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Previous Year Paper

Chemistry - 2006



Match The Following

1. Match the following :

A. Optical isomerism	(i) glycine
B. Zwitter ion	(ii) lactic acid
C. Lewis acid	(iii) ebullioscopic method
D. Lewis acid	(iv) formaldehyde
E. Urotropine	(v) aluminium chloride

Answer



Fill In the Blanks

2. Fill in the blanks by choosing the appropriate words from those given in brackets :

[Entropy, energy, MnO_2 , CuO , +M, -M, +I, -I, directly, inversely, sulphuric acid, hydrochloric acid, nitric acid, square, cube, square root, universe, buffer action, salt hydrolysis, acidic, basic, decreases, increases].

(i) When a spontaneous process takes place, it is accompanied by an increase in the total _____ of the _____.

(ii) The degree of dissociation of a weak electrolyte is _____ proportional to the _____ of its molar concentration.

(iii) Sodium acetate solution is _____ because of _____.

(iv) In the laboratory, bromine can be obtained by heating a mixture of KBr and _____ with conc. _____.

(v) An alkyl group attached to the carbonyl group exerts a _____ effect and thus _____ the reactivity of carbonyl group.

Answer



Multiple Choice Questions

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

Dehydration of an amide with phosphorus pentoxide yields :

A. Ammonia

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C. Alkyl isocyanide

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D. Alkyl amine

Answer

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

The lowest freezing point of 0.1 M aqueous solution is of:

- A. K_2SO_4
- B. NaCl
- C. Urea
- D. Urea

Answer

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

A basic buffer can be prepared by mixing :

- A. CH_3COONa and CH_3COOH
- B. Na_2SO_4 and H_2SO_4
- C. NaCl and NaOH
- D. NaCl and NaOH

Answer

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

The standard reduction electrode potentials of four elements A, B, C and D are -3.05, 1.66, -0.40 and 0.80 volts respectively. The highest chemical activity will be shown by :

- A. A
- B. B
- C. C
- D. C

Answer

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

The solubility of iodine in water may be increased by adding :

- A. Potassium iodide
- B. Chloroform
- C. Carbon disulphide
- D. Carbon disulphide

Answer**Short Answer Type**

8. Correct the following statements :

A system which can exchange neither matter nor energy with the surroundings is called a closed system.
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9. Correct the following statements :

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Hydrolysis of an isocyanide in the presence of an acid yields primary amine and methyl alcohol.

Answer

10. Correct the following statements :

Dissociation of hydrogen sulphide is suppressed in an acidic medium because of neutralization.

Answer

11. Correct the following statements :

When tin is treated with cold and very dilute nitric acid, stannic acid is formed. Answer

12. Correct the following statements :

Oxidation of sucrose with concentrated nitric acid yields glycerol. Answer

13. The depression in the freezing point of a sugar solution was found to be 0.402°C . Calculate the osmotic pressure of the sugar solution at 27°C . ($K_f = 1.86 \text{ K kg mol}^{-1}$ Answer

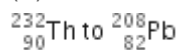
14. A solution is prepared by dissolving 2.0 g of sucrose and 2.0 g of urea in 100 g of water at 298 K. Calculate the vapour pressure of the solution, if the vapour pressure of pure water at 298 K is 23.756 torr.

(Molecular weight of urea = 60 and sucrose = 342)

Answer

15. The average life-period of a radioactive nucleide is 100 hours. How long will it take for 10 g of the nucleide to lose 75 percent of its radioactivity ? [4]

(ii) Calculate the number of α -particles and β -particles emitted in a total transformation from



Answer

16. What is the shape of an acetylene molecule ? Mention the type of hybridization present in it.

Answer

17. Draw the molecular orbital diagram for O_2^+ . What is its bond order ? State whether this molecule is paramagnetic or diamagnetic. Answer

18. Two ionic compounds AB and AB_2 have the same solubility product. Which of the two compounds has a higher solubility at the same temperature ? Justify your answer. Answer

19. (i) What is phase rule ? Draw the phase diagram of water and label all the parts representing the phases and curves. Mark the triple point.

(ii) Calculate the equivalent conductivity of 1 M H_2SO_4 , whose specific conductivity is 26×10

$^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$.

Answer

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20. Explain why an aqueous solution of copper sulphate is acidic, whereas an aqueous solution of sodium carbonate is basic. [Answer](#)

21. The pH of an acidic buffer remains constant even when a few drops of a strong acid are added to it. Give reasons. [Answer](#)

22. Draw a graph which is used to calculate the activation energy of a reaction. Give the appropriate expressions used to calculate the activation energy graphically. [Answer](#)

23. (i) 10 g of an organic compound was present in 100 cm³ of water. It was extracted twice with fresh 50 cm³ portions of ether. How much organic compound was extracted ? (The organic compound is three times more soluble in ether than in water.)

(ii) Give one example each of homogeneous and heterogeneous catalysis.

[Answer](#)

24. (i) Name the crystal structure of the copper metal.

(ii) What is the coordination number of copper in its crystalline state ?

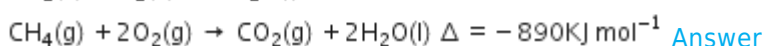
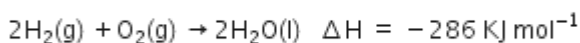
[Answer](#)

25. ΔH and ΔS for vaporization of water at 1 atm pressure are 40.63 KJ mole⁻¹ and 108.8 JK⁻¹mole⁻¹ respectively. Calculate the temperature at which the free energy change for the transformation will be zero. Predict the sign of free energy change below this temperature.

(ii) The heat supplied to a Carnot engine is 1958.22 KJ. How much useful work can be done by the engine which works between 0 °C and 100 °C ?

[Answer](#)

26. Calculate the enthalpy of formation of methane from the following data:



[Answer](#)

27. Write balanced chemical equations for each of the following reactions :

(i) Sodium thiosulphate with aqueous silver nitrate.

(ii) Copper sulphate with aqueous potassium iodide.

(iii) Hydrogen peroxide with acidified ferrous sulphate solution.

(iv) Ozone with moist iodine.

[Answer](#)

28. What are the steps of the electro-thermic process for the manufacture of phosphorus from its mineral ? [Answer](#)

29. Give reasons :

(i) Hydrogen peroxide is used for restoring the colour of lead paintings.

(ii) Silicones are used as lubricants at both high and low temperatures.

[Answer](#)

30. Name the chief ore of lead. Write the steps involved in the extraction of lead from its sulphide ore. [Answer](#)

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31. (i) State the two necessary conditions for a compound to show geometrical isomerism.

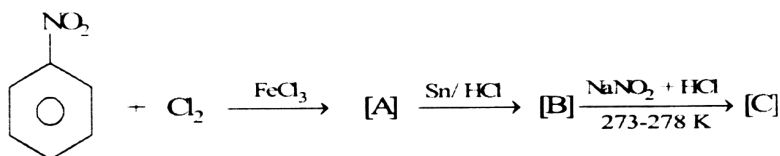
(ii) Why is meso-tartaric acid optically inactive ?

(iii) Write the structure of three compounds which have the same molecular formula of C_4H_8O but

have different functional groups.

[Answer](#)

32. Complete the following reactions and name the intermediate products A, B and C.



[Answer](#)

33. (i) Give any one example of a cross-linked synthetic polymer.

(ii) With reference to the polymer named by you :

(1) Write the compounds from which it is prepared.

(2) Give one physical property of the cross-linked synthetic polymer.

[Answer](#)



Long Answer Type

34. Write the relevant equations to convert:

(i) Fructose to osazone.

(ii) Acetic acid to acetone.

(iii) Acetyl chloride to acetic anhydride.

[Answer](#)

35. Give one test each to distinguish between :

(i) Acetaldehyde and formaldehyde.

(ii) Acetone and acetic acid.

(iii) Starch and cellulose.

[Answer](#)

36. Write balanced chemical equations for the following and name the reactions occurring in each case :

(i) Benzaldehyde reacts with an alcoholic solution of potassium cyanide.

(ii) Aniline is warmed with chloroform and alcoholic potassium hydroxide.

(iii) Propanone is treated with iodine and excess of alkali and warmed.

(iv) Benzoic acid is treated with soda lime.

[Answer](#)