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Previous Year Paper

Chemistry - 2015

Match The Following

1. Match the following:

A. Disaccharide	(i) Lucas reagent
B. Carbylamine	(ii) Condensation polymer
C. Dacron	(iii) Obnoxious smell
D. Dacron	(iv) Sucrose
E. Anhydrous ZnCl2 + conc. HCl	(v) Hexaamminecobalt(III)ion

Answer

Fill In the Blanks

2. Fill in the blanks by choosing the appropriate word/words from those given in the brackets:
(increases, decreases, positive, efficient, 68, non-efficient, no α-hydrogen, α-hydrogen, negative, Rosenmund's, greater, Cannizzaro, 74, common-ion effect, lesser, buffer action, diamagnetic, paramagnetic)

(i) The more_____ the standard reduction potential of a metal, the _____ is its ability to displace hydrogen from acids.

(ii) Both ccp and hcp are _____ packings and occupy about _____% of the available space.

(iii) Solubility of silver chloride _____ in the presence of sodium chloride because of _____.

(iv) Benzaldehyde undergoes _____ reaction on treatment with concentrated sodium hydroxide because it has _____ atom.

(v) The transition metals show _____ character because of the presence of unpaired electrons and Cu+ is _____ because its electronic configuration

is [Ar]3d10.

Answer

Multiple Choice Questions

3. Complete the following statements by selecting the correct alternative from the choices given:
   The molal freezing point constant of water is 1·86 K kg mol-1 . Therefore, the freezing point of 0·1M NaCl solution in water is expected to be:

   A. -1·86°C

   B. -0·372°C

   C. -0·186°C

   D. -0·186°C

   Answer

4. Complete the following statements by selecting the correct alternative from the choices given:
   For a first order reaction the rate constant for decomposition of N_2O_5 is 6×10-4sec-1.
   The half-life period for the decomposition in seconds is:

   A. 11·55

   B. 115·5

   C. 1155

   D. 1155

   Answer

5. Complete the following statements by selecting the correct alternative from the choices given:
   When acetaldehyde is treated with Grignard reagent, followed by hydrolysis the product formed is:

   A. Primary alcohol

   B. Secondary alcohol

   C. Carboxylic acid

   D. Carboxylic acid

   Answer

6. Complete the following statements by selecting the correct alternative from the choices given:
   The geometry of XeF_6 molecule and the hybridization of Xe atom in the molecule is:

   A. Distorted octahedral and sp^3d^3

   B. Square planar and sp^3d^2

   C. Pyramidal and sp^3

   D. Pyramidal and sp^3

   Answer

7. Complete the following statements by selecting the correct alternative from the choices given:

In the complexes $[Fe(CN)6]^{3-}$ and $[Pt(en)\ (H_2O)2(NO_2)(Cl)]_2^+$ the respective oxidation numbers of central metal atoms are :

A. + 3 and +4

B. +6 and +4

C. +6 and +3

D. +6 and +3

Answer

Short Answer Type

8. Answer the following questions:

What is the effect of temperature on the ionic product of water? How will it change the pH value of a neutral solution?

Answer

9. Answer the following questions:

How many hours does it take to reduce 3 moles of Fe3+to Fe2+ with 2·0 A current intensity?

Answer

10. Answer the following questions:

How is urea prepared by Wohler synthesis?

Answer

11. Two liquids A and B form type II non-ideal solution which shows a minimum in its temperature - mole fraction plot (T-*X* diagram). Can the two liquids be completely separated by fractional distillation?

Answer

12. Answer the following questions:

The aqueous solution of sodium acetate is basic. Explain.

Answer

13. A solution containing 0·5 g of KCl dissolves in 100 g of water and freezes at – 0·24°C. Calculate the degree of dissociation of the salt. (K_f for water = 1.86°C) Atomic weights [K = 39, Cl = 35·5]

Answer

14. If 1·71 g of sugar (molar mass = 342) are dissolved in 500 ml of an aqueous solution at 300 K, what will be its osmotic pressure?

Answer

15. 0·70g of an organic compound, when dissolved in 32g of acetone, produces an elevation of 0·25°C in the boiling point. Calculate the molecular mass of the organic compound (Kb for acetone = 1·72 K kg mol^{-1}).

Answer

16. (i) What is the difference between order of a reaction and the molecularity of a reaction?

    (ii) A substance decomposes by following first order kinetics. If 50% of the compound is decomposed in 120 minutes, how long will it take for 90% of the compound to decompose?

    Answer

17. Name the crystal structure of the copper metal

    Answer

18. Chromium metal crystallises with a body centered cubic lattice. The edge length of the unit cell is found to be 287 pm. Calculate the atomic radius. What would be the density of chromium in g / cm3? (atomic mass of Cr = 52·99)

    Answer

19. Why does sodium chloride on heating with sodium vapours acquire yellow colour?

    Answer

20. The equilibrium constant for the reaction:

    $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ at 715 K, is $6{\cdot}0 \times 10^{-2}$.

    If, in a particular reaction, there are 0·25 mol L-1 of H2 and 0·06 mol L-1 of NH_3 present, calculate the concentration of N2 at equilibrium.

    Answer

21. Calculate the concentration of OH^- ions in solution when $[H^+] = 6.2 \times 10^{-2} mol L^{-1}$.

    Answer

22. State the Le-Chatelier's principle.

    Answer

23. For a crystal of sodium chloride, state:

    (i) The type of lattice in which it crystallises.

    (ii) The coordination number of each sodium ion and chloride ion in the crystal lattice.

    (iii) The number of sodium ions and chloride ions present in a unit cell of sodium chloride.

    (iv) The structural arrangement of the sodium chloride crystal.

    Answer

24. Consider the following reaction:

    $N_2O_4(g) + Heat \rightleftharpoons 2NO_2(g)$

    How is the composition of equilibrium mixture affected by:

    (i) a change in temperature

    (ii) a change in pressure

    (iii) a change in concentration of N_2O_4

(iv) the removal of NO_2 from the reaction mixture

Answer

25. The specific conductance of a 0.01 M solution of acetic acid at 298 K is 1.65 x 10^{-4} ohm^{-1} cm^{-1}.The molar conductance at infinite dilution for H^+ ion and CH3COO $^-$ ion are 349.1 ohm^{-1} cm^2mol^{-1} and 40.9 ohm^{-1} cm^2mol^{-1} respectively.

Calculate:

(i) Molar conductance of the solution.

(ii) Degree of dissociation of CH_3COOH.

(iii) Dissociation constant for acetic acid.

Answer

26. (i) Calculate the e.m.f. of the following cell reaction at 298 K:

Mg (s) + Cu^{2+} (0.0001 M) → Mg^{2+} (0.001M) + Cu (s)

The standard potential (E^0) of the cell is 2.71 V.

(ii) The solubility product (Ksp) of BaSO4 is 1.5 x 10-9.Calculate the solubility of barium sulphate in pure water and in 0.1 M $BaCl_2$.

Answer

27. Explain the following :

(i) When NH_4 Cl and NH_4OH are added to a solution containing both, Fe^{3+} and Ca^{2+} ions, which ion is precipitated first and why?

(ii) Dissociation of H_2S is suppressed in acidic medium.

Answer

28. Write the IUPAC names of the following coordination compounds:

(i) $[Cr(NH_3)_4(H_2O)_2]Cl_3$

(ii) $[PtCl_2(NH_3)_4]$ $[PtCl_4]$

Answer

29. State the hybridization and magnetic property of $[Fe(CN)_6]^{3-}$ ion according to the valence bond theory.

Answer

30. (i) What type of isomers are $[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]Br$.? Give a chemical test to distinguish between them.

(ii) Write the structures of optical isomers of the complex ion $[Co(en)_2Cl_2]^+$

Answer

31. Give balanced chemical equations for the following reactions:

    (i) Fluorine is passed through cold, dilute NaOH solution.

    (ii) Hydrogen peroxide is treated with acidified $KMnO_4$ solution.

    (iii) Sulphuric acid is treated with hydrogen sulphide.

    Answer

32. Draw the structure of xenon tetrafluoride molecule and state the hybridization of the central atom and the geometry of the molecule.

    Answer

33. Name the important ore of silver. Write all the steps and reactions involved in the Cyanide process for the extraction of silver from its ore.

    Answer

34. Explain the following:

    (i) Why do transition metal ions possess a great tendency to form complexes?

    (ii) The paramagnetic character in 3d-transition series elements increases up to Mn and then decreases.

    Answer

35. How can the following conversions be brought about:

    (i) Glycerol to formic acid

    (ii) Chlorobenzene to phenol

    (iii) Diethyl ether to ethanol

    (iv) Phenol to aniline.

    Answer

36. (i) How is iodoform prepared from ethanol? Give balanced equation.

    (ii) What will be the product formed when chlorobenzene is heated with sodium metal in the presence of dry ether?

    Answer

37. Identify the compounds A, B, C , D, E and F:

    $$CH_3COCH_3 \xrightarrow{\text{Conc. } HNO_3} A \xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow{LiAlH_4} D$$
    $$\xrightarrow{HNO_2} E \xrightarrow{CH_3COCl} F$$

    Answer

38. Give balanced equations for the following name reactions:

    (i) Reimer-Tiemann reaction.

    (ii) Rosenmund reaction

    (iii) Hoffmann’s degradation reaction

    Answer

39. Give one chemical test to distinguish between the following pairs of compounds:

(i) Ethylamine and diethylamine.

(ii) Acetaldehyde and benzaldehyde

Answer

40. Arrange the following compounds in the ascending order of their basic strength and give reasons for your answer:

Methylamine, Aniline, Ethylamine, Diethyl ether

Answer

41. Name the monomers and the type of polymerization in each of the following polymers:

(a) Polyester

(b) Bakelite

Answer

42. An organic compound A with molecular formula C_2H_7N on reaction with nitrous acid gives a compound B. B on controlled oxidation gives compound C. C reduces Tollen's reagent to give silver mirror and D. B reacts with D in the presence of concentrated sulphuric acid to give sweet smelling compound E. Identify A, B, C, D and E. Give the reaction of C with ammonia.

Answer

43. Give balanced equations for the following reactions:

(i) How will you convert ethyl amine to methyl amine?

(ii) What is the effect of denaturation on the structure of proteins?

(iii) Name the nitrogen base residues present in DNA.

Answer

44. Give balanced equations for the following reactions:

(i) Aniline is treated with nitrous acid and HCl at low temperature.

(ii) Acetyl chloride is treated with ethyl alcohol.

(iii) Formaldehyde is treated with ammonia

Answer