide Series	138.91	140.12	140.91	144.24	(145)	150.4	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04
Actinide Series	:Ac	Th	Pa	Ű	93) 237.05	94 Pu	ee Am	Sm 28	BK	98 C'i	Es.	Frn	101 IVICI	102 [·]) (259)