

Class: 12
Subject: chemistry
Topic: D & F block elements
No. of Questions: 25

- 1) The atomic numbers belonging to the third transition series are
- 55 and 70 to 78
 - 56 and 71 to 79
 - 57 and 72 to 80
 - 58 and 73 to 81

Sol.(c) For the third transition series:

Starting element: $2 + 8 + 8 + 18 + 18 + 3 = 57$

Ending element: $2 + 8 + 8 + 18 + 18 + (14 + 12) = 80$

In between 57 to 80, the fourteen elements from 58 to 71 belong to the inner transition elements

- 2) The number of unpaired electrons in $[\text{Co}(\text{NH}_3)_6]^{2+}$ is
- 1
 - 2
 - 3
 - 5

Sol.(c) Co^{2+} ion has three unpaired electrons because its electronic configuration is $3d^7$.

- 3) Which of the following elements of the first transition series do(es) not exhibit variable oxidation state?
- Zn only
 - Sc only
 - Sc and Zn
 - Sc, Zn and Ti

Sol. (c) Sc and Zn does not exhibit variable oxidation state.

- 4) The oxidation states of Mn in K_2MnO_4 and $KMnO_4$, respectively, are
- +6 and +7
 - +6 and +6
 - +7 and +7
 - +7 and +6

Sol. (a) oxidation state of Mn in K_2MnO_4 is +6 and $KMnO_4$ is +7.

- 5) The equivalent mass of $KMnO_4$ in acidic medium is calculated by dividing its molar mass by
- three
 - four
 - five
 - six

Sol.(c) Equivalent weight of $KMnO_4 = \frac{\text{Mol.wt}}{5}$

- 6) The calculated value of magnetic moment of $24Cr^{3+}$ is
- 1.73 Bohr magneton
 - 2.83 Bohr magneton
 - 3.87 Bohr magneton
 - 4.90 Bohr magneton

Sol.(c)

The electronic configuration of $24Cr^{3+}$ is $(3d)^3$. Hence, $\mu/\mu_B = \sqrt{3(5)} = 3.87$.

- 7) Which of the following ions is diamagnetic in nature?
- $22Ti^{3+}$
 - $25Mn^{2+}$
 - $29Cu^{2+}$
 - $30Zn^{2+}$

Sol.(d) Only $30Zn^{2+}$ has no unpaired electron and hence, is diamagnetic.

- 8) If a transition-metal compound absorbs blue to blue-green radiations from the visible region, its colour would be

- a. yellow
- b. orange to red
- c. purple to violet
- d. blue-green

Sol.(b) fact

9) Which of the following statements is not correct?

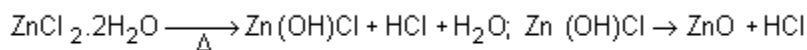
- a. The oxides of transition metals in their low oxidation state are generally basic.
- b. The oxides of transition metals in their intermediate and high oxidation states are generally amphoteric and acidic, respectively.
- c. Mixed iron oxides are found in the mineral magnetite.
- d. Silver oxide is soluble in ammonium hydroxide forming the complex $\text{Ag}(\text{NH}_3)\text{OH}$.

Sol.(d) The complex formed is $\text{Ag}(\text{NH}_3)_2\text{OH}$.

10) Which of the following methods cannot be used to prepare anhydrous zinc chloride?

- a. Heating the crystals of $\text{ZnCl}_2 \cdot 2\text{H}_2\text{O}$
- b. Passing dry chlorine over heated zinc
- c. Passing dry hydrogen chloride over heated zinc
- d. Distilling metallic zinc with mercury(II) chloride

Sol.(a)



11) Which of the following hydroxides has the maximum basic character?

- a. $\text{La}(\text{OH})_3$
- b. $\text{Pm}(\text{OH})_3$
- c. $\text{Dy}(\text{OH})_3$
- d. $\text{Lu}(\text{OH})_3$

Sol.(a) As the size of the ion decreases, its tendency to donate the electron decreases causing a decrease in basicity.

12) Which of the following represents magnetite ore?

- a. Ag
- b. AgBr
- c. $\text{Ag}(\text{S}_2\text{O}_3)_2^{2-}$
- d. CuCl_4^{2-}

Sol. (a) The black image is silver.

18) Which of the following is not an ore of zinc?

- a. Sphalerite
- b. Cassiterite
- c. Calamine
- d. Zineite

Sol. (b) Cassiterite is SnO_2 .

19) Which of the following statements is not correct?

- a. Zinc chloride is used as a flux in soldering.
- b. Zinc chloride mixed with zinc oxide is used in dental filling.
- c. Zinc chloride is used in dry cells.
- d. None of these

Sol. (d) fact

20) Ammonium dichromate is used in some fireworks. The green-coloured powder blown in the air is

- a. CrO_3
- b. Cr_2O_3
- c. Cr
- d. $\text{CrO}(\text{O})_3$

Sol. (b) green color powder is Cr_2O_3

21) *The chemical reactivity of lanthanides resemble to which other elements of the periodic table?*

Sol. The chemical reactivity of the starting lanthanides resemble calcium due to similar first and second ionization energy. But latter lanthanides resemble Al due to ability of showing +3 oxidation state and similarity in I.E.

- 22) Enthalpies of atomization of transition elements are higher than those of alkali and alkaline earth metals. Explain.

Sol. number of unpaired electrons in transition elements are more when compared to these in alkali and alkaline earth metals. As a result, the metallic bonds in transition metals are stronger and enthalpies of atomization are higher than those of alkali and alkaline earth metals.

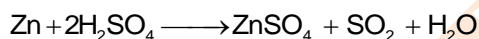
- 23) Explain the following:

(a) Chromium is a typical metal while mercury is a liquid metal.

(b) Zinc readily liberates H_2 from cold dil. H_2SO_4 but not from cold conc. H_2SO_4 .

Sol. (a) Chromium has five unpaired electrons in its d-orbitals which make its metallic bond very strong, whereas in mercury there is no unpaired d-electrons so its metallic bond is very weak, hence it is a liquid.

(b) Since, conc. H_2SO_4 act as an oxidizing agent hence does not evolve H_2 when it reacts with zinc.



- 24) It is well known that alkali and alkaline earth metals displace hydrogen from dilute acids. But most of the transition elements do not behave so. Explain.

Sol. Alkali and alkaline earth metals have positive oxidation potential. But most of the transition elements have negative oxidation potentials. So they are not as good oxidizing agents as the alkali and alkaline earth metal are.

- 25) Cu^+ ion has $3d^{10}4s^0$ configuration and colourless but Cu_2O is red and Cu_2S is black. Explain.

Sol. Cu^+ ion has $3d^{10}4s^0$ configuration, i.e. it has no unpaired electron hence there is no d-d transition possible and it is colourless. But Cu_2O and Cu_2S are coloured due to charge transfer of electrons from O^{2-} or S^{2-} to the vacant orbital of Cu^+ ion.