**Periodic Classification of Elements**

Electrons are filled in various shells and subshells in a fairly regular fashion. Therefore, properties of elements are repeated periodically. Such trends in their physical and chemical properties were noticed by chemists in the nineteenth century and attempts were made to classify elements on their basis long before structure of atom was known.

## EARLIER ATTEMPTS OF CLASSIFICATION OF ELEMENTS

The first classification of elements was as metals and non-metals. This served only limited purpose mainly because of two reasons:

1. All the elements were grouped in to these two classes only. Moreover the group containing metals was very big.
2. Some elements showed properties of both-metals and non-metals and they could not be placed in any of the two classes.

### Dobereiner’s triads:

In 1829, Dobereiner, a German scientist made some groups of three elements each and called them triads. All three elements of a triad were similar in their properties. He observed that the

atomic mass\* of the middle element of a triad was nearly equal to the arithmetic mean of atomic masses of other two elements. Also, same was the case with their other properties. Let us take the example of three elements lithium, sodium and potassium. They form a Dobereiner’s triad. More examples:(Calcium, Strontium, Barium) and (Chlorine, Bromine, Iodine).

Dobereneir’s idea of classification of elements into triads did not receive wide acceptance as he could arrange only a few elements in this manner.

### Newland’s law of Octaves:

In 1864 John Alexander Newland, an English chemist noticed that “when elements are arranged in the increasing order of their atomic masses\* every eighth element had properties similar to the first element.” Newland called it the Law of Octaves. It was due to its

similarity with musical notes where, in every octave, after seven different notes the eighth note is repetition of the first one as shown below.

However, Newland could arrange elements in this manner only up to calcium out of a total of over sixty elements known at his time. Because of this shortcoming his work was not received well by the scientific community.

## MENDELEEV’S PERIODIC LAW AND PERIODIC TABLE

### Mendeleev’s periodic law:

The chemical and physical properties of elements are a periodic function of their atomic masses\*.A tabular arrangement of the elements based on the periodic law is called periodic

table.

### Main features of Mendeleev’s periodic table:

1. The horizontal rows present in the periodic table are called periods. You can see that there are seven periods in the periodic table. These are numbered from 1 to 7 (Arabic numerals).

2. Properties of elements in a particular period show regular gradation (i.e. increase or decrease) from left to right.

3. The vertical columns present in it are called groups. You must have noticed that these are nine in number and are numbered from I to VIII and Zero (Roman numerals).

4. Groups I to VII are subdivided into A and B subgroups. Groups Zero and VIII don’t have any subgroups.

5. All the elements in a particular group are chemically similar in nature. They show regular gradation in their physical properties and chemical reactivities.