CHEMISTRY

BOOKS - IIT-JEE PREVIOUS YEAR (CHEMISTRY)

D & F BLOCK ELEMENTS

Jee Main And Advanced

1. In the following reaction, ZnO is respectively as a/an

(i) $ZnO + Na_2O \rightarrow Na_2ZnO_2$

(ii) $ZnO + CO_2 \rightarrow ZnCO_3$

A. base and acid

B. base and base

C. acid and acid

D. acid and base

Answer: D

Watch Video Solution

2. Sodium salt of an organic acid 'X' produces effervescence with conc. H_2SO_4. 'X' reacts with the acidified aqueous $CaCl_2$ solution to give a white precipitate which decolourises acidic solution of $KMnO_4$ 'X' is

A. C_6H_5COONa

B. HCOONa

C. CH_3COONa

D. $Na_2C_2O_4$

Answer: D

Watch Video Solution

3. Which of the following combination will produce H_2 gas ?

A. Fe metal and conc. HNO_3

B. Cu metal and conc. HNO_3

C. Au metal and NaCN (aq) in the presence of air

D. Zn metal and NaOH (aq)

Answer: D

Watch Video Solution

4. Which of the following compounds is metallic and ferromagnetic ?

A. CrO_2

B. VO_2

C. MnO_2

D. TiO_2

Answer: A

Watch Video Solution

5. The reaction of zinc with dilute and concentrated nitric acid, respectively, produce

A. NO_2 and NO

B. NO and N_2O

C. NO_2 and N_2O

D. N_2O and NO_2

Answer: D

Watch Video Solution

6. The geometries of the ammonia complexes of Ni^{2+}, Pt^{2+} and Zn^{2+}, respectively, are

A. octahedral, square planar and tetrahedral

B. square planar, octahedral and tetrahedral

C. tetrahedral, square planar and octahedral

D. octahedral, tetrahedral and square planar

Answer: A

Watch Video Solution

7. Which of the following compounds is not yellow coloured ?

A. $Zn_2\left[Fe(CN)_6\right]$

B. $K_3\left[Co(NO_2)_6\right]$

C. $(NH_4)_3\left[\mathrm{As}(Mo_3O_{10})_4\right]$

D. $BaCrO_4$

Answer: A

Watch Video Solution

8. Which series of reactions correctly represents chemical rections related to iron and its compounds ?

A. $Fe \xrightarrow{\text{Dil.}H_2SO_4} FeSO_4 \xrightarrow{H_2SO_4, O_2} Fe_2(SO_4)_3 \xrightarrow{\text{Heat}} Fe$

B. $Fe \xrightarrow{O_2\,.\,\text{Heat}} FeSO_4 \xrightarrow{\text{Dil}\,.\,H_2SO_4} Fe_2SO_4 \xrightarrow{\text{Heat}} Fe$

C. $Fe \xrightarrow{Cl_2, \text{Heat}} FeCl_3 \xrightarrow{\text{Heat,air}} FeCl_2 \xrightarrow{\text{Zn}} Fe$

D. $Fe \xrightarrow{O_2, \text{Heat}} FeCl_3 \xrightarrow{\text{Co},600^\circ C} FeO \xrightarrow{\text{CO},700^\circ C} Fe$

Answer: D

Watch Video Solution

9. Four successive members of first row transition element are listed belw. Which one of them is expected to have highest $E_{\frac{M^{3+}}{(M^{2+})^{\ominus}}}$ value?

A. $Cr(Z = 24)$

B. $Mn(Z = 25)$

C. $Fe(Z = 26)$

D. $Co(Z = 27)$

Answer: D

Watch Video Solution

10. Consider the following reaction

$$xMnO_4^- + C_2O_4^{2-} + zH^+ \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$

The value of x, y and z in the reaction are respectively

A. 5,2 and 16

B. 2,5 and 8

C. 2,5 and 16

D. 5,2 and 8

Answer: C

Watch Video Solution

11. Which one of the following arrangements does not represent the correct order of the property stated against it?

A. $V^{2+} < Cr^{2+} < Mn^{2+} < Fe^{2}$: paramagnetic behaviour

B. $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2}$: ionic size

C. $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution

D. $Sc < Ti < Cr < Mn$: number of oxidation states.

Answer: A

Watch Video Solution

12. The colour of light absobed by an aqueous solution of $CuSO_4$ is

A. orange-red

B. blue-green

C. yellow

D. violet

Answer: A

Watch Video Solution

13. Which of the following will not be oxidised by O_3?

A. KI

B. $FeSO_4$

C. $KMnO_4$

D. K_2MnO_4

Answer: C

Watch Video Solution

14. In any transition series, from left to right, the d-orbitals are progressively filled and their properties vary accordingly.

Q. Which of the following pair of compounds is expected to exhibit same colour in aqueous solution?

A. $VOCl_2, FeCl_2$

B. $CuCl_2, VOCl_2$

C. $MnCl_2, FeCl_2$

D. $FeCl, CuCl_2$

Answer: B

Watch Video Solution

15. When I^{Θ} is oxidised by MnO_4^{Θ} in an alkaine medium, I^{Θ} converts into

A. IO_3^-

B. I_2

C. IO_4^-

D. IO^-

Answer: A

Watch Video Solution

16. The pair of compounds having metals in their highest oxidation state is .

A. $MnO_2, FeCl_3$

B. $[MnO_4]^-, CrO_2Cl_2$

C. $[Fe(CN)_6]^{3-}, [Co(CN)_3]$

D. $[NiCl_4]^{2-}, [CoCl_4]^{-}$

Answer: B

Watch Video Solution

17. $(NH_4)_2Cr_2O_7$ on heating gives a gas which is also given by

A. heating NH_4NO_2

B. heating NH_4NO_3

C. $Mg_3N_2 + H_2O$

D. $Na(\text{comp.}) + H_2O_2$

Answer: A

Watch Video Solution

18. When MnO_2 is fused woth KOH, a coloured compound is formed, the product and its colour are

A. K_2MnO_4, purple green

B. $KMnO_4$, purple

C. Mn_2O_3, brown

D. Mn_3O_4, black

Answer: A

Watch Video Solution

19. Among the following, identify the species with an atom in $+6$ oxidation state.

A. MnO_4^-

B. $Cr(CN)_6^{3-}$

C. NiF_6^{2-}

D. CrO_2Cl_2

Answer: D

Watch Video Solution

20. On heating ammonium dichromate, the gas evolved is

A. oxygen

B. ammonia

C. nitrous oxide

D. nitrogen

Answer: D

Watch Video Solution

21. In the dichromate dianion,

A. $4Cr - O$ bonds are equivalent

B. $6Cr - O$ bonds are equivalent

C. all $Cr - O$ bonds are equivalent

D. all $Cr - O$ bonds are non-equivalent

Answer: B

Watch Video Solution

22. Which of the following compounds is expected to be coloured?

A. Ag_2SO_4

B. CuF_2

C. MgF_2

D. $CuCl$

Answer: B

Watch Video Solution

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

A. CrO_3

B. CuF_3

C. MgF_2

D. $CuCl$

Answer: B

Watch Video Solution

24. The reaction which proceeds in the forward direction is

A. $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$

B. $NH_3 + H_2O + NaCl \rightarrow NH_3cl + NaOH$

C. $NH_3 + H_2O + NaCl \rightarrow NH_3cl + NaOH$

D. $2CuI + I_2 + 4H^+ \rightarrow 2Cu^{2+} + 4KI$

Answer: A

Watch Video Solution

25. Zinc-copper couple that can be used as a reducing agent is obtained by

A. mixing of zinc dust and copper gauge

B. zine coated with copper

C. copper coated with zinc

D. zinc and copper wires welded together

Answer: B

Watch Video Solution

26. How many unpaired electrons are there in Ni^{2+} ?

A. 0

B. 2

C. 4

D. 8

Answer: B

Watch Video Solution

27. One of the consituents of German silver is

A. Ag

B. Cu

C. Mg

D. Al

Answer: B

Watch Video Solution

28. Which of the following dissolves in hot concentrated NaOH solution?

A. Fe

B. Zn

C. Cu

D. Ag

Answer: B

Watch Video Solution

29. Which of the following statement are correct about Cr^{2+} (Z = 24) and Mn^{3+} (Z = 25) ?

(i) Cr^{2+} is a reducing agent

(ii) Mn^{3+} is an oxidizing agent

(iii) Both Cr^{2+} and Mn^{3+} exhibit d^4 configuration

(iv) When Cr^{2+} is used as a reducing agent, the chromium ion attains d^5 electronic configuration

A. Cr^{2+} is a reducing agent

B. Mn^{3+} is an oxidising agent

C. both Cr^{2+} and Mn^{3+} exhibit d^4 electronic configuration

D. when Cr^{2+} is used as a reducing agent, the chromium ions attains d^5 electronic configuration.

Answer: A::B::C

Watch Video Solution

30. Which of the following halides react(s) with $AgNO_{3\,(aq)}$ to give a precipitate that dissolves in $Na_2S_2O_{3\,(aq)}$

A. HCl

B. HF

C. HBr

D. HI

Answer: A::C::D

Watch Video Solution

Watch Video Solution

31. Reduction of the metal centre in aqueous permanganate ion involves

A. three electrons in neutral medium

B. five electrons in neutral medium

C. three electrons in alkaline medium

D. five electrons in acidic medium

Answer: A::C::D

Watch Video Solution

32. Which of the following statement(s) is/are correct ?

A. The electronic configuration of Cr is $[Ar]3d^2 4s^1$

(Atomic number of Cr = 24)

B. The magnetic quantum number may have a negative value

C. In silver atom, 23 electrons have a spin of one type and 24 of the opposite type (Atomic number of Ag = 47)

D. The oxidation state of nitrogen in HN_3 is -3

Answer: B::C

Watch Video Solution

33. Which of the following statement(s) is/are correct when a mixture of NaCl and $K_2Cr_2O_7$ is genetly warmed with conc. H_2SO_4 ?

A. A deep red vapours is formed

B. Vapours when passed into NaOH solution gives a yellow solution of Na_2CrO_4

C. Chlorine gas is evolved

D. Chromyl chloride is formed

Answer: A::B::D

Watch Video Solution

34. Which of the following alloys contain (s) Cu and Zn?

A. Bronze

B. Brass

C. Gun metal

D. Type metal

Answer: B::C

Watch Video Solution

35. The aqueous solution of the following salts will be coloured in the case of

A. $Zn(NO_3)_2$

B. $LiNO_3$

C. $Co(NO_3)_2$

D. $CrCl_3$

Answer: C::D

Watch Video Solution

36. Potassium manganate (K_2MnO_4) is formed when

A. chlorine is passed into aqueous $KMnO_4$ solution

B. manganese dioxide is fused with KOH in air

C. formaldehyde reacts with potassium permanganate in the presence of strong alkali

D. potassium permanganate reaction with conc. H_2SO_4

Answer: B::C

Watch Video Solution

37. Statement I : Zn^{2+} is diamagnetic

Statement II : The electrons are lost from 4s orbital to from Zn^{2+}

A. Statement I is true , Statement II is true , Statement II is the correct explanation of Statement I

B. Statement I is true , Statement II is true , Statement II is not the correct explanation of Statement I

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II is false

Answer: B

Watch Video Solution

38. Assertion: If a strong acid is added to a solution of potassium chromate it changes its colour from yellow to orange.

Reason: The colour change is due to the oxidation of potassium chromate.

A. Statement I is true , Statement II is true , Statement II is the correct explanation of Statement I

B. Statement I is true , Statement II is true , Statement II is not the correct explanation of Statement I

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II is false

Answer: C

Watch Video Solution

39. The compound $Yba_2Cu_3O_7$ which shows super conductivity has copper in oxidation state____. Assume that the rare earth element yttrium is in its usual $+3$ oxidation state.

Watch Video Solution

40. The outermost electrinic configuration of Cr is _____

Watch Video Solution

41. Fehling's solution 'A' consists of an aqueous solution of copper sulphate, while Fehling's solution 'B' consists of an alkaline solution .....

Watch Video Solution

42. Among (i) $FeSO_4.7H_2O$, (ii) $CuSO_4.5H_2O$, (iii) $ZnSO_4.7H_2O$ and (iv) $MnSO_4 4H_2O$, isomorphous salts are

Watch Video Solution

43. Mn^{2+} can be oxidised to $MnO_4(\ominus)$ by _ _ _ (SnO_2,PbO_2,BaO_2`).

Watch Video Solution

44. Depositive zinc oxhibits paramagnetism due to loss of two electrons from 3d-orbitals of neutral atom.

Watch Video Solution

45. Copper metal reduces Fe^{2+} in an acid medium.

Watch Video Solution

46. In neutral or faintly alkaline solution, 8 moles of permanganate anions to produce X moles of a sulphur containing product. The magnitude of X is .....

Watch Video Solution

47. In dilute aqueous H_2SO_4 the complete diaquadioxalatoferrate (II) is oxidised by MnO_4^-. For thi reaction, the ratio of the rate of change of $\left[H^+\right]$ to the rate of change of $\left[MnO_4^-\right]$ is

Watch Video Solution

48. Consider the following list of regents: Acidified $K_2Cr_2O_7$, alkaline $KMnO_4$, $CuSO_4$, H_2O_2, CI_2, O_3, HNO_3, and $Na_2S_2O_3$. The total number of reagents that can oxidis aqueous I^Θ ion I_2 is

Watch Video Solution

49. $\underset{\text{White fumes with pungent smell}}{(B)} \xleftarrow{\text{Moist air}} \underset{\text{(M=Transition element colourless)}}{MCl_4} \xleftarrow{Zn} \underset{\text{(purple colour)}}{(A)}$

Indentify the metal M and hence MCl_4. Explain the difference in colours of MCl_4 and A.

Watch Video Solution

50. Give reason : CrO_3 is an acid anhydride.

Watch Video Solution

51. A compound of vanadium has a magnetic moment of $1.73BM$. Work out the electronic configuration of vanadium in the compound

Watch Video Solution

52. Write balanced equations for the following

(i) Oxidatiuon of hydrogen peroxide with potassium permaganate in acidic medium

(ii) Reaction of zinc with dilute nitric acid.

Watch Video Solution

53. Complete and balance the following reactions

(i) $[MnO_4]^{2-} + H^+ \rightarrow ..... + [MnO_4]^- + H_2O$

(ii) $SO_2(aq) + Cr_2O_7^{2-} + 2H^+ \rightarrow .... + ... +$

Watch Video Solution

54. Complete and balance the following reaction

$(NH_4)_2S_2O_8 + H_2O + MnSO_4 \rightarrow .... + ... + ...$

Watch Video Solution

55. Write the balanced chemicalm equations for the following reactions

(i) A mixture of potassium dichromate and sodium chloride is heated with concentrated H_2SO_4

(ii) Potassium permanganate is added to a hot solution of manganous sulphate.

Watch Video Solution

56. Complete and balance the following reactions.

(i) $Mn^{2+} + PbO_2 \rightarrow MnO_4^- + H_2O$

(ii) $Ag^+ + AsH_3 \rightarrow H_3AsO_3 + H^+$

Watch Video Solution

57. Give reason in one or two sentences

"Most transition metal compound are coloured".

Watch Video Solution

58. Write the balanced equations for the reactions when

(i). Potassium permanganate interacts with manganese dioxide in the presence of potassium hydroxide.

(ii). Potassium ferrocyanide is heated with concentrated sulphuric acid.

Watch Video Solution

59. State the conditions under which the following preparations are carried out. Give the necessary equations which need not be balanced. Potassium permanganate from manganese dioxide.

Watch Video Solution

60. Complete and balance the following reactions

(i) $Zn + NO_3^- \rightarrow Zn^{2+} + NH_4^+$

(ii) $Cr_2O_7^{2-} + C_2H_4O \rightarrow C_2H_4O_2 + Cr^{3+}$

Watch Video Solution

61. CrO_3 dissolves in aqueous NaOH to give

A. $Cr_2O_7^{2-}$

B. CrO_4^{2-}

C. $Cr(OH)_3$

D. $Cr(OH)_2$

Answer: B

Watch Video Solution

62. Pick out the incorrect statement

A. MnO_2 dissolves in dilute HCl. But does not form Mn^{4+}

B. MnO2 oxidises hot concentrated H_2SO_4 liberating oxygen

C. K_2MnO_4 is formed when MnO_2 is fused with KOH in presence of KNO_3

D. Decomposition of $KMnO_4$ is not catalysed by sunlight

Answer: D

Watch Video Solution

63. When $KMnO_4$ is added to oxalic acid, the decolourisation is slow in the beginning but becomes instantaneous after sometime because

A. Mn^{2+} acts as autocatalyst

B. CO_2 is formed as product

C. Reaction is exothermic

D. MnO_4^- catalyses the reaction

Answer: A

Watch Video Solution

64. K_2MnO_4 can be converted into $KMnO_4$ using all of the following except

A. dil. H_2SO_4

B. Cl_2

C. O_3

D. HCl

Answer: D

Watch Video Solution

65. Addition of non-metals like B and C to the interstitial sites of a transition metal results the metal

A. of more ductility

B. of less ductility

C. less malleable

D. of more hardness

Answer: B::C::D

Watch Video Solution

66. Which of the following statement concening $KMnO_4$ is incorrect ?

A. In dilute alkaline medium, it is reduced to MnO_2

B. When added in samll quantity to concentrated H_2SO_4 a green solution containing MnO_3^+ ion is formed

C. With larger amount of $KMnO_4$ added to concentrated H_2SO_4, an explosive oil Mn_2O_7 is formed

D. $KMnO_4$ is stable to heat and sunlight

Answer: D

Watch Video Solution

67. To an acidified dichromate solution, a pinch of Na_2O_2 is added and shaken. What is observed ?

A. Blue colouration

B. Red colouration finally changing to green

C. Oxygen gas is evolved

D. Bluish-green precipitate is formed

Answer: A::C

Watch Video Solution

68. Assertion : $KMNO_4$ in aqueous solution is purple coloured due to charge transfer

Reason : In MnO_4^- these is no electron present in the d-orbital of Mn

A. Both assertion and reason are correct and reason is the correct explanation of the assertion

B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. Assertion is correct but reason is wrong

D. Assertion is incorrect but reason is correct

Answer: B

Watch Video Solution

69. Assertion : CrO_3 reacts with HCl to form chromyl chloride gas

Reason : Chromyl chloride (CrO_2Cl_2) has tetrahedral shape.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion

B. Both assertion and reason are correct but reason is not the correct explanation of assertion

C. Assertion is correct but reason is wrong

D. Assertion is incorrect but reason is correct

Answer: B

Watch Video Solution

Objective Q 2

1. Fe^{3+} is reduced of Fe^{2+} by using

A. H_2O_2 is presence of NaOH

B. Na_2O_2 in water

C. H_2O_2 in presence of H_2SO_4

D. Na_2O_2 in presence of H_2SO_4

Answer: A::B

View Text Solution