

Periodic Table

Mr. Skirbst











Periodic Table

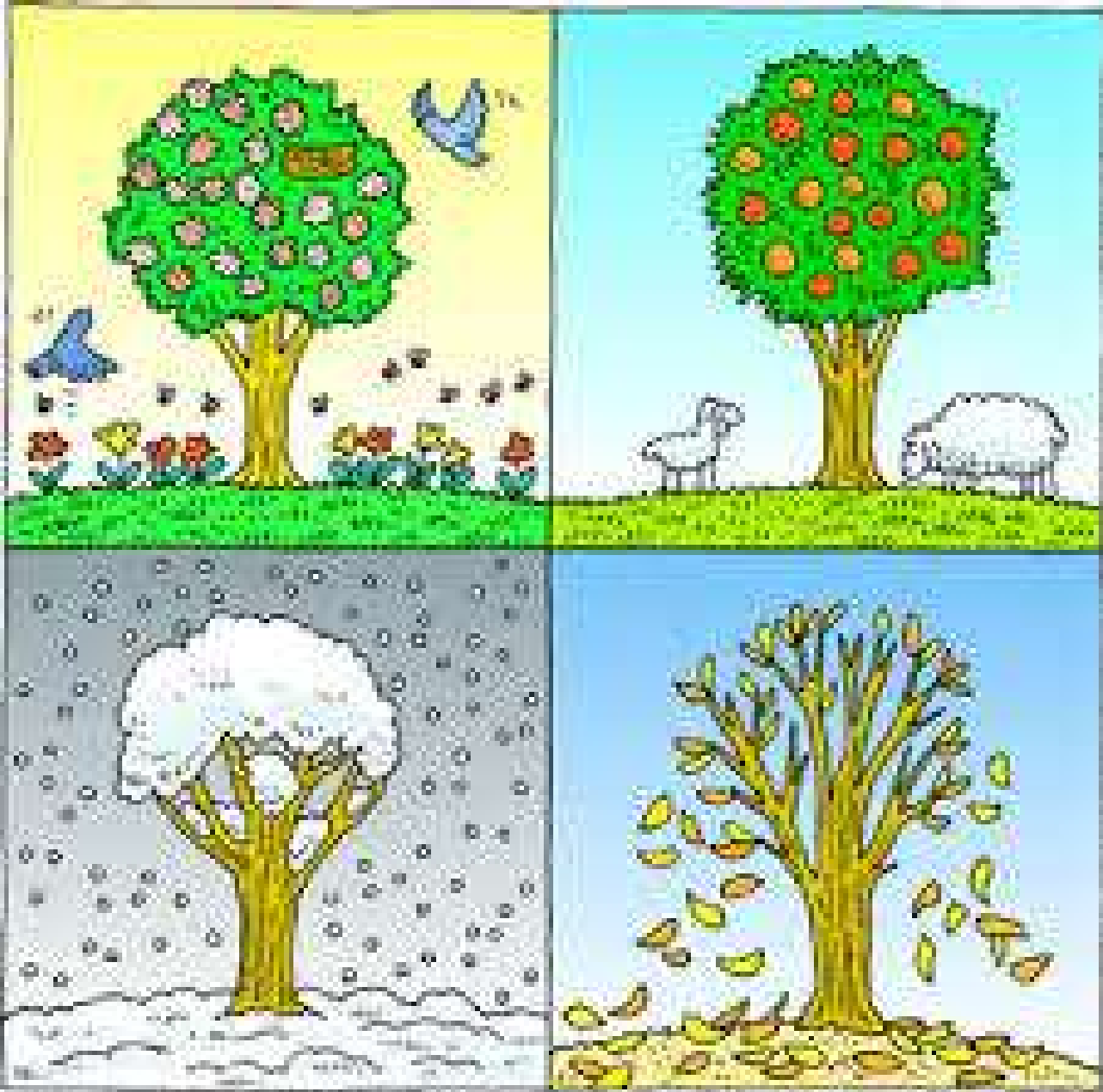
- An arrangement of elements based on a repeating pattern



Patterns with Christmas Lights

					
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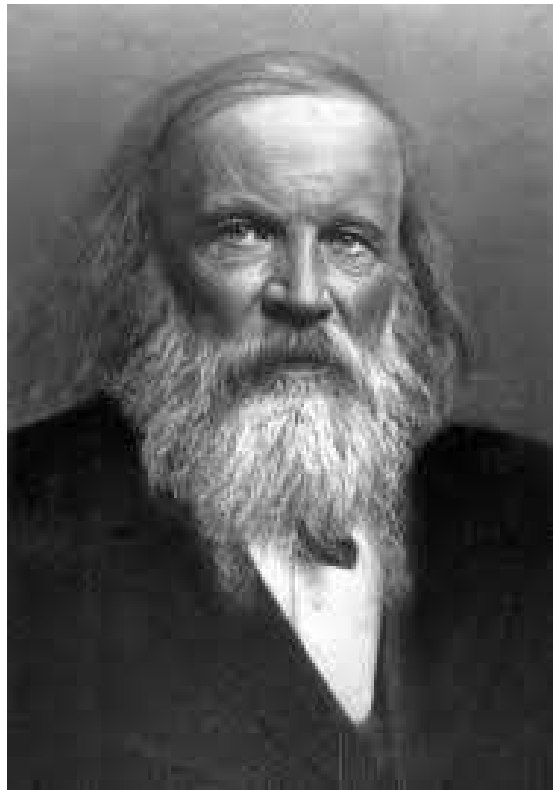
					
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CALENDAR

Periodic Table

Dmitri Mendeleev (Russian Chemist)



Periodic Table

Dmitri Mendeleev (Russian Chemist)

- In mid 1800's, first to arrange elements into a periodic table

Periodic Table

Dmitri Mendeleev's Table

- According to increasing atomic mass

ОПЫТЪ СИСТЕМЫ ЭЛЕМЕНТОВЪ.

ОСНОВАННОЙ НА ИХЪ АТОМНОМЪ ВѢСѢ И ХИМИЧЕСКОМЪ СХОДСТВѢ.

			Ti = 50	Zr = 90	? = 180.
			V = 51	Nb = 94	Ta = 182.
			Cr = 52	Mo = 96	W = 186.
			Mn = 55	Rh = 104,4	Pt = 197,1.
			Fe = 56	Rn = 104,4	Ir = 198.
			Ni = 59	Pt = 106,8	Os = 199.
H = 1			Cu = 63,4	Ag = 108	Hg = 200.
	Be = 9,1	Mg = 24	Zn = 65,2	Cd = 112	
	B = 11	Al = 27,1	? = 68	Ur = 116	Au = 197?
	C = 12	Si = 28	? = 70	Sn = 118	
	N = 14	P = 31	As = 75	Sb = 122	Bi = 210?
	O = 16	S = 32	Se = 79,4	Te = 128?	
	F = 19	Cl = 35,5	Br = 80	I = 127	
Li = 7	Na = 23	K = 39	Rb = 85,4	Cs = 133	Tl = 204.
		Ca = 40	Sr = 87,6	Ba = 137	Pb = 207.
		? = 45	Ce = 92		
		?Er = 56	La = 94		
		?Yt = 60	Di = 95		
		?In = 75,8	Th = 118?		

Periodic Table

Dmitri Mendeleev's Table

- According to increasing atomic mass
- Predicted element #32 “ekasilicon”
(later discovered as Germanium)

Periodic Table

Henry Mosley (British Scientist)



Periodic Table

Henry Moseley (British Scientist)

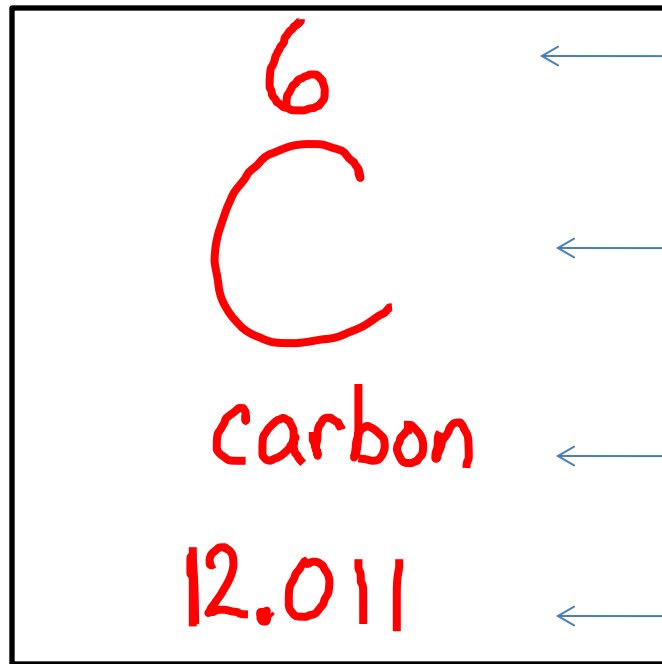
- In early 1900's developed the Periodic Law (elements are arranged by atomic *number* = # of protons)

Periodic Table of Elements

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		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																														
Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Uu	Fl	Uup	Lr	Cup	Uuq																														
<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>La</td> <td>Ce</td> <td>Pr</td> <td>Nd</td> <td>Pm</td> <td>Sm</td> <td>Eu</td> <td>Gd</td> <td>Th</td> <td>Dy</td> <td>Ho</td> <td>Er</td> <td>Tm</td> <td>Yb</td> <td>Lu</td> </tr> <tr> <td>Ac</td> <td>Th</td> <td>Pa</td> <td>U</td> <td>Np</td> <td>Pu</td> <td>Am</td> <td>Cm</td> <td>Bk</td> <td>Cf</td> <td>Es</td> <td>Fm</td> <td>Md</td> <td>Nu</td> <td>Lr</td> </tr> </tbody> </table>																		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Th	Dy	Ho	Er	Tm	Yb	Lu	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	Nu	Lr
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Th	Dy	Ho	Er	Tm	Yb	Lu																																	
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	Nu	Lr																																	

Periodic Table

Element Square:



approx

← atomic number
(# protons)

← Symbol

← name

← atomic mass
(#P + #N)

Periodic Table

Columns:



- Called “groups” or “families”

Periodic Table

Columns:



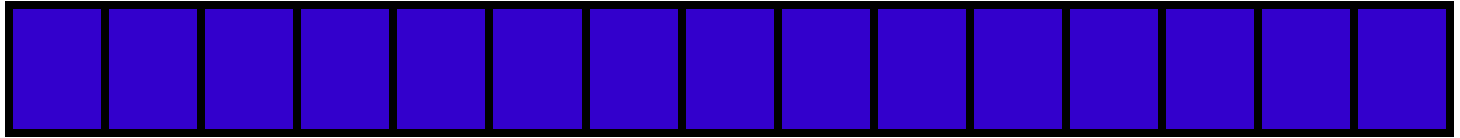
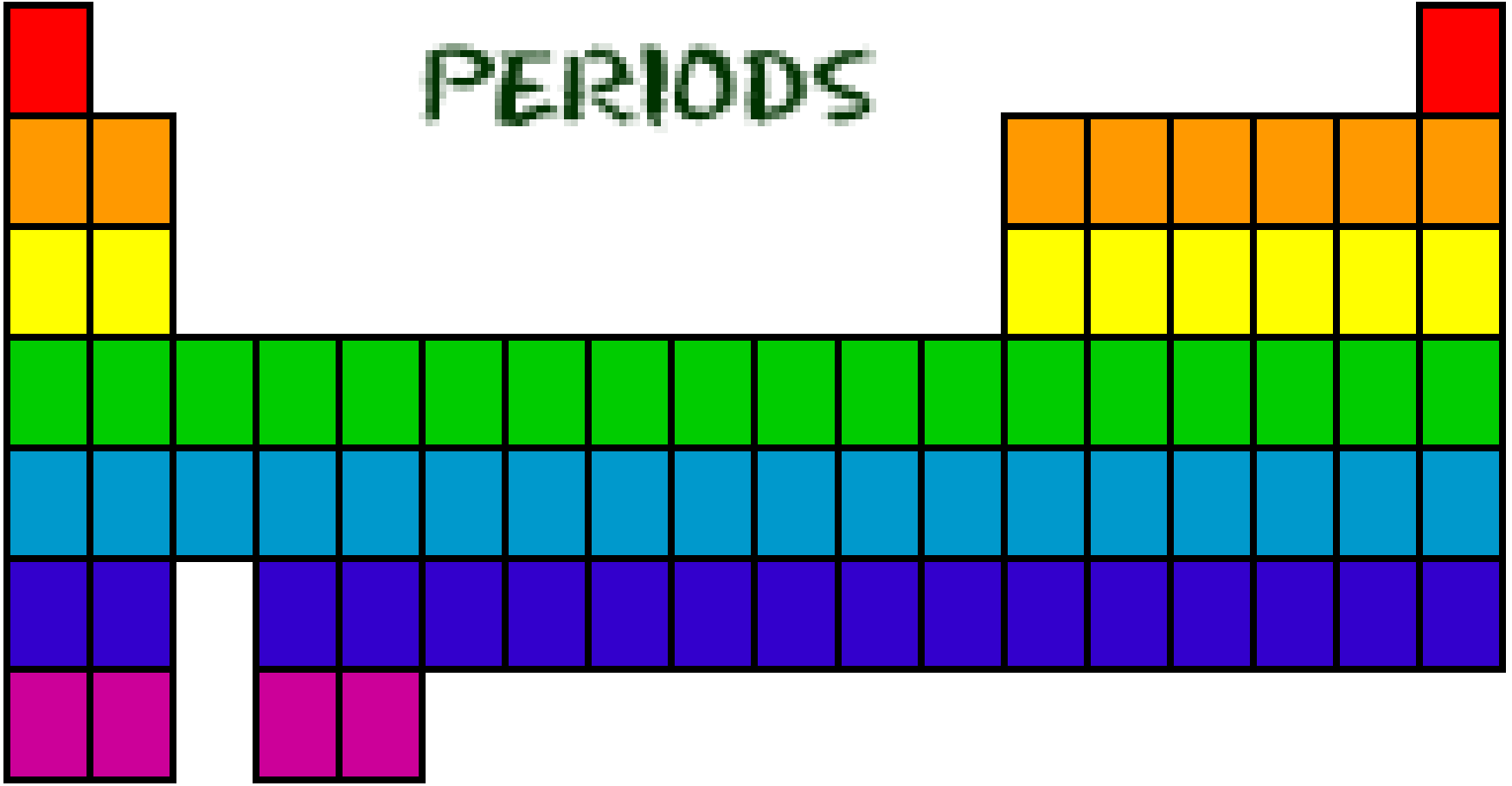
- Called “groups” or “families”
- Elements have similar characteristics or properties

Periodic Table

Rows: 

- Called “periods”

PERIODS



Periodic Table

Rows: 

- Called “periods”
- Elements’ valence # increases from left to right

Periodic Table

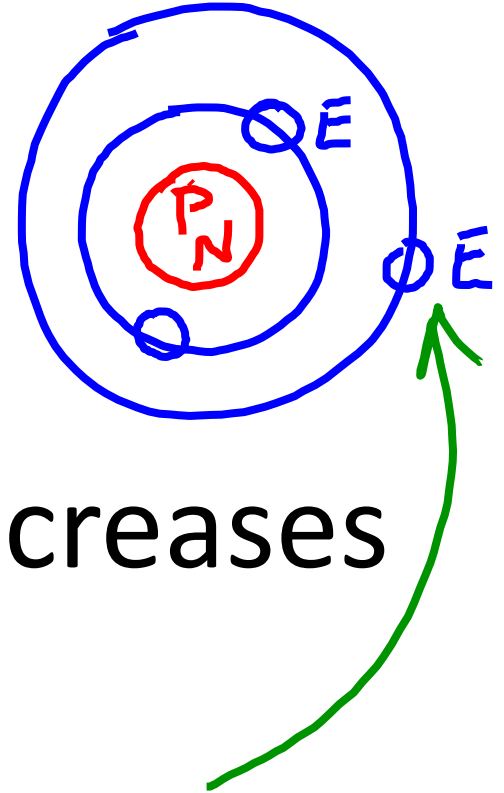
Rows:



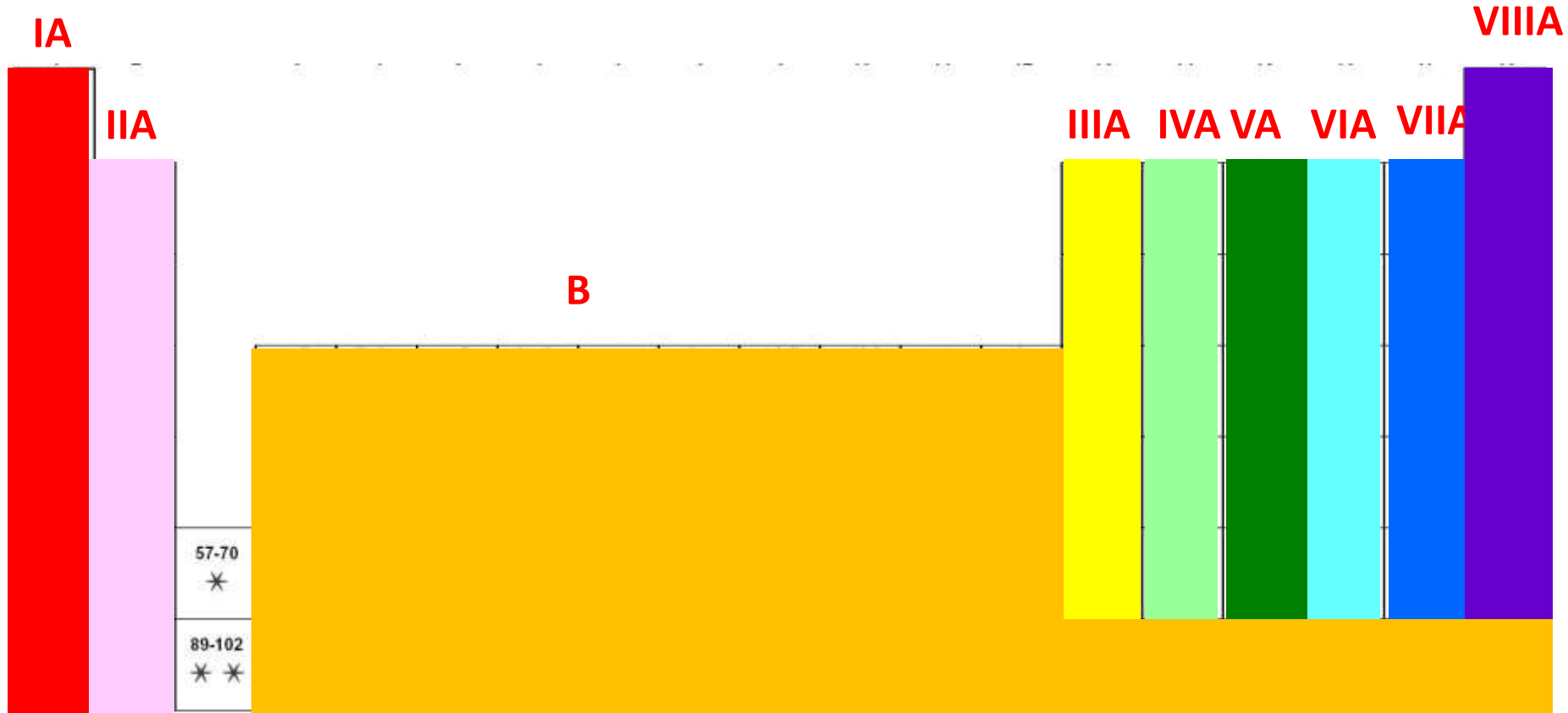
- Called “periods”

- Elements’ valence # increases from left to right

- (valence = # “outer” electrons)



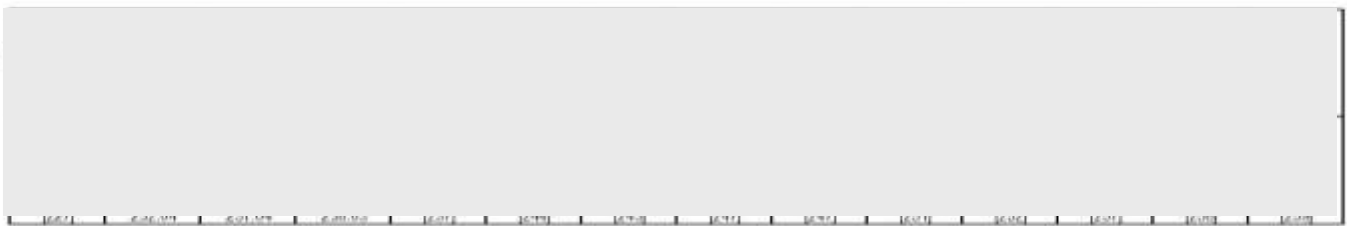
IA	– <u>Alkali Metals</u>	<i>(highly reactive!)</i>
IIA	– <u>Alkaline Earth Metals</u>	<i>(very reactive)</i>
IIIA	– <u>Boron Family</u>	<i>(valence # = 3)</i>
IVA	– <u>Carbon Family</u>	<i>(very “friendly”)</i>
VA	– <u>Nitrogen Family</u>	<i>(valence # = 5)</i>
VIA	– <u>Oxygen Family</u>	<i>(share electrons)</i>
VIIA	– <u>Halogens</u>	<i>(active non-metal)</i>
VIIIA	– <u>Noble Gases</u>	<i>(unreactive)</i>
B	– <u>Transition Metals</u>	<i>(versatile metals)</i>
RE	– <u>Rare Earth Elements</u>	<i>(soft/radioactive)</i>



*Lanthanide series

RE

**Actinide series



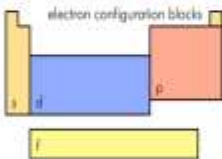
The Periodic Table of the Elements

group 1																	18	
period 1	1 H Hydrogen																	2 He Helium
2	3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
3	11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
4	19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
5	37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
6	55 Cs Cesium	56 Ba Barium	57 Lu Lutetium	58 Hf Hafnium	59 Ta Tantalum	60 W Tungsten	61 Re Rhenium	62 Os Osmium	63 Ir Iridium	64 Pt Platinum	65 Au Gold	66 Hg Mercury	67 Tl Thallium	68 Pb Lead	69 Bi Bismuth	70 Po Polonium	71 At Astatine	72 Rn Radon
7	87 Fr Francium	88 Ra Radium	89 Lr Lawrencium	90 Rf Rutherfordium	91 Db Dubnium	92 Sg Seaborgium	93 Bh Bohrium	94 Hs Hassium	95 Mt Meitnerium	96 Ds Darmstadtium	97 Rg Roentgenium	98 Cn Copernicium	99 Uut Ununtrium	100 Uuq Ununquadium	101 Uup Ununseptium	102 Uuh Ununhexium	103 Uus Ununseptium	104 Uuo Ununquadium

atomic mass — 55.845
 or most stable mass number — 762.5
 1st ionization energy in kJ/mol — 1.83
 chemical symbol — Fe
 name — Iron
 electron configuration — [Ar] 3d⁶ 4s²

atomic number — 26
 electronegativity — +6, +5, +4, +3, +2, +1, -1, -2
 oxidation states — most common are bold

- alkali metals
- alkaline metals
- other metals
- transition metals
- lanthanoids
- actinoids
- metalloids
- nonmetals
- halogens
- noble gases
- unknown elements
- radioactive elements have masses in parenthesis



- notes
- as of yet, elements 113-118 have no official name designated by the IUPAC.
 - 1 kJ/mol = 96 485 eV
 - all elements are implied to have an oxidation state of zero.

138.9054 89 La Lanthanum	140.116 58 Ce Cerium	140.9076 59 Pr Praseodymium	144.242 60 Nd Neodymium	144.9125 61 Pm Promethium	150.36 62 Sm Samarium	151.964 63 Eu Europium	157.25 64 Gd Gadolinium	158.9253 65 Tb Terbium	162.500 66 Dy Dysprosium	164.9303 67 Ho Holmium	167.259 68 Er Erbium	168.9342 69 Tm Thulium	173.054 70 Yb Ytterbium
(227) 89 Ac Actinium	232.0380 90 Th Thorium	231.0368 91 Pa Protactinium	238.0289 92 U Uranium	(237) 93 Np Neptunium	(244) 94 Pu Plutonium	(243) 95 Am Americium	(247) 96 Cm Curium	(247) 97 Bk Berkelium	(251) 98 Cf Californium	(252) 99 Es Einsteinium	(257) 100 Fm Fermium	(258) 101 Md Mendelevium	(259) 102 No Nobelium