

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based Notes of Chapter - 05)

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Periodic Classification of Elements

Early Attempts of Classification of Elements

Initially scientists had classified elements into metal and non-metals. However, some elements possessed properties which could neither be classified as metals nor non-metals called metalloids. This classification was found to be insufficient for scientific study. Later on, a number of chemists attempted to make a rational and systematic classification of the physical and chemical properties of elements and tabulate the results in the form of a table.

Periodic table – The table giving the arrangement of the known elements according to their properties so that similar elements fall within the same vertical column and dissimilar elements are separated

DOBEREINER'S TRIADS

Law of Triads: When elements are arranged in the order of their increasing atomic masses, the atomic mass of the middle element was approximately the mean of the atomic masses of the other two elements.

In other word, “The average atomic mass of first and third elements is equivalent the atomic mass of middle element of the tried.”

For example: Consider the triad of lithium, sodium and potassium. The atomic mass of sodium is the mean of the atomic masses of lithium and potassium.

Element	Atomic Mass
Lithium	7.0
Sodium	Atomic mass of Na = $\frac{7.0 + 39}{2} = 23$
Potassium	39

EXAMPLES OF DOBEREINER'S TRIADS

Element	Lithium	Beryllium	Potassium	Arithmetic mean
Atomic mass	7.0	9.0	11.0	9.0
Element	Lithium	Beryllium	Boron	Arithmetic mean
Atomic mass	7.0	9.0	11.0	9.0
Element	LITHIUM	SODIUM	POTASSIUM	Arithmetic mean
Atomic mass	7.0	23.0	39.0	23.0
Element	Carbon	Nitrogen	Oxygen	Arithmetic mean
Atomic mass	12.0	14.0	16.0	14.0
Element	CALCIUM	STRONTIUM	BARIUM	Arithmetic mean
Atomic mass	40.0	87.5	137	88.1
Element	CHLORINE	BROMINE	IODINE	Arithmetic mean
Atomic mass	35.0	80.0	127.0	80.6

DEFECTS / LIMITATIONS / SHORTCOMING OF TRIAD CLASSIFICATION

- A large number of similar elements could not be grouped into triads e.g., iron, manganese, nickel, cobalt, zinc and copper are similar elements but could not be placed in the triads.
- It was possible that quite dissimilar elements could be grouped into triads.

Dobereiner could only classify 3 triads successfully (**highlighted in the table**).

Since he failed to arrange the then known elements in the form of triads his attempt at classification was not very successful.
