Chemistry Study Materials for Class 10

(Based on: Periodic Classification of Elements)

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Achievements of Mendeleev's Periodic Table

Mendeleev's periodic table was one of the greatest achievements in chemistry with some of its important contributions as follows:

Systematic Study of Elements

Mendeleev's Periodic table simplified the study of elements. As the arrangements of elements showing similar properties were classified into groups, it was very useful in studying and remembering the properties of a large number of elements in a systematic way.

Prediction of New Elements

Based on the positions in the periodic table, Mendeleev could predict the properties of some undiscovered elements. He left three blanks for elements that were not discovered at that time. He was able to predict the properties of these unknown elements more or less accurately. He named them eka-boron, eka-aluminium and eka-silicon. He named them so, as they were just below boron, aluminium and silicon in the respective sub-groups. Eka-boron was later named as scandium, eka-aluminium as gallium and eka-silicon as germanium. A Comparative Study of the Properties of Elements Predicted and later Discovered

Property	Eka-boron	Scandium
Atomic weight	44	43.79
Oxide	Eb_2O_3	Sc_2O_3
Specific gravity	3.5	3.864
Sulphate	$Eb_2(SO_4)_3$	$Sc_2(SO_4)_3$

Property	Eka-aluminium	Gallium
Atomic weight	68	69.9
Specific gravity	5.9	5.94
Melting point	Low	303.15°K
Formula of oxide	Ea_2O_3	Ga_2O_3
Solubility in acid and alkali	Dissolves slowly in both acid and alkali	Dissolves slowly in both acid and alkali

Correction of Atomic Masses

Mendeleev's periodic table helped in correcting the atomic masses of some of the elements, based on their positions in the periodic table. For example, atomic mass of beryllium was corrected from 13.5 to 9.0. Atomic masses of indium, gold and platinum were also corrected.

Demerits of Mendeleev's Periodic Table

1. Hydrogen resembles alkali metals as well as halogens. So, **a correct position could not be assigned to hydrogen in the periodic table.**

2. The position of isotopes could not be explained. Isotopes are atoms of the same element having similar chemical properties but different atomic masses. If the elements are arranged according to atomic masses, the isotopes should be placed in different groups of the periodic table. For e.g., there are three isotopes of hydrogen with atomic mass 1, 2, and 3. According to Mendeleev's periodic table these should be placed at three separate places.

3. Anomalous Pair:- At certain places, an element of higher atomic mass was placed before an element of lower atomic mass. In certain pairs of elements like, Ar (40) and K (39); Co (58.9) and Ni (58.6); Te (127.6) and I (126.9) the arrangement was not justified. For example, argon was placed before potassium whereas its atomic mass is more than potassium.

4. Some elements placed in the same sub group had different properties.

For example: Manganese is placed with the halogens which are totally different in their properties.

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