

15%
Transition Elements
Session 3

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Learning Objectives

- **What is Transition Elements?**
- **Characteristics of Transition Elements**
 - *Metallic Character, MP & BP and Colour*

What is Transition Elements?

- The elements that include *group 3-12* in the periodic table
- And it is also known as *d-block element*.

WHY???

Last electron enters in the d-subshell

What is Transition Elements?

Oxygen (O)

At.no. 8

So, 8 electrons

e.c: $1s^2 2s^2 2p^4$

Helium (He)

At.no. 2

So, 2 electrons

e.c: $1s^2$

Iron (Fe)

At.no. 26

26 electrons

e.c: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$

Characteristics of Transition Elements

1. **Metallic Character**
2. **Melting and Boiling Point**
3. **Colour**

Refer and Read from page number 138-147



Characteristics of Transition Elements:

1. Metallic Character

Q. Transition elements are _____ conductor of heat and electricity.

Ans.: Good



Characteristics of Transition Elements:

2. Melting and Boiling Point

Q. They have _____ melting and boiling point.

Ans.: High

Characteristics of Transition Elements: **3. Colour**

Transition elements forms *coloured ions*.

❖ Reason:

Due to *incompletely filled d-orbitals*, they appear colourful.

Incompletely filled d-orbital:

It means d-orbital is not filled to its full capacity

d^1
 d^2
 d^3
 d^4
 d^5
 d^6
 d^7
 d^8
 d^9

✓ **Completely filled d-orbitals: d^{10}**

Characteristics of Transition Elements: **3. Colour**

Colors of Some Transition Metal Ions

 Ti^{3+} Cr^{3+} Mn^{2+} Fe^{3+} Co^{2+} Ni^{2+} Cu^{2+}

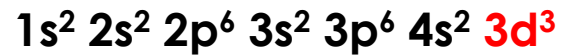
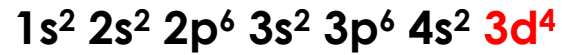
Characteristics of Transition Elements: 3. Colour

Transition Element: **Iron shows colour**

$\text{Fe}_{26} = 26$ electrons

$\text{Fe}^{2+} = 24$ electrons (Green)

$\text{Fe}^{3+} = 23$ electrons (Yellow)



Incomplete d-orbital



Transition Element: **Titanium Doesn't shows colour**

$\text{Ti}_{22} = 22$ electrons

$\text{Ti}^{4+} = 18$ electrons



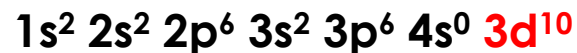
No d-orbital



Transition Element: **Copper Doesn't shows colour**

$\text{Cu}_{29} = 29$ electrons

$\text{Cu}^+ = 28$ electrons



Completely filled d-orbital



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