Classification of Elements and Periodicity in Properties

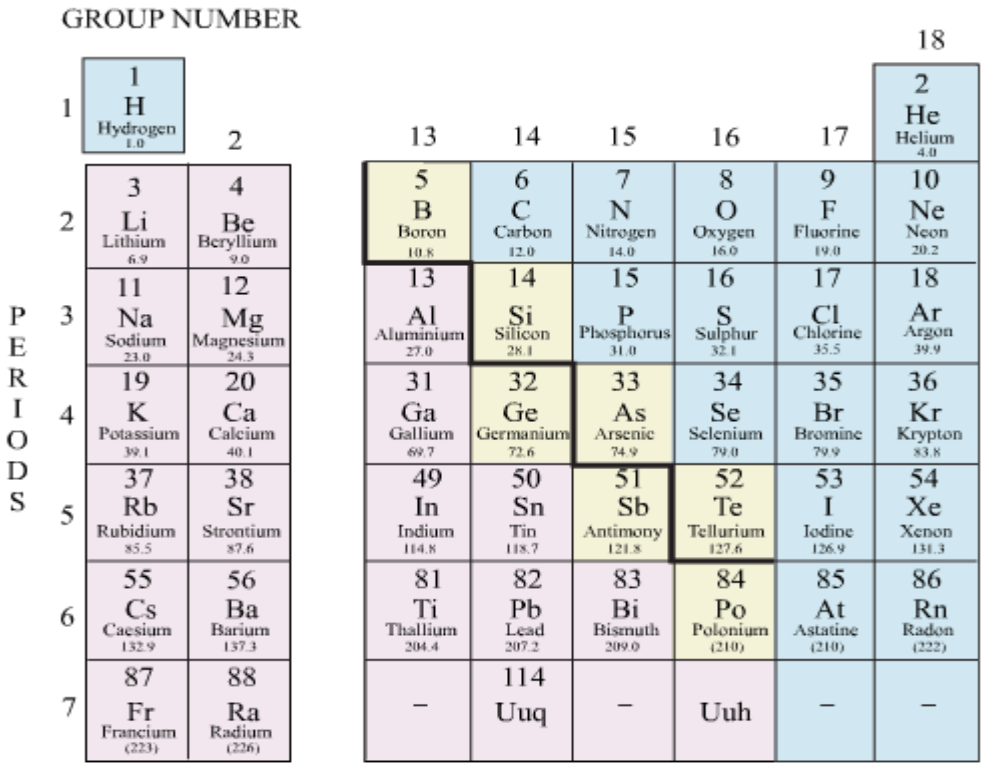
Limitations of Mendeleev's periodic table

- It failed to explain the position of hydrogen.
- It was not able to explain the position of isotopes.
- In the table some elements having higher mass were kept before the elements having lesser atomic mass.

Modern periodic law states that the properties of elements are a periodic function of their atomic numbers, not their atomic masses.

The modern periodic table consists of 7 periods and 18 groups. Elements having the same valence shell are present in the same period. Elements having the same number of valence electrons are present in the same group. Metals are present on the left-hand side of the periodic table, whereas non-metals are present on the right hand side of the periodic table.

Group 1, 2 and 13-18: Representative elements
Group 3-12: Transition elements
Period 6: Elements with atomic numbers 58-71: Lanthanoids
Period 7: Elements with atomic numbers 90-103: Actinoids



- ***s*-block elements:** Group 1 (alkali metals) and 2 elements (alkaline earth metals) having ns^1 and ns^2 outermost electronic configuration respectively

- ***p*-block elements:** Elements belonging to Group 13 to 18; the outermost electronic configuration varies from ns^2np^1 to ns^2np^6

  Elements of Group 16, 17, and 18 are called chalcogens, halogens, and noble gases respectively.

- ***d*-block elements:** Elements belonging to Group 3 to 12 The general electronic configuration is $(n-1)d^{1-10}ns^{0-2}$.They are also called transition metals.

- ***f*-block elements** (Inner-transition metals): Lanthanoids and actinoids, with outermost electronic configuration $(n-2)f^{1-14}(n-1)d^{0-1}ns^2$

  Metals, non-metals, and metalloids:

1. Metals are present on the left side of the periodic table and non-metals are located at the top right hand side of the periodic table.
2. The elements that exhibit properties of both metals and non-metals are called **metalloids** or **semi-metals**.

- **Periodic trends:**