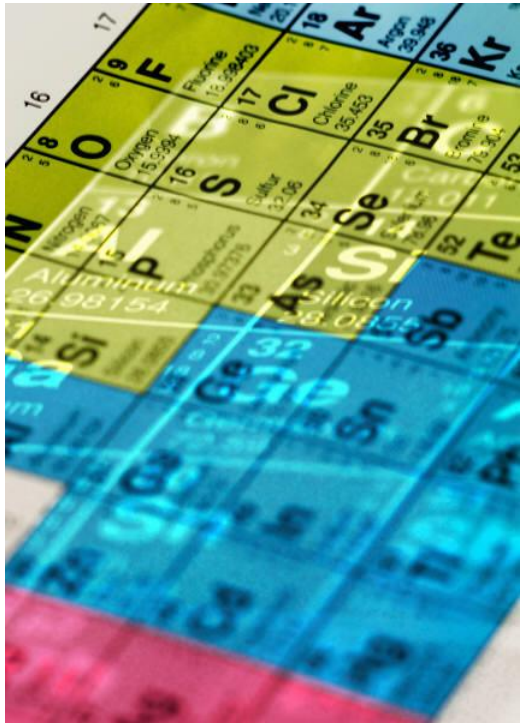
Unit 5: The Periodic Table

Section 1: Organizing the Elements



Early chemists used the properties of elements to sort them into groups, or triads.

<u>1700</u>:
13
elements

Chlorine
35.453 amu

Bromine
79.904 amu

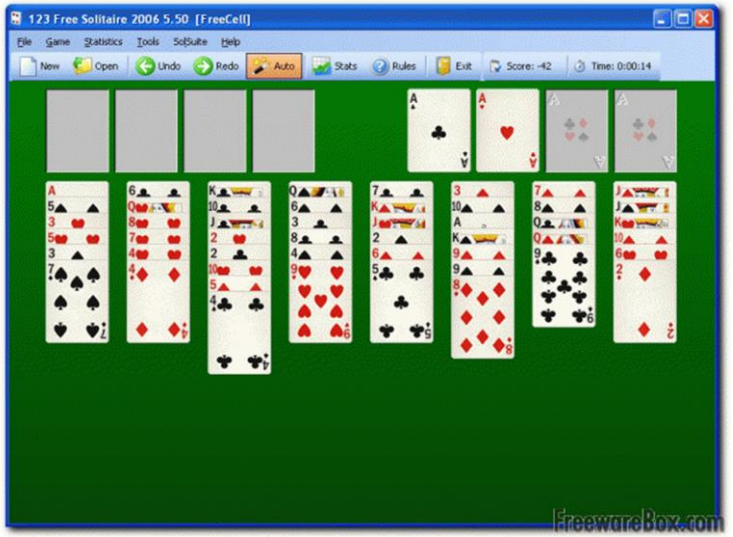
Iodine
126.90 amu

1864:
56
elements

- Newlands and Meyer arrange elements by atomic mass and notice similar properties.

1869:
63
elements

Dmitri Mendeleev got an idea from his favorite card game…



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Mendeleev arranged the **elements** by **increasing atomic mass** *and* by **similar properties**.

Mendeleev's table **predicted** the **properties** of undiscovered elements.

Group / Period	I	II	III	IV	V	VI	VII	VIII
1	H=1							
2	Li=7	Be=9.4	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=27.3	Si=28	P=31	S=32	Cl=35.5	
4	K=39	Ca=40	?=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56,Co=59 Ni=59
5	Cu=63	Zn=65	?=68	?=72	As=75	Se=78	Br=80	
6	Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	?=100	Ru=104,Rh=104 Pd=106
7	Ag=108	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8	Cs=133	Ba=137	?Di=138	?Ce=140				
9								
10			?Er=178	?La=180	Ta=182	W=184		Os=195,Ir=197 Pt=198
11	Au=199	Hg=200	Tl=204	Pb=207	Bi=208			
12				Th=231		U=240		

Elements later discovered:
Gallium, Germanium, and Scandium

Properties of Gallium		
	Mendeleev's predictions	Actual Properties
Atomic mass	68	69.7
Density	6.0 g/cm^3	5.9 g/cm^3
Appearance	soft gray metal	soft gray metal
Melting point	Low melting point	29.8°C

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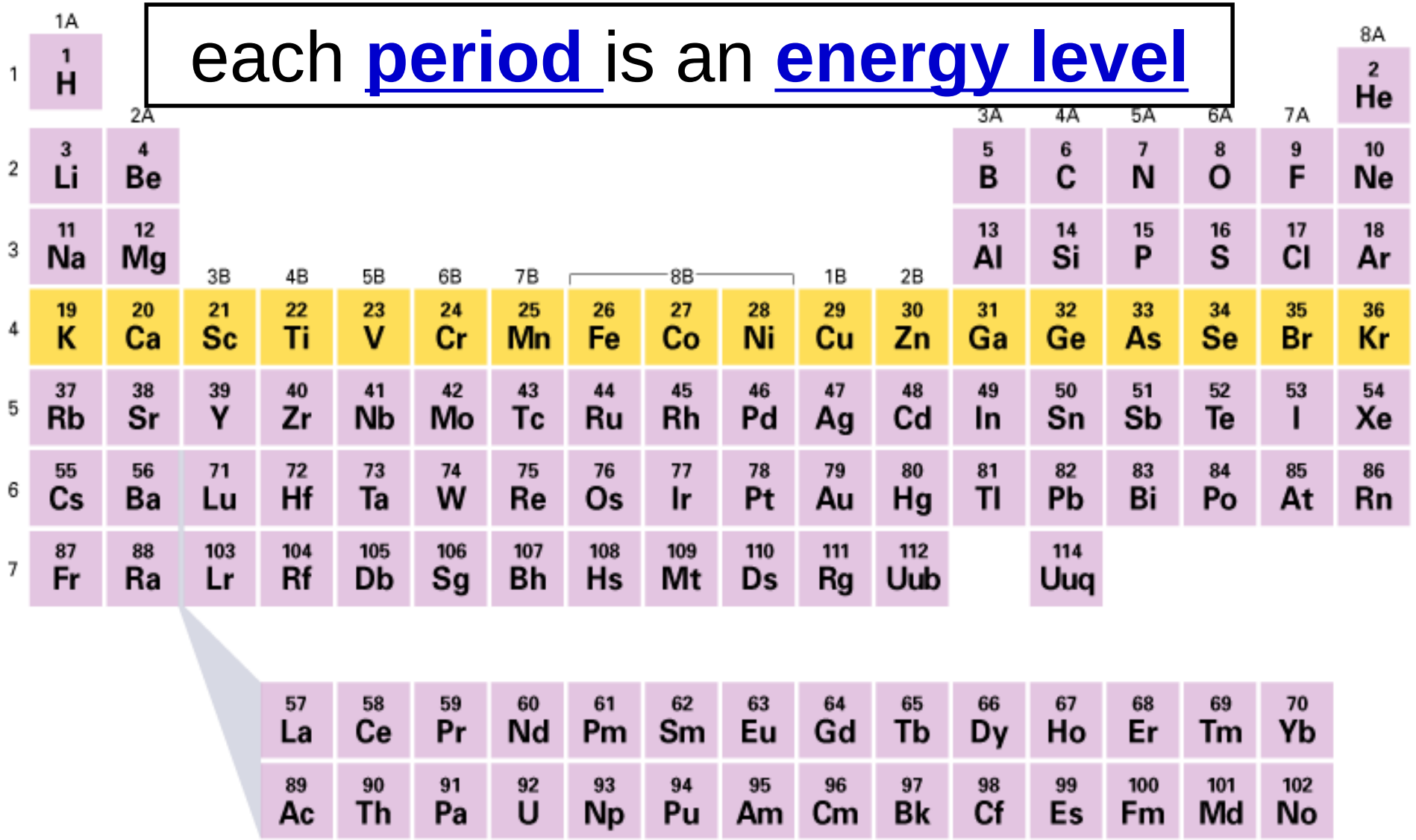
1913: atomic numbers

Moseley arranges elements by the newly discovered "atomic number."

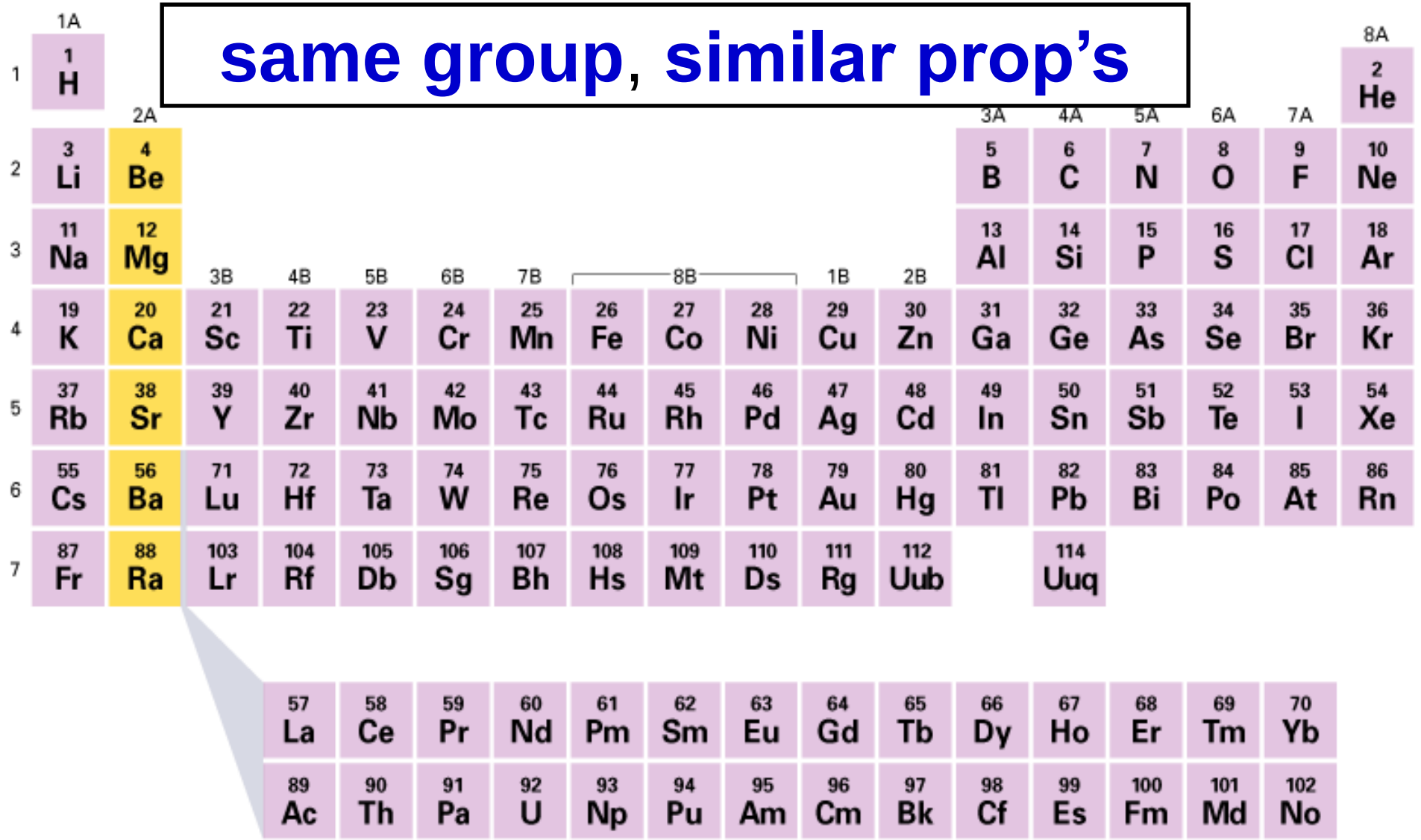
- Period: a row across the table.

each **period** is an **energy level**



- Group : a column down the table.

same group, similar prop's

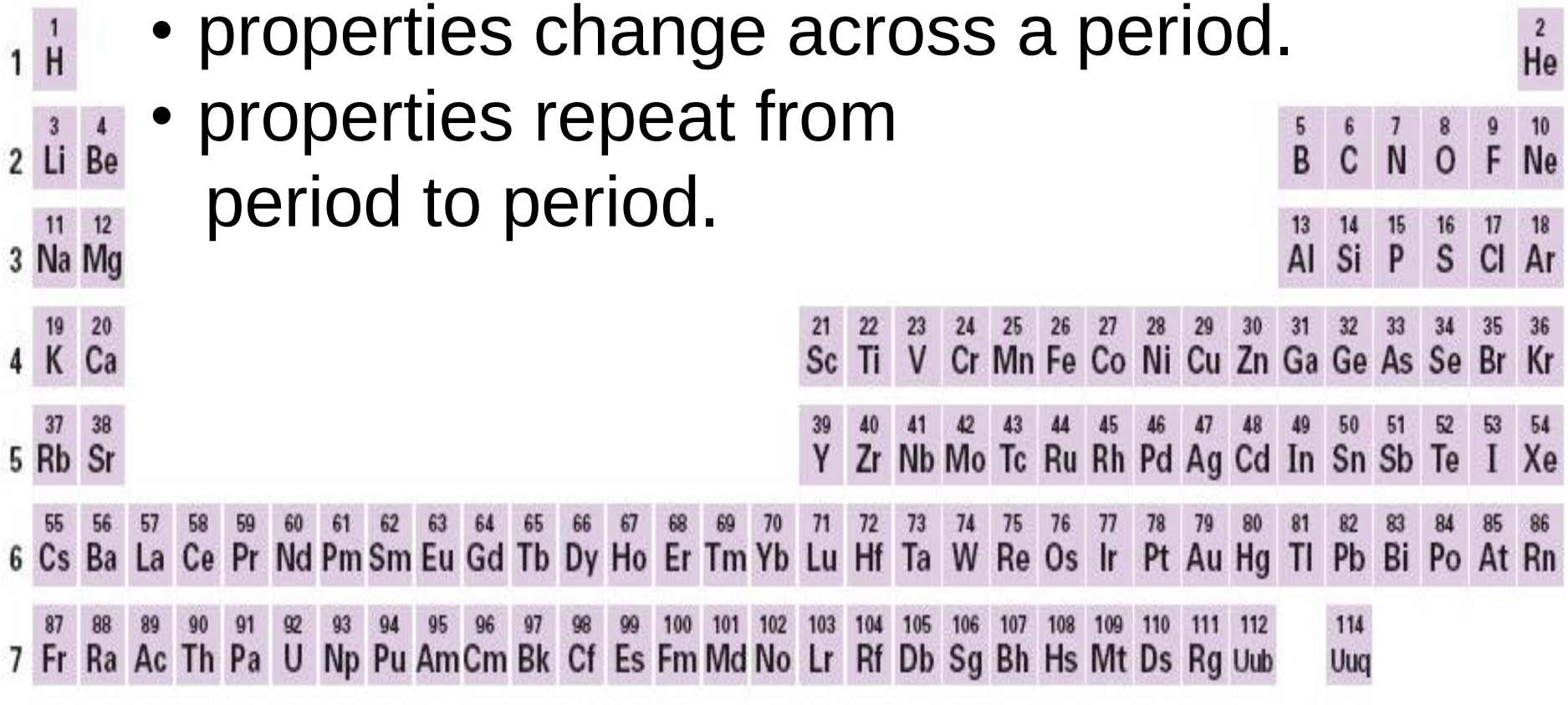


•The modern periodic table arranges elements by increasing atomic number.

Periodic Law:

periodic repetition of **properties**

- properties change across a period.
- properties repeat from period to period.

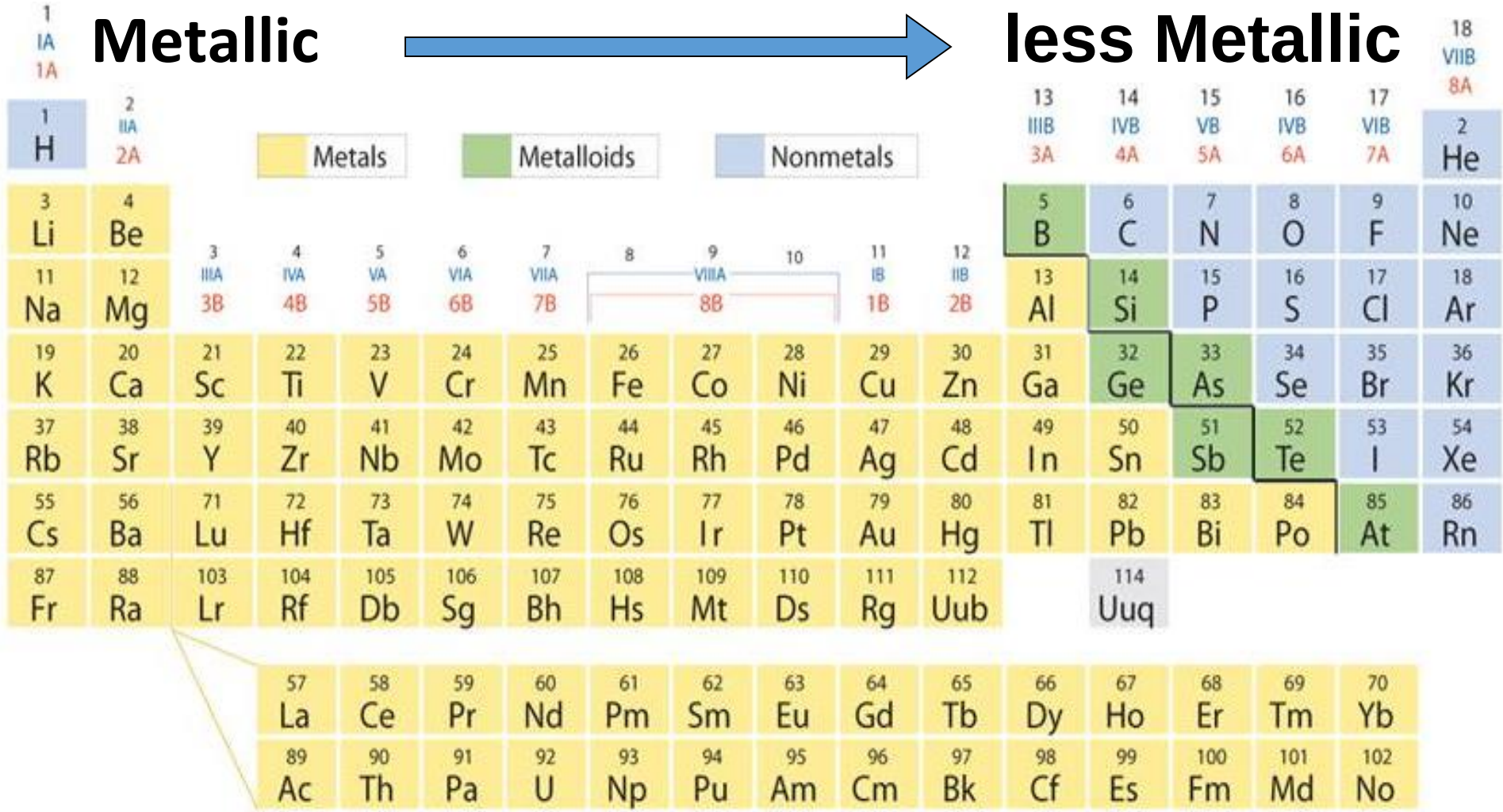


3 classes of elements are:

Metals (most elements)

Metalloids

Nonmetals



Metals	Nonmetals	Metalloids
luster (shiny) malleable (sheets) ductile (wires) good conductors (heat/electricity)	most gases brittle solids poor conductors	dull/shiny brittle semi-conductors