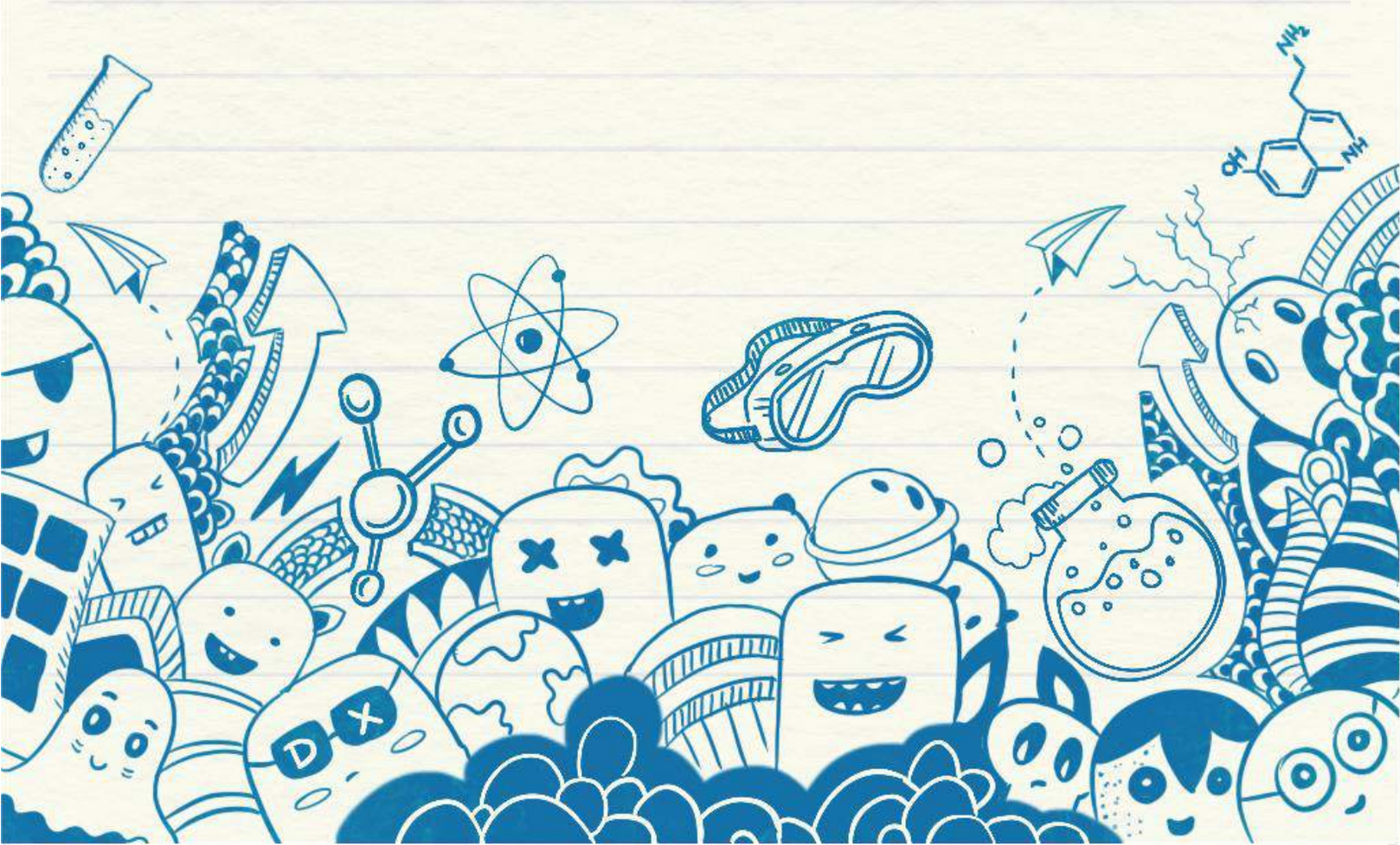
CHEMISTRY

BYJU'S

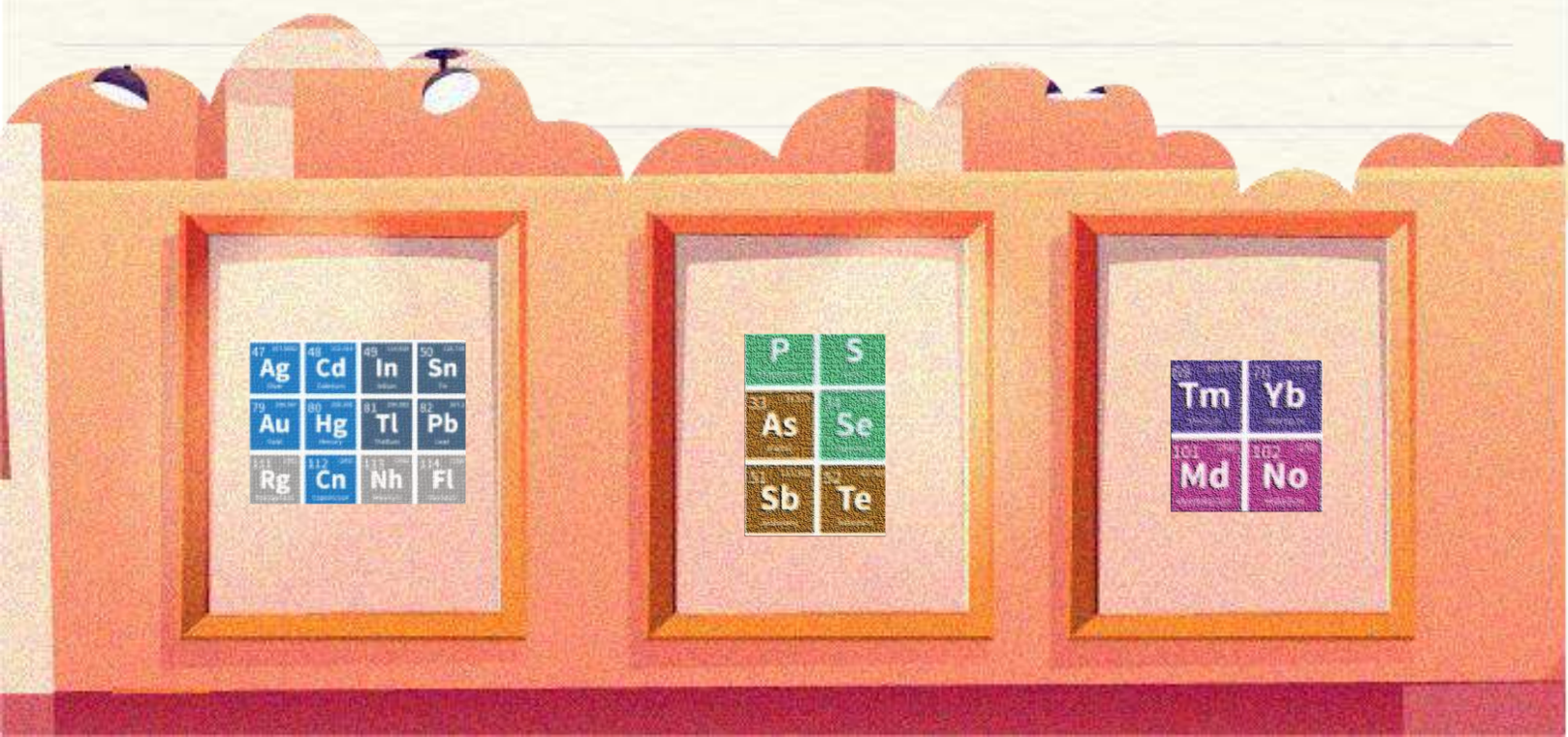
POST CLASS NOTES

Periodic Classification of Elements



Topics

1. Various attempts in the classification of elements
2. Modern periodic table
3. Trends in modern periodic table

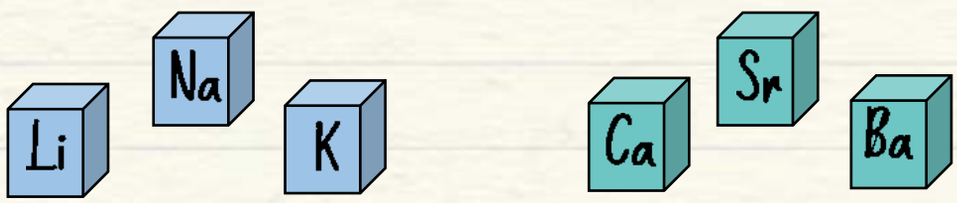


1. Various Attempts in the Classification of Elements

1829

1.1 Johann Wolfgang Döbereiner — Döbereiner's Triads

- Identified some groups of **three** elements that have identical physical and chemical properties known as **triads**



- The atomic mass of the **middle** element in a triad was roughly the **average** of the atomic masses of the other two elements

Element	Atomic Mass	Mean atomic mass 1st and 3rd element
Li	7 u	$\frac{7 + 39}{2} = 23$ u
Na	23 u	
K	39 u	

Limitations

- Only three triads from the elements known at that time

B

1866 | 1.2 John Newlands | Newlands' Law of Octaves

Every eighth element had properties similar to the first element

⇓ Resembles

Octaves of music

Basis of arrangement ⇒ Increasing order of atomic mass

sa (do)	re (re)	ga (mi)	ma (fa)	pa (so)	da (la)	ni (ti)
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S

Limitations

- Law applicable upto calcium only
- Adjusted two or more elements in the same slot
- Discovery of noble gases lead every ninth element similar to the first one

B

1869 | 1.3 Dmitri Ivanovich Mendeleev | Mendeleev's Periodic Table

- Physical and chemical properties of elements → Periodic function of → Their atomic mass

I	II	III	IV	V	VI	VII			
H									
Li	Be	B	C	N	O	F			
Na	Mg	Al	Si	P	S	Cl		VIII	
K	Ca		Ti	V	Cr	Mn	Fe	Co	Ni
Cu	Zn			As	Se	Br			

- Predicted the existence of some elements that had not been discovered at that time

Sc → Eka-boron

Ga, Ge → Eka-silicon

Ga → Eka-aluminium

- Noble gases could be placed without disturbing the existing order

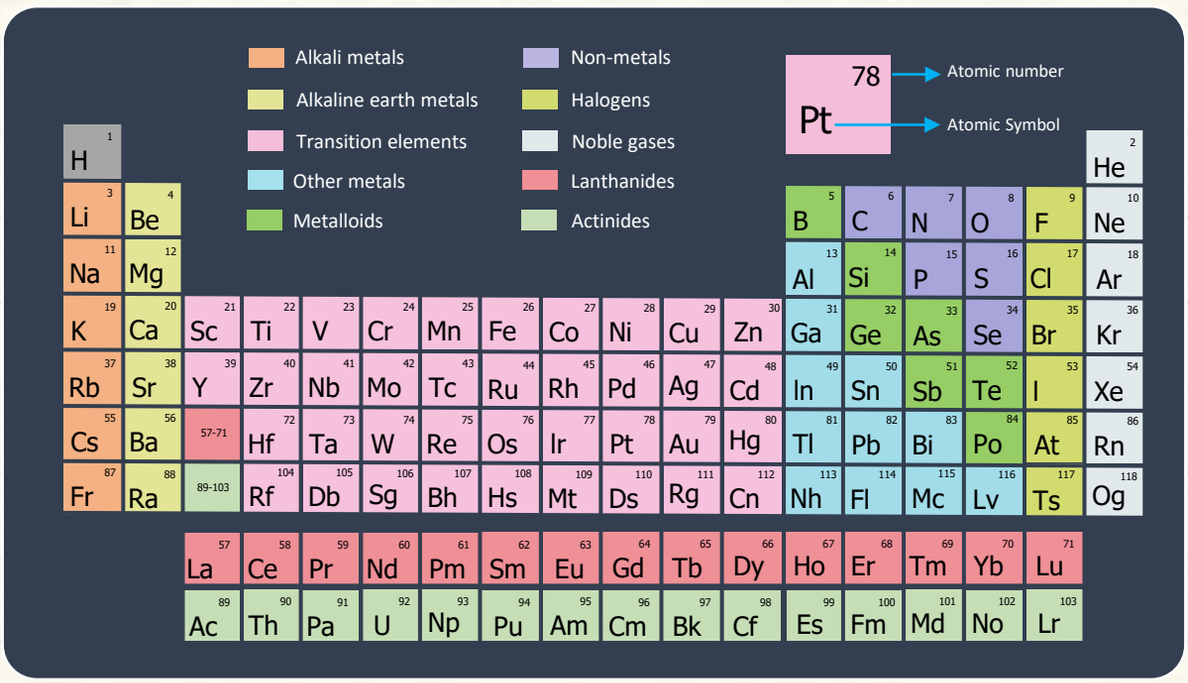
Limitations

- No fixed position was assigned to hydrogen
- No room for isotopes
- At a few instances, an element having slightly greater atomic mass was placed before an element with a slightly lower atomic mass

2. Modern Periodic Table

1913 **Henry Moseley**

- Physical and chemical properties of elements ⇒ Periodic function of ⇒ Their atomic number

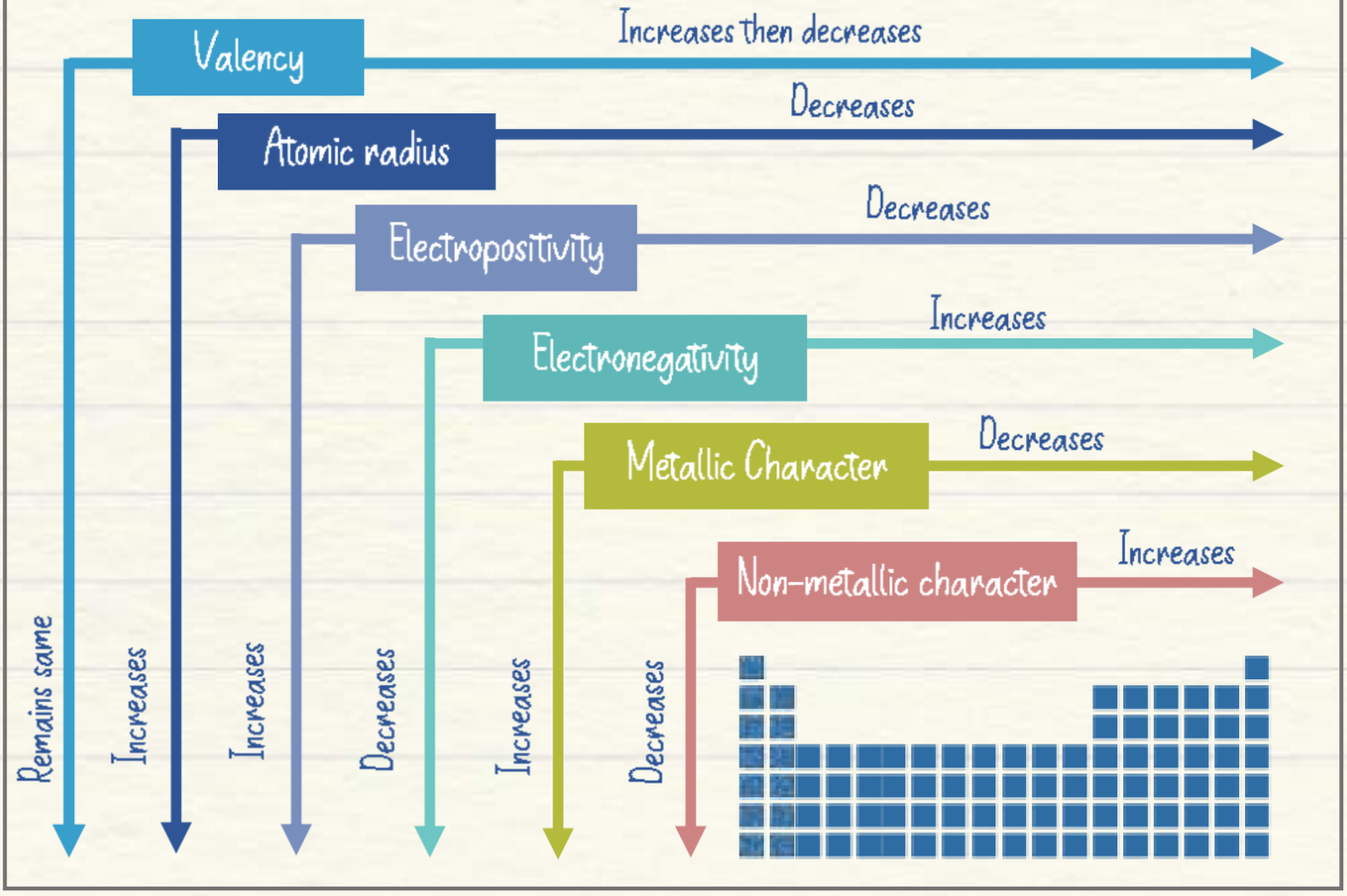


2.1 Features of Modern Periodic Table

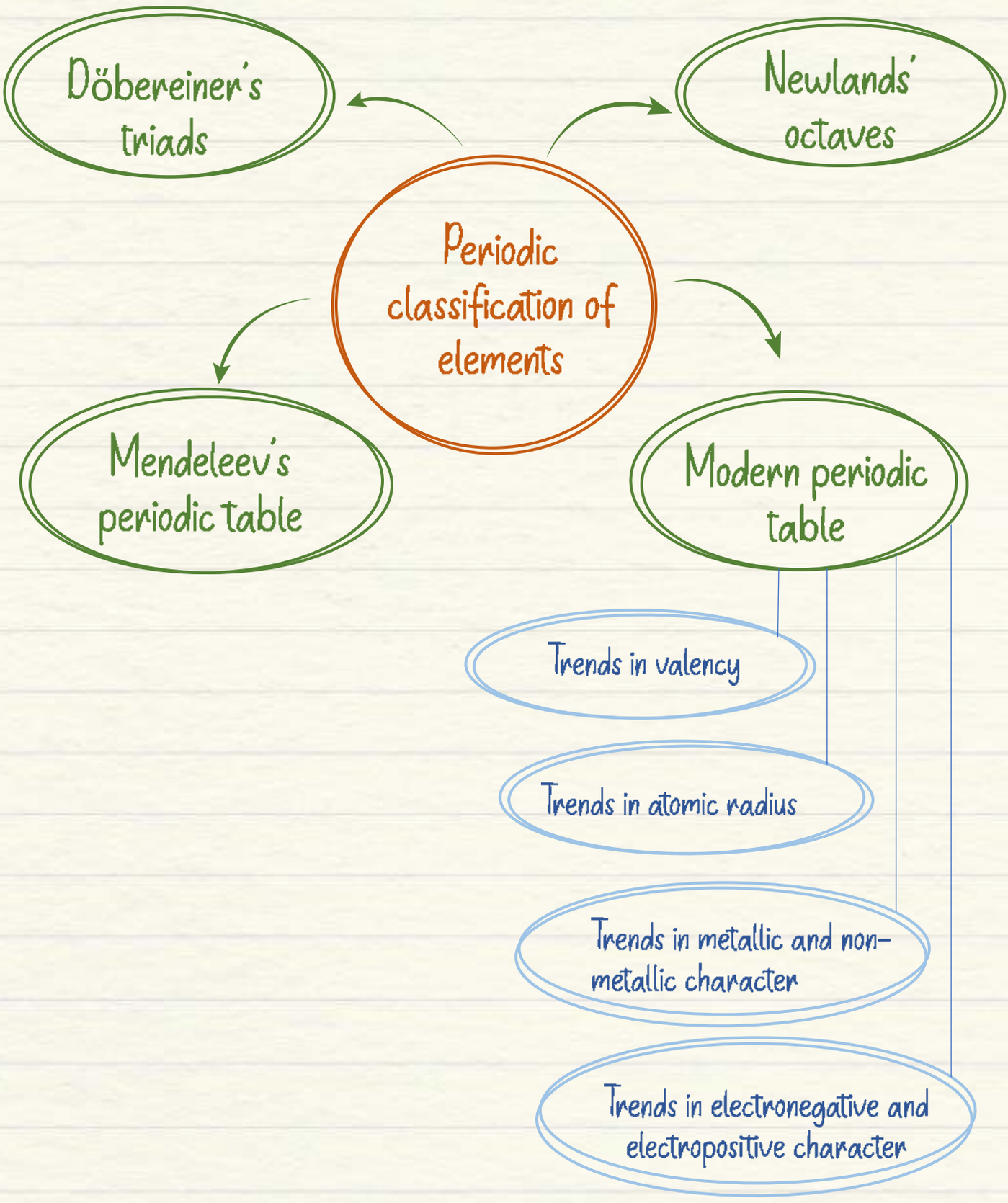
- There are 18 groups and 7 periods
- Down the group
  - ⇒ number of shells increases
  - ⇒ number of valence electrons remain the same
- Across the period:
  - ⇒ number of shells remain the same
  - ⇒ number of valence shell electrons increases by one unit

3. Trends in Modern Periodic Table

Valency	★ Valence electrons < 4, Valency = Number of valence electrons ★ Valence electrons > 4, Valency = 8 – Number of valence electrons
Atomic radius	Distance between the centre of the nucleus and the outermost shell
Electropositivity	Tendency to lose electrons to attain stable electronic configuration
Electronegativity	Tendency to gain electrons to attain stable electronic configuration
Metallic Character	Metals tend to form bonds by losing electrons (electropositive)
Non-metallic Character	Non-metals tend to form bonds by gaining electrons (electronegative)



Mind Map


Döbereiner's triads
Newlands' octaves
Periodic classification of elements
Mendeleev's periodic table
Modern periodic table
Trends in valency
Trends in atomic radius
Trends in metallic and non-metallic character
Trends in electronegative and electropositive character