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Previous Year Paper

Chemistry - 2005



Match The Following

1. Match the following :

A. Carbylamine reaction	(i) asymmetric carbon atom
B. Disaccharide	(ii) explosive
C. TNT	(iii) condensation polymer
D. TNT	(iv) sucrose
E. Optical isomerism	(v) abnoxious smell

Answer



Fill In the Blanks

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

[Olefenic, aldol, safety matches, sodium sulphite, homolytic, organometallic, aldol condensation, flowers of sulphur, pesticides, heterolytic, antiknock, β -hydroxy-aldehyde, rat poison, sulphur dioxide, free radicals, antichlor, mixed condensation, photography, sodium hydroxide, charged species].

(i) Red phosphorus is used in the manufacture of _____ and _____.

(ii) Hypo is prepared by boiling _____ solution with _____ in alkaline medium.

(iii) The breaking of covalent bonds may be either through _____ or by _____ fission.

(iv) Acetaldehyde in presence of dilute alkali gives _____ and the reaction is called _____.

(v) TEL, an _____ compound, is used as an _____ agent.

Answer



Multiple Choice Questions

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

(i) A quantitative relationship between the temperature and rate constant of a reaction is given by

A. Nernst equation

B. Arrhenius equation

C. Van't Hoff equation

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Answer

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

In the reaction $\text{HOH} + \text{NH}_3 \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$, water acts as :

- A. Lewis acid
- B. Lewis base
- C. Both as Lewis acid and Lewis base
- D. Both as Lewis acid and Lewis base

Answer

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

The number of Faradays which will be required to reduce 4 gram equivalents of Cu^{2+} to Cu metal is :

- A. 1
- B. 2
- C. 3
- D. 3

Answer

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

Entropy is an example of:

- A. Intensive property
- B. Extensive property
- C. Colligative property
- D. Colligative property

Answer

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

Mac Arthur-Forrest process is used for the extraction of:

- A. Aluminium
- B. Copper
- C. Silver
- D. Silver

Answer



Short Answer Type

8. Correct the following statements :

Molarity of a solution is independent of temperature.

Answer

9. Correct the following statements :

Radioactive disintegration is a second-order process.

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10. Correct the following statements :

Linear overlap of two atomic p-orbitals leads to the formation of pi-bond.

Answer

11. Correct the following statements :

Graphite has a two-dimensional sheet-like structure in which each carbon atom is sp^3 hybridized.

Answer

12. Correct the following statements :

For water-system, the number of phases that can exist in equilibrium is two.

Answer

13. Calculate the mole fraction of water in a sodium hydroxide solution which has 80 g of NaOH and 54 g of H_2O . [Relative atomic masses : Na = 23, O = 16, H = 1]. Answer

14. The bond angles in CH_4 (109.5°), NH_3 (107°) and H_2O (104.5°) are different although these molecules have the same hybridization, sp^3 . Give a suitable reason for this. Answer

15. Radium has a half-life of 1580 years. How long would it take for each of the samples of radium given below to disintegrate ?

(i) 20% of a 5 g sample.

(ii) 20% of a 50 g sample.

Answer

16. State the main characteristics of an ionic and a network type of crystal citing a suitable example for each. Answer

17. For the cell



Given that $E_{Zn}^{2+} = +0.761$ volt; $E_{Cu}^{2+} = +0.339$ volt

(i) Write the cell reaction

(ii) Calculate the emf and free energy change at 298 K involved in the cell. [Faraday's constant $F = 96500$ coulomb equivalent $^{-1}$].

Answer

18. (i) What is the physical significance of entropy ?

(ii) How is the entropy of the universe changing ?

Answer

19. For the extraction of aluminium, write

(i) The most important ore.

(ii) One method for the purification of the mentioned ore.

(iii) The role of cryolite and calcium fluoride in electrolysis.

Answer

20. Calculate the maximum work for the expansion of 1 mole of an ideal gas from $1/$ to $10/$ at a temperature of $0^\circ C$. Answer

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21. (i) Give the structural representation of constitution of bleaching powder.

(ii) Write the chemical reactions when bleaching powder reacts with dilute HCl.

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(iii) What is responsible for its oxidizing as well as bleaching properties.

[Answer](#)

22. Complete the following reactions and name the type of reaction to which each belongs:

i) $\text{CH}_3\text{Br} + \text{KOH (aq)} \rightarrow$

ii) $\text{H}_2\text{C}=\text{CH}_2 + \text{HCl} \rightarrow$

iii) $\text{C}_2\text{H}_5\text{OH} \xrightarrow[443\text{K}]{\text{conc. H}_2\text{SO}_4}$

[Answer](#)

23. (a) Write chemical equations for the following reactions and name the main product:

(i) Formaldehyde with ammonia

(ii) Acetone with sodium hypoiodite

(iii) Oxalic acid with glycerol at 260°C .

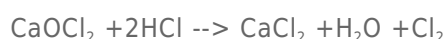
(iv) Acetic anhydride with salicylic acid.

[Answer](#)

24. An aromatic compound 'A' on analysis was found to contain C, 79.14% and H, 5.66%. When 'A' is treated with alkali it does not turn brown or become polymerized but reacts as follows :



(b) In excess of dil HCl, bleaching powder liberates Cl_2 .



Where $\text{X} = \text{A} + 2\text{H}$; Y gives an acid, Z, on the addition of dilute HCl; here Z is $\text{Z} = \text{A} + (\text{O})$.

Identify the compound 'A' and name the reaction it is undergoing by giving reasons in support of it.

[Answer](#)

25. How will you show the amphoteric nature of glycine ? Mention the pH value for its isoelectric point. [Answer](#)

26. How can primary, secondary and tertiary aliphatic amines be distinguished by reaction with HNO_2 ($\text{NaNO}_2 + \text{dilute H}_2\text{SO}_4$) ? [Answer](#)

27. How will you convert sorbitol into glucose ?

[Answer](#)

28. What are the reaction products of the following ?

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$\text{HNO}_3, \text{H}_2\text{SO}_4$

Br_2, Fe

$\text{HNO}_3, \text{H}_2\text{SO}_4$

(ii) Why are same compounds not obtained at the final stage ?

Answer

29. Give the monomers of the following polymers :

(i) Teflon (ii) Bakelite

Answer

30. Name the type of isomerism exhibited by the following pairs of compounds :

(i) Acetaldehyde and vinyl alcohol

(ii) Maleic acid and fumaric acid.

Answer



Long Answer Type

31. (i) Write the equation which relates the number of phases, components and degree of freedom of a system in equilibrium.

(ii) How many phases and components are there in a system consisting of:

(1) a mixture of O_2 and N_2 gases

(2) N_2 gas containing H_2O vapour

(3) a mixture of ice and water

(4) a mixture of powdered iron and sulphur

(5) a lump of solid iron (II) sulphide

Give a suitable explanation, in brief, for your answer.

Answer

32. Consider the reaction,



The initial rates for different initial concentrations of the reactants are given below :

Initial concentration (mol l^{-1}) Initial rate ($\text{mol l}^{-1} \text{s}^{-1}$)

	A	B	
(i)	1.0	1.0	2.0×10^{-3}
(ii)	2.0	1.0	4.0×10^{-3}
(iii)	4.0	1.0	8.0×10^{-3}
(iv)	1.0	2.0	2.0×10^{-3}
(v)	1.0	4.0	2.0×10^{-3}

- (a) Write the orders with respect to A and B.
- (b) What is the overall order ?
- (c) Write the rate law equation.
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(d) Calculate the rate constant.

(e) Suggest a possible mechanism.

Answer

33. Explain the principle involved in the following observations :

(i) Cu^{2+} is precipitated as CuS in the acidic medium while Ni^{2+} is precipitated as NiS in a basic medium with H_2S .

(ii) A solution of a weak acid and its salt with strong base has a definite pH value which does not change appreciably on dilution.

(iii) A solution of sodium chloride is neutral while that of ferric chloride is acidic in nature.

Answer

34. (i) Why could fluorine not be prepared for a long time from HF and metal fluorides either by electrolysis or by any chemical reaction ?

(ii) Describe the modern method for the preparation of fluorine by giving :

(a) Materials used in the construction of the cell.

(b) Electrolyte used.

(c) Electrode reactions.

Answer