

Topic - d-block elements and their characteristics property

Introduction

The chemical elements in the periodic table are arranged together in blocks according to their outermost electronic configuration. There are four blocks in periodic table which are as follows.

s-block elements →

The elements with a half-filled or fully filled outer s-orbital comprise the s-block elements.

p-block elements → The elements with partly filled or fully filled outer p-orbitals comprise the p-block elements

d-block elements → The elements between s-block and p-block that is between group 3 and 12 in the periodic table have at most two electrons in the outermost s orbital, and incompletely filled d orbitals next to outermost orbital and in which successive addition of electrons takes place progressively in the inner d-orbitals are called d-block elements.

f-block elements → Similarly, the elements in which filling up of electrons takes place in inner f-orbitals are known as f-block elements.

- The d- and f block of elements are generally called transition elements.
- However, the f-block elements are commonly known as inner transition elements.

Then.

Q. What are transition elements?

2.

Ans. As defined by IUPAC the transition element is the one with a partly filled d-orbitals in its ground state or in any of its oxidation state.

So, Cu, Ag and Au are considered as transition metals since Cu(I) has $3d^9$ configuration, Ag(I) has $4d^9$ and Au(III) has a $5d^8$ configuration.

But Zn, Cd and Hg are excluded from transition metals as they have d^{10} configurations.

There are four series of transition elements

- i) The first transition series $\rightarrow$ Scandium (Sc, $Z=21$) to Zinc (Zn, $Z=30$) i.e. addition of electrons in 3d orbitals.
- ii) The second transition series $\rightarrow$ Yttrium (Y, $Z=39$) to Cadmium (Cd, $Z=48$) i.e. addition of electrons in 4d orbitals.
- iii) The third transition series $\rightarrow$ Lanthanum (La, $Z=57$) to Hafnium (Hf, $Z=72$) through Mercury (Hg, $Z=80$) i.e. addition of electrons in 5d orbitals.
- iv) The fourth transition series $\rightarrow$ Actinium (Ac, $Z=89$) to Rutherfordium (Rf, $Z=104$) through Copernicium (Cn, $Z=112$) i.e. addition of electrons in 6d orbitals.