

Chapter 05

Periodic Classification of Elements

History of Periodic table:

Matter around us is present in the form of compounds, mixtures, elements etc. All these are composed by atoms of different elements. Till date 118 elements are known to us. Out of these 94 are naturally occurring and remaining are synthesized in the laboratory.

It is difficult to study properties of elements separately. Hence attempts were made to organize these elements.

Easily scientists arranged elements as metals, non-metals and metalloids. But this is not enough to study all 118 elements.

Dobereiner's Triads:

German chemist Dobereiner arranged the elements with similar properties into group. These groups contain three elements each and are called as "Triads".

In Triad, the three elements are arranged in increasing order of their atomic mass. The average atomic mass of first element and third element is nearly equal to atomic mass of second element.

Ex. Consider the triad of Li^7 , Na^{23} , K^{39} .

The average of atomic masses of Li & Na is

$$\frac{7 + 39}{2} = \frac{46}{2} = 23 \quad (\text{Atomic mass of Sodium})$$

Group A element	Atomic mass	Group B element	Atomic mass	Group C elements	Atomic mass
N	14.0	Ca	40.1	Cl	35.5
P	31.0	Sr	87.6	Br	79.9
As	74.9	Ba	137.3	I	126.9

Table: Dobereiner's Triads

Limitation:

Out of then known elements (Nearly 56) Dobereiner could identify only three triads. Hence, this is not much useful.

Newland's law of octaves:

After Dobereiner, an English scientist John Newlands arranged the elements in increasing order of their atomic weights.

He proposed that "Every eighth element is similar to the first element in its properties, like musical notes octaves". Hence, this is called Newlands law of octaves.

Table: Newland's octaves

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
Cl	K	Ca	Cr	Ti	Mn	Fe
Co and Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce and La	Zr	—	—

Limitation:

- Law of octaves is applicable only up to Calcium.
- Newlands assumed only then known 56 elements would exist.
- After discovery of more elements, this found in valid.