

CHEMISTRY STUDY MATERIALS FOR CLASS 12
(Questions – Answers of Chapter -08)
GANESH KUMAR DATE:- 16/01/2021

d – block and f -block elements

1. Define transition elements.

Ans. Transition element is defined as the one which has incompletely filled *d*- orbitals in its ground state or in any one of its oxidation states.

2. What is the position of the d block elements in the periodic table?

Ans. The d block elements are in the middle of s and p blocks, comprising the groups 3 to 12. They are the four rows of elements in the periods 4th (3d series), 5th (4d series), 6th (5d series) and 7th (6d series).

3. Zinc, cadmium and mercury of group 12 are not regarded as transition metals, Why ?

Ans. Zinc, cadmium and mercury of group 12 have full d^{10} configuration (all *d* orbitals are completely filled) in their ground state as well as in their common oxidation states and hence, are not regarded as transition metals

4. Why d- block elements are named as ‘transition elements ‘ ?

Ans. The *d*-block elements occupy the middle of the periodic table and their properties are transitional between *s*- and *p*- block elements.

5. Write the general electronic configuration of d block elements. Ans.

[Noble gas] $(n-1)d^{1-10}ns^{1-2}$

6. Write the general outer electronic configuration of d- block elements.

Ans. The general outer electronic configuration of d- block elements is

$(n-1)d^{1-10} ns^{1-2}$

7. Write the general electronic configuration of f- block elements.

Ans. The general electronic configuration of f- block elements

(Lanthanoids) is $[Xe] 4f^{1-14} 5d^{0-1} 6s^2$

8. Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state.

Ans. Cerium

9. The outer electronic configuration of Cr is $3d^5 4s^1$ instead of $3d^4 4s^2$, why?

Ans. Half filled ($3d^5$) orbitals are relatively more stable, hence one electron of 4s orbital jumps to 3d orbital.

10. The outer electronic configuration of Cu is $3d^{10} 4s^1$ instead of $3d^9 4s^2$, why?

Ans. Completely filled ($3d^{10}$) orbitals are relatively more stable, hence one electron of 4s orbital jumps to 3d orbital.

11. Account for high melting point and boiling points of transition metals.

Ans. The melting and boiling points of transition metals are high because of the involvement of greater number of electrons from (n-1)d orbitals in addition to the ns electrons in the inter atomic metallic bonding.

12. What is the trend in melting points of transition metals in a series?

Ans. The melting points of the transition metals in a series rise to a maximum at the middle of the series (i.e. Cr or Mo or W - element with d^5 configuration) and fall regularly as the atomic number increases.

13. Why do transition metals have higher enthalpies of atomization?

Ans. Involvement of a large number of unpaired electrons of d orbitals favour stronger inter atomic interactions resulting in stronger bonds between the atoms of a metal and higher enthalpies of atomization.

14. Name one 3d series elements that do not show variable oxidation states.

Ans. Sc (+3)

15. Transition metals exhibit variable oxidation states in its compounds, why?

Ans. Transition metals exhibit variable oxidation states in its compounds due to the availability of both ns & (n - 1) d electrons for bond formation.

16. Name 3d series metal which shows highest oxidation state.

Ans. The highest oxidation state shown by 3d series transition metals is +7
by Mn

17. Name a metal in the 3d series of transition metals which exhibit +1 oxidation state most frequently.

Ans. copper

18. What is the trend in oxidation state of transition metals?

Ans. The oxidation state increases with increase in atomic number & reaches a maximum in the middle and then decreases.

19. 3d series transition metals exhibit +2 as the most common oxidation state (except Sc) why?

Ans. The +2 oxidation state, which commonly occurs for nearly all the transition metals, is due to the loss of their outer 4s electrons. Why transition metals and their compounds show paramagnetic behavior?

Ans. The transition metal ions are generally containing one or more unpaired electrons in them & hence their compounds are generally paramagnetic.

20. Name of an alloy of transition metals with non transition metals

Ans. Brass (Cu & Zn) or Bronze (Cu & Sn)

21. What is the action of neutral or faintly alkaline permanganate solution on iodide?

Ans. Alkaline permanganate solution oxidizes iodide to iodate.

22. What happens when potassium permanganate is heated to 513 K?

Ans. Potassium permanganate decomposes at 513K to potassium manganate, manganese dioxide and oxygen.

23. What is the principal oxidation state exhibited by the lanthanoids?

Ans. The principal oxidation state of lanthanoids is +3.
