

QUESTION BANK ON ***d-BLOCK ELEMENTS***

StudySteps.in

Select one or more than one correct options.

Q.1 (T) imparts violet colour $\xrightarrow{\text{compd (U)} + \text{conc. H}_2\text{SO}_4}$ (V) Red gas $\xrightarrow{\text{NaOH} + \text{AgNO}_3}$ (W) Red ppt. $\xrightarrow{\text{NH}_3 \text{ soln.}}$ (X)

(W) Red ppt. $\xrightarrow{\text{dil. HCl}}$ (Y) white ppt.

(U) $\xrightarrow[\Delta]{\text{NaOH}}$ (Z) gas (gives white fumes with HCl)

sublimes on

heating

Identify (T) to (Z).

(A) T = KMnO_4 , U = HCl, V = Cl_2 , W = HgI_2 , X = $\text{Hg}(\text{NH}_2)\text{NO}_3$, Y = Hg_2Cl_2 , Z = N_2

(B) T = $\text{K}_2\text{Cr}_2\text{O}_7$, U = NH_4Cl , V = CrO_2Cl_2 , W = Ag_2CrO_4 , X = $[\text{Ag}(\text{NH}_3)_2]^+$, Y = AgCl , Z = NH_3

(C) T = K_2CrO_4 , U = KCl, V = CrO_2Cl_2 , W = HgI_2 , X = Na_2CrO_4 , Y = BaCO_3 , Z = NH_4Cl

(D) T = K_2MnO_4 , U = NaCl, V = CrO_3 , W = AgNO_2 , X = $(\text{NH}_4)_2\text{CrO}_4$, Y = CaCO_3 , Z = SO_2

Q.2 The number of moles of acidified KMnO_4 required to convert one mole of sulphite ion into sulphate ion is
 (A) 2/5 (B) 3/5 (C) 4/5 (D) 1

Q.3 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \xrightleftharpoons[\text{Mo}]{\text{Fe}}$ $2\text{NH}_3(\text{g})$; Haber's process, Mo is used as

(A) a catalyst (B) a catalytic promoter
 (C) an oxidising agent (D) as a catalytic poison

Q.4 Potash alum is a double salt, its aqueous solution shows the characteristics of
 (A) Al^{3+} ions (B) K^+ ions (C) SO_4^{2-} ions (D) Al^{3+} ions but not K^+ ions

Q.5 $\text{Cr}_2\text{O}_7^{2-} \xrightleftharpoons[\text{Y}]{\text{X}} 2\text{CrO}_4^{2-}$, X and Y are respectively

(A) X = OH^- , Y = H^+ (B) X = H^+ , Y = OH^-
 (C) X = OH^- , Y = H_2O_2 (D) X = H_2O_2 , Y = OH^-

Q.6 Addition of non-metals like B and C to the interstitial sites of a transition metal results the metal
 (A) of more ductability (B) of less ductability (C) less malleable (D) of more hardness

Q.7 Mercury is a liquid at 0°C because of
 (A) very high ionisation energy (B) weak metallic bonds
 (C) high heat of hydration (D) high heat of sublimation

Q.8 CrO_3 dissolves in aqueous NaOH to give
 (A) $\text{Cr}_2\text{O}_7^{2-}$ (B) CrO_4^{2-} (C) $\text{Cr}(\text{OH})_3$ (D) $\text{Cr}(\text{OH})_2$

Q.9 The correct statement(s) about transition elements is/are
 (A) the most stable oxidation state is +3 and its stability decreases across the period
 (B) transition elements of 3d-series have almost same atomic sizes from Cr to Cu
 (C) the stability of +2 oxidation state increases across the period
 (D) some transition elements like Ni, Fe, Cr may show zero oxidation state in some of their compounds

Q.10 An ornamental of gold having 75% of gold, it is of carat.
 (A) 18 (B) 16 (C) 24 (D) 20

Q.11 Solution of MnO_4^- is purple-coloured due to
 (A) d-d-transition (B) charge transfer from O to Mn
 (C) due to both d-d-transition and charge transfer (D) none of these

- Q.12 The ionisation energies of transition elements are
 (A) less than p-block elements (B) more than s-block elements
 (C) less than s-block elements (D) more than p-block elements
- Q.13 Transition elements are more metallic than representative elements (s and p-block elements) due to
 (A) availability of d-orbitals for bonding
 (B) variable oxidation states are not shown by transition elements
 (C) all electrons are paired in d-orbitals
 (D) f-orbitals are available for bonding
- Q.14 During estimation of oxalic acid Vs KMnO_4 , self indicator is
 (A) KMnO_4 (B) oxalic acid (C) K_2SO_4 (D) MnSO_4
- Q.15 The metal(s) which does/do not form amalgam is/are
 (A) Fe (B) Pt (C) Zn (D) Ag
- Q.16 Which of the following statements concern with transition metals?
 (A) compounds containing ions of transition elements are usually coloured
 (B) the most common oxidation state is +3
 (C) they show variable oxidation states, which differ by two units only
 (D) they easily form complexes
- Q.17 Correct statement(s) is/are
 (A) an acidified solution of $\text{K}_2\text{Cr}_2\text{O}_7$ liberates iodine from KI
 (B) $\text{K}_2\text{Cr}_2\text{O}_7$ is used as a standard solution for estimation of Fe^{2+} ions
 (C) in acidic medium, $M = N/6$ for $\text{K}_2\text{Cr}_2\text{O}_7$
 (D) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ on heating decomposes to yield Cr_2O_3 through an endothermic reaction
- Q.18 The highest oxidation state shown by transition elements is
 (A) + 7 by Mn (B) + 8 by Os (C) + 8 by Ru (D) + 7 by Fe
- Q.19 A compound of mercury used in cosmetics, in Ayurvedic and Yunani medicines and known as Vermilion is
 (A) HgCl_2 (B) HgS (C) Hg_2Cl_2 (D) HgI
- Q.20 Acidified chromic acid + $\text{H}_2\text{O}_2 \xrightarrow[\text{(blue colour)}]{\text{Org. solvent}} \text{X} + \text{Y}$, X and Y are
 (A) CrO_5 and H_2O (B) Cr_2O_3 and H_2O (C) CrO_2 and H_2O (D) CrO and H_2O
- Q.21 $\uparrow \text{Y(g)} \xleftarrow{\text{KI}} \text{CuSO}_4 \xrightarrow{\text{dil H}_2\text{SO}_4} \text{X (Blue colour)}$, X and Y are
 (A) $\text{X} = \text{I}_2$, $\text{Y} = [\text{Cu}(\text{H}_2\text{O})_4]^{2+}$ (B) $\text{X} = [\text{Cu}(\text{H}_2\text{O})_4]^{2+}$, $\text{Y} = \text{I}_2$
 (C) $\text{X} = [\text{Cu}(\text{H}_2\text{O})_4]^+$, $\text{Y} = \text{I}_2$ (D) $\text{X} = [\text{Cu}(\text{H}_2\text{O})_5]^{2+}$, $\text{Y} = \text{I}_2$
- Q.22 Transition elements are usually characterised by variable oxidation states but Zn does not show this property because of
 (A) completion of np-orbitals (B) completion of (n-1)d orbitals
 (C) completion of ns-orbitals (D) inert pair effect
- Q.23 $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ (Ammonium dichromate) is used in fire works. The green coloured powder blown in air is
 (A) Cr_2O_3 (B) CrO_2 (C) Cr_2O_4 (D) CrO_3
- Q.24 The d-block element which is a liquid at room temperature, having high specific heat, less reactivity than hydrogen and its chloride (MX_2) is volatile on heating is
 (A) Cu (B) Hg (C) Ce (D) Pm
- Q.25 Coinage metals show the properties of
 (A) typical elements (B) normal elements
 (C) inner-transition elements (D) transition element
- Q.26 Iron becomes passive by due to formation of
 (A) dil. HCl , Fe_2O_3 (B) 80% conc. HNO_3 , Fe_3O_4
 (C) conc. H_2SO_4 , Fe_3O_4 (D) conc. HCl , Fe_3O_4

- Q.27 Bayer's reagent used to detect olifinic double bond is
 (A) acidified KMnO_4 (B) aqueous KMnO_4
 (C) 1% alkaline KMnO_4 solution (D) KMnO_4 in benzene
- Q.28 Amphoteric oxide(s) is/are
 (A) Al_2O_3 (B) SnO (C) ZnO (D) Fe_2O_3
- Q.29 Interstitial compounds are formed by
 (A) Co (B) Ni (C) Fe (D) Ca
- Q.30 The transition metal used in X-rays tube is
 (A) Mo (B) Ta (C) Tc (D) Pm
- Q.31 The catalytic activity of transition elements is related to their
 (A) variable oxidation states (B) surface area
 (C) complex formation ability (D) magnetic moment
- Q.32 $\text{MnO}_4^- + x\text{e}^- \xrightarrow{\text{(Alkaline medium)}} \text{MnO}_4^{2-}$
 $\quad \quad \quad + y\text{e}^- \xrightarrow{\text{(Acidic medium)}} \text{Mn}^{2+}$
 $\quad \quad \quad + z\text{e}^- \xrightarrow{\text{(Neutral medium)}} \text{MnO}_2$
 x, y and z are respectively
 (A) 1, 2, 3 (B) 1, 5, 3 (C) 1, 3, 5 (D) 5, 3, 1
- Q.33 $\text{Cu} + \text{conc. HNO}_3 \xrightarrow{\text{(hot)}} \text{Cu}(\text{NO}_3)_2 + \text{X}$ (oxide of nitrogen); then X is
 (A) N_2O (B) NO_2 (C) NO (D) N_2O_3
- Q.34 When KMnO_4 solution is added to hot oxalic acid solution, the decolourisation is slow in the beginning but becomes instantaneous after some time. This is because
 (A) Mn^{2+} acts as auto catalyst (B) CO_2 is formed
 (C) Reaction is exothermic (D) MnO_4^- catalyses the reaction.
- Q.35 CuSO_4 solution reacts with excess KCN to give
 (A) $\text{Cu}(\text{CN})_2$ (B) CuCN (C) $\text{K}_2[\text{Cu}(\text{CN})_2]$ (D) $\text{K}_3[\text{Cu}(\text{CN})_4]$
- Q.36 The higher oxidation states of transition elements are found to be in the combination with A and B, which are
 (A) F, O (B) O, N (C) O, Cl (D) F, Cl
- Q.37 In the equation: $\text{M} + 8\text{CN}^- + 2\text{H}_2\text{O} + \text{O}_2 \longrightarrow 4[\text{M}(\text{CN})_2]^- + 4\text{OH}^-$, metal M is
 (A) Ag (B) Au (C) Cu (D) Hg
- Q.38 An element of 3d-transition series shows two oxidation states x and y, differ by two units then
 (A) compounds in oxidation state x are ionic if $x > y$
 (B) compounds in oxidation state x are ionic if $x < y$
 (C) compounds in oxidation state y are covalent if $x < y$
 (D) compounds in oxidation state y are covalent if $y < x$
- Q.39 Pick out the incorrect statement:
 (A) MnO_2 dissolves in conc. HCl, but does not form Mn^{4+} ions
 (B) MnO_2 oxidizes hot concentrated H_2SO_4 liberating oxygen
 (C) K_2MnO_4 is formed when MnO_2 in fused KOH is oxidised by air, KNO_3 , PbO_2 or NaBiO_3
 (D) Decomposition of acidic KMnO_4 is not catalysed by sunlight.
- Q.40 1 mole of Fe^{2+} ions are oxidised to Fe^{3+} ions with the help of (in acidic medium)
 (A) 1/5 moles of KMnO_4 (B) 5/3 moles of KMnO_4
 (C) 2/5 moles of KMnO_4 (D) 5/2 moles of KMnO_4
- Q.41 The metals present in insulin and haemoglobin are respectively
 (A) Zn, Hg (B) Zn, Fe (C) Co, Fe (D) Mg, Fe

- Q.42 To an acidified dichromate solution, a pinch of Na_2O_2 is added and shaken. What is observed:
 (A) blue colour (B) Red colour changing to green
 (C) Copious evolution of oxygen (D) Bluish - green precipitate
- Q.43 The rusting of iron is formulated as $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ which involves the formation of
 (A) Fe_2O_3 (B) $\text{Fe}(\text{OH})_3$ (C) $\text{Fe}(\text{OH})_2$ (D) $\text{Fe}_2\text{O}_3 + \text{Fe}(\text{OH})_3$
- Q.44 Metre scales are made-up of alloy
 (A) invar (B) stainless steel (C) elektron (D) magnalium
- Q.45 Amongst CuF_2 , CuCl_2 and CuBr_2
 (A) only CuF_2 is ionic
 (B) both CuCl_2 and CuBr_2 are covalent
 (C) CuF_2 and CuCl_2 are ionic but CuBr_2 is covalent
 (D) CuF_2 , CuCl_2 as well as CuBr_2 are ionic
- Q.46 A metal M which is not affected by strong acids like conc. HNO_3 , conc. H_2SO_4 and conc. solution of alkalis like NaOH , KOH forms MCl_3 which finds use for toning in photography. The metal M is
 (A) Ag (B) Hg (C) Au (D) Cu
- Q.47 Solid $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ having covalent, ionic as well as co-ordinate bonds. Copper atom/ion forms co-ordinate bonds with water.
 (A) 1 (B) 2 (C) 3 (D) 4
- Q.48 $\text{CuSO}_4(\text{aq}) + 4\text{NH}_3 \longrightarrow \text{X}$, then X is
 (A) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ (B) paramagnetic
 (C) coloured (D) of a magnetic moment of 1.73 BM
- Q.49 $\text{KMnO}_4 + \text{HCl} \longrightarrow \text{H}_2\text{O} + \text{X}(\text{g})$, X is a (acidified)
 (A) red liquid (B) violet gas (C) greenish yellow gas (D) yellow-brown gas
- Q.50 Purple of cassius is:
 (A) Pure gold (B) Colloidal solution of gold
 (C) Gold (I) hydroxide (D) Gold (III) chloride
- Q.51 Amongst the following species, maximum covalent character is exhibited by
 (A) FeCl_2 (B) ZnCl_2 (C) HgCl_2 (D) CdCl_2
- Q.52 Number of moles of SnCl_2 required for the reduction of 1 mole of $\text{K}_2\text{Cr}_2\text{O}_7$ into Cr_2O_3 is (in acidic medium)
 (A) 3 (B) 2 (C) 1 (D) $1/3$
- Q.53 Amphoteric oxide(s) of Mn is/are
 (A) MnO_2 (B) Mn_3O_4 (C) Mn_2O_7 (D) MnO
- Q.54 Pick out the incorrect statement:
 (A) MnO_4^{2-} is quite strongly oxidizing and stable only in very strong alkalies. In dilute alkali, neutral solutions, it disproportionates.
 (B) In acidic solutions, MnO_4^- is reduced to Mn^{2+} and thus, KMnO_4 is widely used as oxidising agent
 (C) KMnO_4 does not acts as oxidising agent in alkaline medium
 (D) KMnO_4 is manufactured by the fusion of pyrolusite ore with KOH in presence of air or KNO_3 , followed by electrolytic oxidation in alkaline solution.
- Q.55 The aqueous solution of CuCrO_4 is green because it contains
 (A) green Cu^{2+} ions (B) green CrO_4^{2-} ions
 (C) blue Cu^{2+} ions and green CrO_4^{2-} ions (D) blue Cu^{2+} ions and yellow CrO_4^{2-} ions
- Q.56 Manganese steel is used for making railway tracks because
 (A) it is hard with high percentage of Mn (B) it is soft with high percentage of Mn
 (C) it is hard with small concentration of manganese with impurities
 (D) it is soft with small concentration of manganese with impurities

- Q.57 In nitroprusside ion, the iron exists as Fe^{2+} and NO as NO^+ rather than Fe^{3+} and NO respectively. These forms of ions are established with the help of
 (A) magnetic moment in solid state (B) thermal decomposition method
 (C) by reaction with KCN (D) by action with K_2SO_4
- Q.58 Acidified KMnO_4 can be decolourised by
 (A) SO_2 (B) H_2O_2 (C) FeSO_4 (D) FeCl_3
- Q.59 Transition elements in lower oxidation states act as Lewis acid because
 (A) they form complexes (B) they are oxidising agents
 (C) they donate electrons (D) they do not show catalytic properties
- Q.60 The lanthanide contraction is responsible for the fact that
 (A) Zr and Hf have same atomic sizes (B) Zr and Hf have same properties
 (C) Zr and Hf have different atomic sizes (D) Zr and Hf have different properties
- Q.61 The Ziegler-Natta catalyst used for polymerisation of ethene and styrene is $\text{TiCl}_4 + (\text{C}_2\text{H}_5)_3\text{Al}$, the catalysing species (active species) involved in the polymerisation is
 (A) TiCl_4 (B) TiCl_3 (C) TiCl_2 (D) TiCl
- Q.62 An ion of definite magnetic moment (spin only) is
 (A) Sc^{3+} (B) Ti^{3+} (C) Cu^{2+} (D) Zn^{2+}
- Q.63 The electrons which take part in order to exhibit variable oxidation states by transition metals are
 (A) ns only (B) $(n-1)d$ only
 (C) ns and $(n-1)d$ only but not np (D) $(n-1)d$ and np only but not ns
- Q.64 'Bordeaux mixture' is used as a fungicide. It is a mixture of
 (A) $\text{CaSO}_4 + \text{Cu}(\text{OH})_2$ (B) $\text{CuSO}_4 + \text{Ca}(\text{OH})_2$
 (C) $\text{CuSO}_4 + \text{CaO}$ (D) $\text{CuO} + \text{CaO}$
- Q.65 Which of the following reaction is possible at anode?
 (A) $2\text{Cr}^{3+} + 7\text{H}_2\text{O} \longrightarrow \text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+$ (B) $\text{F}_2 \longrightarrow 2\text{F}^-$
 (C) $\frac{1}{2}\text{O}_2 + 2\text{H}^+ \longrightarrow \text{H}_2\text{O}$ (D) None of these
- Q.66 Colourless solutions of the following four salts are placed separately in four different test tubes and a strip of copper is dipped in each one of these. Which solution will turn blue?
 (A) KNO_3 (B) AgNO_3 (C) $\text{Zn}(\text{NO}_3)_2$ (D) ZnSO_4
- Q.67 Peacock ore is:
 (A) FeS_2 (B) CuFeS_2 (C) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ (D) Cu_5FeS_4
- Q.68 "925 fine silver" means an alloy of:
 (A) 7.5 % Ag and 92.5% Cu (B) 92.5 % Ag and 7.5 % Cu
 (C) 80% Ag and 20 % Cu (D) 90 % Ag and 10% Cu
- Q.69 Iron salt used in blue prints is:
 (A) FeC_2O_4 (B) $\text{Fe}_2(\text{C}_2\text{O}_4)_3$ (C) $\text{K}_4[\text{Fe}(\text{CN})_6]$ (D) $\text{K}_3[\text{Fe}(\text{CN})_6]$
- Q.70 When acidified KMnO_4 is added to hot oxalic acid solution, the decolourization is slow in the beginning, but becomes very rapid after some time. This is because:
 (A) Mn^{2+} acts as autocatalyst (B) CO_2 is formed as the product
 (C) Reaction is exothermic (D) MnO_4^- catalyses the reaction

Question No. 71 to 80

Questions given below consist of two statements each printed as Assertion (A) and Reason (R); while answering these questions you are required to choose any one of the following four responses:

(A) if both (A) and (R) are true and (R) is the correct explanation of (A)

(B) if both (A) and (R) are true but (R) is not correct explanation of (A)

(C) if (A) is true but (R) is false

(D) if (A) is false and (R) is true

- Q.71 **Assertion :** KMnO_4 is purple in colour due to charge transfer.
Reason : In MnO_4^- , there is no electron present in d-orbitals of manganese.
- Q.72 **Assertion :** K_2CrO_4 has yellow colour due to charge transfer.
Reason : CrO_4^{2-} ion is tetrahedral in shape.
- Q.73 **Assertion :** The highest oxidation state of chromium in its compounds is +6.
Reason : Chromium atom has only six electrons in ns and (n-1) d orbitals.
- Q.74 **Assertion :** CrO_3 reacts with HCl to form chromyl chloride gas.
Reason : Chromyl chloride (CrO_2Cl_2) has tetrahedral shape.
- Q.75 **Assertion :** Zinc does not show characteristic properties of transition metals.
Reason : In zinc outermost shell is completely filled.
- Q.76 **Assertion :** Tungsten has a very high melting point.
Reason : Tungsten is a covalent compound.
- Q.77 **Assertion :** Equivalent mass of KMnO_4 is equal to one-third of its molecular mass when it acts as an oxidising agent in an alkaline medium.
Reason : Oxidation number of Mn is +7 in KMnO_4 .
- Q.78 **Assertion :** Ce^{4+} is used as an oxidising agent in volumetric analysis.
Reason : Ce^{4+} has the tendency of attain +3 oxidation state.
- Q.79 **Assertion :** Promethium is a man made element.
Reason : It is radioactive and has been prepared by artificial means.
- Q.80 **Assertion :** Cu^+ ion is colourless.
Reason : Four water molecules are coordinated to Cu^+ ion.

ANSWER KEY

Q.1	B	Q.2	A	Q.3	B	Q.4	A,B,C	Q.5	A
Q.6	B,C,D	Q.7	A,B	Q.8	B	Q.9	A,B,C,D	Q.10	A
Q.11	B	Q.12	A,B	Q.13	A	Q.14	A	Q.15	A,B
Q.16	A,B,D	Q.17	A,B,C	Q.18	B,C	Q.19	B	Q.20	A
Q.21	B	Q.22	B	Q.23	A	Q.24	B	Q.25	D
Q.26	B	Q.27	C	Q.28	A,B,C	Q.29	A,B,C	Q.30	A
Q.31	A,B,C	Q.32	B	Q.33	B	Q.34	A	Q.35	D
Q.36	A	Q.37	A,B	Q.38	B,C	Q.39	D	Q.40	A
Q.41	B	Q.42	A,C	Q.43	D	Q.44	A	Q.45	A,B
Q.46	C	Q.47	D	Q.48	A,B,C,D	Q.49	C	Q.50	B
Q.51	C	Q.52	A	Q.53	A,B	Q.54	C	Q.55	D
Q.56	A	Q.57	A	Q.58	A,B,C	Q.59	A	Q.60	A,B
Q.61	B	Q.62	B,C	Q.63	C	Q.64	B	Q.65	A
Q.66	B	Q.67	D	Q.68	B	Q.69	B	Q.70	A
Q.71	B	Q.72	B	Q.73	A	Q.74	B	Q.75	C
Q.76	C	Q.77	B	Q.78	A	Q.79	A	Q.80	C