

# Groups in the Periodic table

# Learning Outcomes

- Elements. Symbols of elements 1–36.
- The periodic table as a list of elements arranged to demonstrate trends in their physical and chemical properties.
- Brief statement of the principal resemblances of elements within each main group, in particular alkali metals, alkaline earth metals, halogens and noble gases.

# Modern periodic table

Group 1		2	Transitional Elements																3	4	5	6	7	0			
Row																											
1	7 4 Li lithium	9 9 Wd wood																	11 6 B boron	14 7 C carbon	12 6 N nitrogen	18 9 O oxygen	61 7 Do doreen	11 9 Ne neon			
2	23 11 67 Na sodium	12 24 Mg magnesium																	12 16 Al aluminium	19 12 Si silicon	21 16 P phosphorus	16 32 S sulphur	35.5 11 Cl chlorine	40 9 Ar argon			
3	10 7 72 K potassium	44 20 Ca calcium	41 12 Mr man	15 29 Ti titanium	0 0 Ng nothing	5 8 Cr chromium	25 50 Mn manganese	4077 898 Fe iron de havilland	17 6 Co cobalt	59 59 Ni nickle	109 52 Ag silver	60 22 Zn zinc	999 911 Cu copper	25 12 Xm christmas	70 32 As arsenic	70 32 Hi hello	8 11 Br bromine	36 83 Kr kryptonite									
4	13 11 70 Fo foramynstance	8 19 Sr strontium	84 13 Y yttrium	91 41 Zr zirconium	108 4 To toronto	97 4 Mo molybdenum	2 29 Mngm manganeseum	20 40 Mz marzipan	102 16 Rh rhodium	41 21(i) I-Ca I calcium	243 19 Au gold	111 16 Cd cadmium	114 17 In indium	109 15 Sn tin	3 11 Rd red	1 1 H2O water	126 44 I iodine	104 15 Xe xenon									
5	224 86 Cs caesium	141 17 Ba barium	147 57 La lanthanum	4 4 Mu music	11 6 Dy dysprosium	104 89 W tungsten	312 6 Sg segnomin (thomason's oil)	104 89 Tg tungsten	11 27 Wx wax	19 78 Pt platinum	243 191 fAu fools gold	101 91 Hg mercury	23 12 Po podium	17 6 Pb lead	207 82 Bi bismuth	207 82 Hj henhemjamib	109 17 G goo	304 1 Rn radon									
6	7 77 Fr france	22 9 Ra radium	60 40 Lt light																								
		6 7 La lambert	97 4 Pr prae-sodium	304 7 Mt malt	148 17 Pm promethium	40 19 Bu business	16 21 Rb rhubarb	108 63 Cd custard	19 8 F flourine	4 9 Od odium	52 16 Do docherty	176 84 Er erbiun	17 76 Ro rodeo	24 19 Ty thankum	104 83 Eu europium												
		5 4 Jz jazz	0.01 0.001 A atom	28 119 U uranium	241 17 Np neptunium	231 16 Pu plutonium	304 30 Gu goolinium	20 91 Am americum	246 94 Cm curium	5 10 Te tedium	21 60 Es einsteinium	19 6 Wi wine	97 42 Tc technetium	104 7 Lu lavender	20 10 Bf beef												

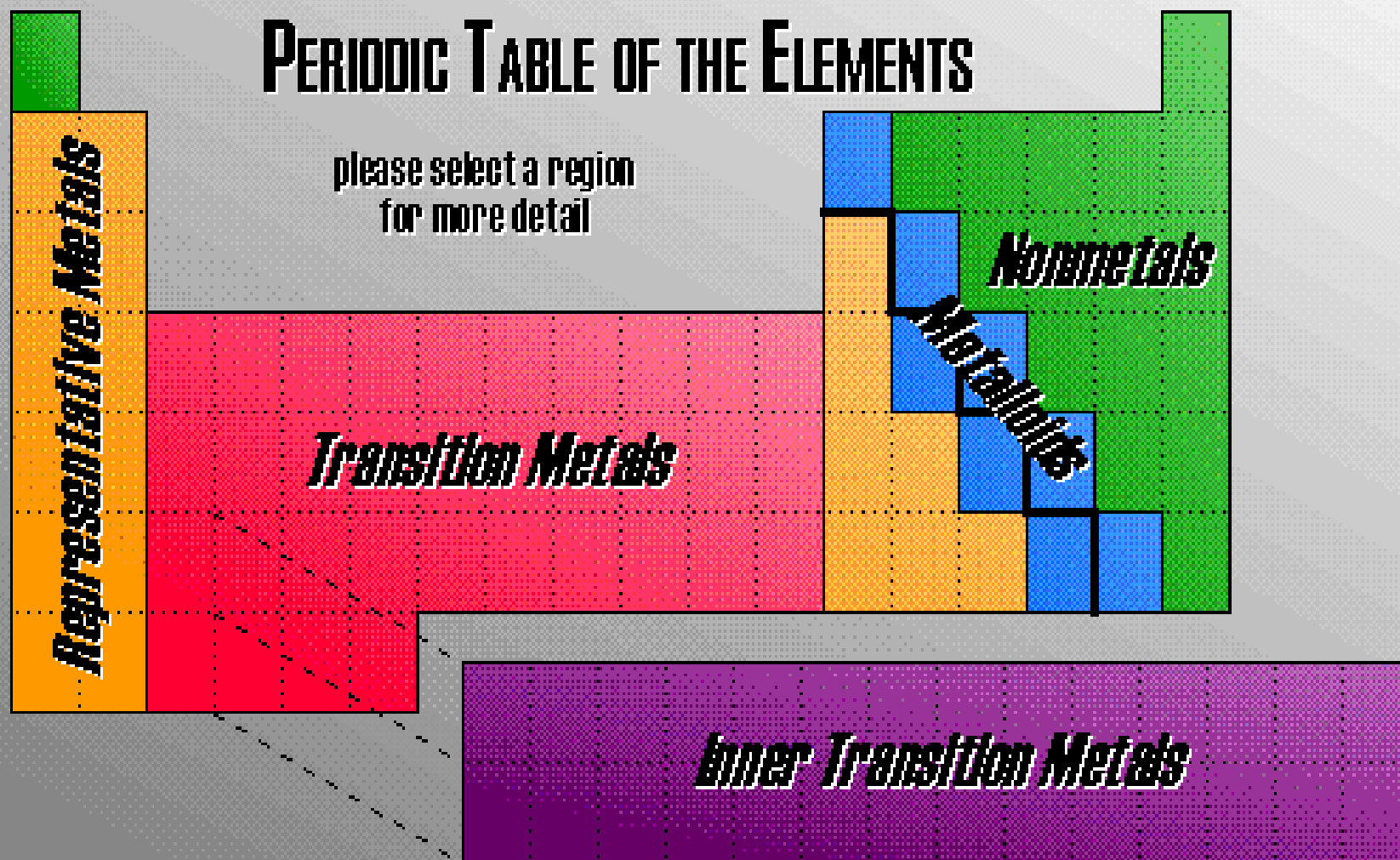
## \*Periods

- The period number of an element signifies the highest unexcited energy level for an electron in that element.
- It also tells us the number of energy levels occupied by electrons.

# \*Groups

- Elements in the same group have the same number of electrons in their outermost energy level.
- This number is equal to the group number.
- The outer electrons are called valence electrons. Because they have the same number of valence electrons, elements in a group share similar chemical properties.

# Classifying Elements- Metals

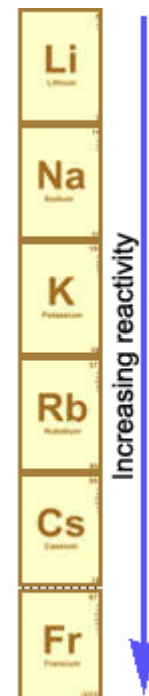


## \*Metals

- Metals are lustrous (shiny), malleable (can be hammered) and Ductile (can be stretched)
- are good conductors of heat and electricity.
- Usually hard.

# \*Alkali metals

- Group 1
- Very reactive
- Low density
- Soft-can be cut with a knife
- Burn in air to form oxides
- React with water to form hydroxides
- Form +1 ions



A vertical column of six yellow boxes representing the alkali metals in Group 1 of the periodic table. From top to bottom, the boxes are labeled: Li (Lithium), Na (Sodium), K (Potassium), Rb (Rubidium), Cs (Cesium), and Fr (Francium). To the right of the column is a blue arrow pointing downwards, with the text 'Increasing reactivity' written vertically alongside it.

Li <small>Lithium</small>
Na <small>Sodium</small>
K <small>Potassium</small>
Rb <small>Rubidium</small>
Cs <small>Cesium</small>
Fr <small>Francium</small>



# Alkaline Metals 1

## Learning outcome

Demonstration of the reaction with water of lithium, sodium and potassium.

# \*Sodium

- Sodium + Oxygen  $\rightarrow$  Sodium oxide
- Sodium + Water  $\rightarrow$  Sodium Hydroxide + Hydrogen gas
- Stored in oil to prevent them from reacting with air or water

\*

- Write a chemical equation to represent these word equations for Sodium.
- Repeat for Lithium and Potassium.
- Do in pencil!!

# \*Alkaline Earth Metals

- Group 2
- Reactive
- Harder than group one
- Burn in air to form oxide
- React with water to form hydroxides
- Form +2 ions

IA	IIA	
<sup>1</sup> <u>H</u>		
<sup>3</sup> <u>Li</u>	<sup>4</sup> <u>Be</u>	
<sup>11</sup> <u>Na</u>	<sup>12</sup> <u>Mg</u>	<b>IIIB</b>
<sup>19</sup> <u>K</u>	<sup>20</sup> <u>Ca</u>	<sup>21</sup> <u>Sc</u>
<sup>37</sup> <u>Rb</u>	<sup>38</sup> <u>Sr</u>	<sup>39</sup> <u>Y</u>
<sup>55</sup> <u>Cs</u>	<sup>56</sup> <u>Ba</u>	
<sup>87</sup> <u>Fr</u>	<sup>88</sup> <u>Ra</u>	

# Beryllium

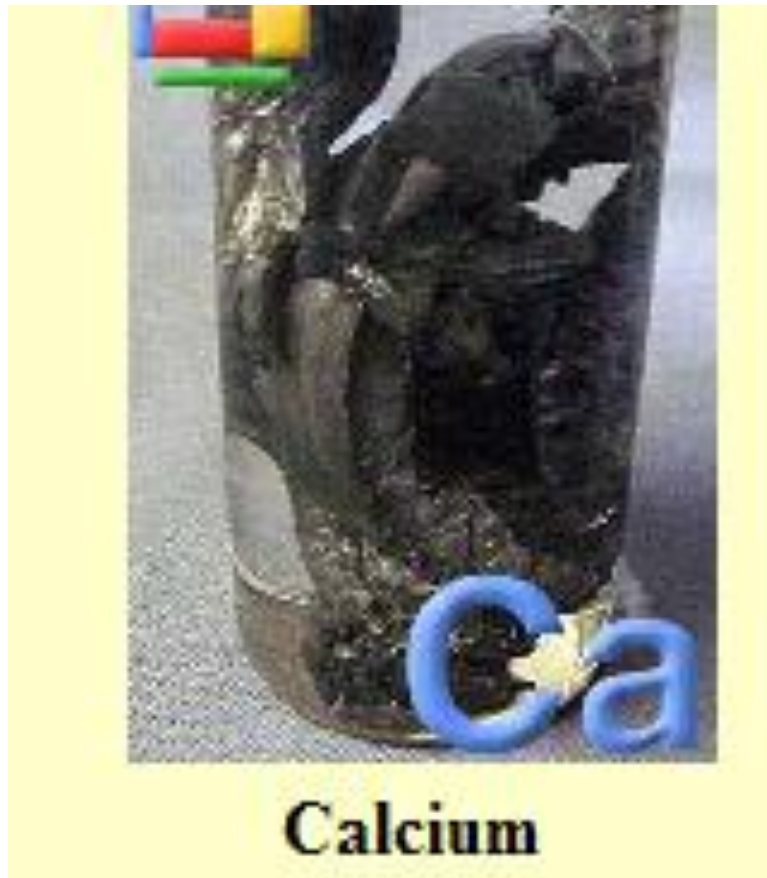


**Beryllium**

# Barium



calcium



# Magnesium



**Magnesium**

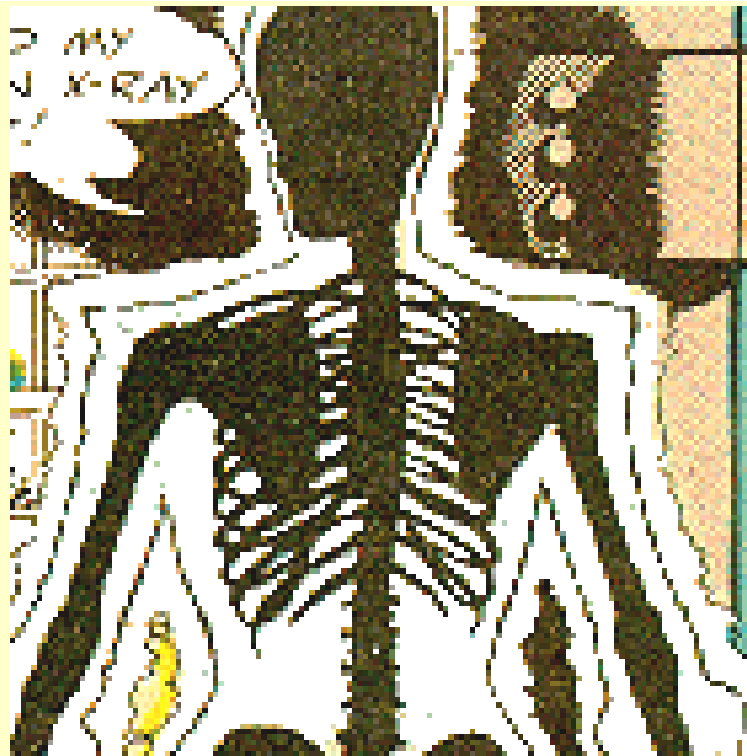


# Strontium



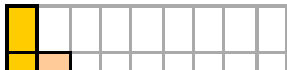
**Strontium**

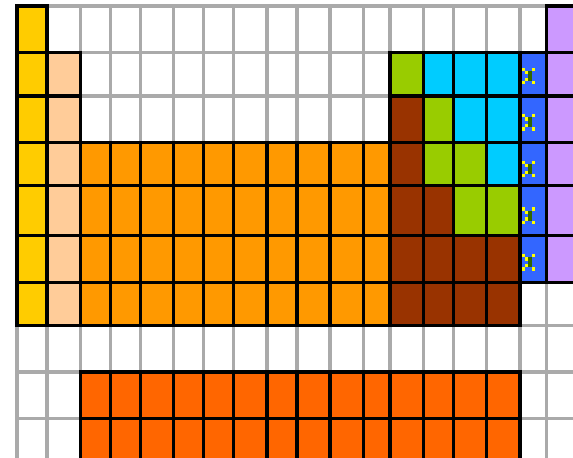
# Radium



**Radium**

# \*Halogens

- Group 7
  - Highly Reactive
  - Chlorine, Bromine, Iodine
  - React with hydrogen to form acids
  - Form -1 ions
- 
- A decorative graphic in the bottom right corner consisting of a grid of colored squares. The grid is 10 squares wide and 4 squares high. The first column has a yellow square in the top row and an orange square in the bottom row. The second column has an orange square in the bottom row. All other squares are white.



# Chlorine

- Green gas
- Chlorine + Hydrogen  $\rightarrow$  Hydrogen Chloride gas
- Hydrogen chloride gas dissolves in water to form Hydrochloric acid.
- Chlorine reacts with sodium to form Sodium Chloride [Table Salt]

# bromine



bromine



raisinette

# iodine



# Noble Gases

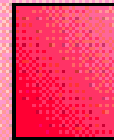
- Group 8
- Helium , Neon, Argon
- are very unreactive
- Do not form ions.
- Have full outer shell of electrons, are stable.
- used to make lighted signs, refrigerants, and lasers.



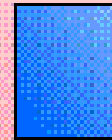
# Transition metals

## Transition Metals

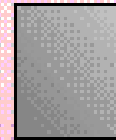
Select an element for more information



Gas



Liquid



Solid

		<i>Group</i>									
		IIIB (3)	IVB (4)	VB (5)	VIB (6)	VII B (7)	VIII			IB (11)	IIB (12)
<i>Period</i>	4	Sc	Ti	V	Cr	Mn	(8)	(9)	(10)	Cu	Zn
	5	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd
	6	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
	7	Ac	Unq	Unp	Unh						



# Transition Metals

- The transition elements are located in groups IB to VIIIB.
- These elements are very hard, with high melting points and boiling points. The transition metals are good electrical conductors.
- They form positively charged ions.

More on these later.