CHEMISTRY

BOOKS - GURUKUL BOOKS & PACKAGING CHEMISTRY (HINGLISH)

JULY 2018

Section I

1. What is the role of the following compounds :

(a) CaF_2 in the metallurgy of aluminium ?

(b) SiO_2 in the extraction of copper from copper pyrites ?

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2. Classify the following molecular solids into different types :

(a) HCl (b) CO_2

(c) Solid ice (d) SO_2

3. Define the following terms :

(a) Cryoscopic constant

(b) Resistivity

4. Arrange the following oxyacids of chlorine in decreasing order of their thermal stability. Give reason.

HOClO, HOCl, $HClO_4$, $HOClO_2$

5. Derive van't Hoff general solution equation for 'n' mole of solute.

6. Represent a cell consisting of $Mg \mid Mg^{2+} \parallel Ag^+ \mid Ag$ half cell and write the cell reaction. $\left(E^\circ_{Ag^+/Ag} = 0.799V, E^\circ_{Mg^{2+}/Mg} = -2.37V\right)$

7. Define the order of chemical reaction .

Find the overall order of the following reactions :

(a)

$CHCl_{3(g)} + Cl_{2(g)} \rightarrow CCl_{4(g)} + HCl_{(g)}$, $\text{Rate} = k[CHCl_3][Cl_2]$

(b) $2NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g)}$, $\text{Rate} = k[NO]^2[O_2]$
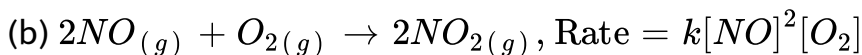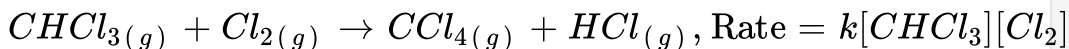
8. State and explain Hess's law of constant heat summation.

9. Explain the following with the help of balanced chemical equation :

(a) Bleaching action of SO_2.

Dehydration of formic acid by concentrated H_2SO_4.

Burning of benzene in presence of excess of dioxygen .

10. The density of silver having atomic mass 107.8 gram mol^{-1} is

10.8 gram cm^{-3}. If the edge length of cubic unit cell is

$4.05 \times 10^{-8}cm$, find the number of silver atoms in the unit cell.

$$\left(N_A = 6.022 \times 10^{23}, 1A^\circ = 10^{-8}cm\right)$$

11. How much quantity of electricity in coulomb is required to deposit $1.346 \times 10^{-3}kg$ Ag in 3.5 minutes from $AgNO_3$ solution ? (Given : Molar mass of Ag is $108 \times 10^{-3}kgmol^{-1}$)

12. 5 moles of helium expand isothermally and reversibly from a pressure $40 \times 10^{-5}Nm^{-2}$ to $4 \times 10^{-5}Nm^{-2}$ at 300 K. Calculate the work done, change in internal energy and heat absorbed during the expansion . $\left(R = 8.314Jk^{-1}mol^{-1}\right)$

13. Write structure and molecular formula for the following compounds :

(a) orthophosphoric acid

(b) sulphurous acid

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14. What is 'Ellingham diagram' ? Write any two points of its significance .

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15. In a first order reaction $A \rightarrow$ product, 80% of the given sample of compound decomposes in 40 min. What is the half life period of the reaction ?

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16. Write features of reversible process .

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**17.** Write any 'four points ' of difference between fluorine and other halogens.

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18. What is freezing point of a liquid ? The freezing point of pure benzene is 278.4 K. Calculate the freezing point of the solution when 2.0 gram of a solute having molecular weight 100 gram is added to 100 gram of benzene. (K_f for benzene $= 5.12kg\mathrm{mol}^{-1}$)

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19. Select and write the most appropriate answer from the given alternatives for each sub-question :

A substance which shows highest entropy is ....

    A. $SrCO_{3(s)}$

    B. $Cu_{(s)}$

    C. $NaCl_{(aq.)}$

    D. $Cl_{2(g)}$
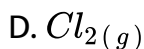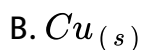
Answer: B::C::D

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20. Select and write the most appropriate answer from the given alternatives for each sub-question :

The process of extracting a soluble material from an insoluble solid by dissolving out in a suitable solvent is known as ....
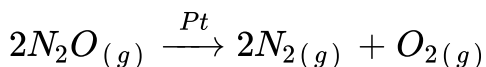
A. Calcination

B. Roasting

C. Leaching

D. Smelting

Answer: A::C

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21. Select and write the most appropriate answer from the given alternatives for each sub-question :

The kinetic order for the following reaction is ....

$$2N_2O_{(g)} \xrightarrow{Pt} 2N_{2(g)} + O_{2(g)}$$

A. zero

B. first

C. second

D. third

Answer: A

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22. Select and write the most appropriate answer from the given alternatives for each sub-question :

Which of the following compounds of chlorine is used as refrigerant ?

A. CCl_3NO_2

B. CCl_2F_2

C. $COCl_2$

D. CCl_4

Answer: B::C

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23. Select and write the most appropriate answer from the given alternatives for each sub-question :

4.0 grams of NaOH (Molar mass = 40.0 gram mol^{-1}) is dissolved in 500 cm^3 of water. What is the molarity of NaOH solution ?

A. 1 M

B. 0.8 M

C. 0.5 M

D. 0.2 M

Answer: B::D

24. Select and write the most appropriate answer from the given alternatives for each sub-question :

Number of types of orthorhombic unit cell is ....

A. 7

B. 3

C. 4

D. 2

Answer: C::D

25. Select and write the most appropriate answer from the given alternatives for each sub-question :

The S.I. unit of cell constant for conductivity cell is ....

   A. m^{-1}

   B. $S \cdot m^{-2}$

   C. cm^{-2}

   D. $S \cdot dm^2 \cdot \text{mol}^{-1}$

Answer: B

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Section Ii

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1. Explain the geometry of $\left[Cu(NH_3)_4\right]^{2+}$ on the basis of hybridisation . [At. No. $Cu = 29$]

2. What are 'd' and 'f' block elements ?

3. Write a short note on Sandmeyer's reaction .

4. What is the action of the following on isopropyl methyl ether ?

(a) cold HI (b) hot HI

5. Write balanced equations for the following conversions :

Cyclopropane carboxylic acid to cyclopropyl-methanol .

(b) Acetyl chloride to benzyl methyl ketone using dialkyl cadmium.

6. What is the action of lithium aluminium hydride in the presence of ether on the following compounds ?

(a) nitroethane

(b) 2-methyl-1-nitropropane

7. How is glucose prepared from starch ?

8. Define :

(a) Analgesics (b) Antimicrobials

9. Complete and rewrite the balanced chemical equation for the following reactions :

(a) 1-chloro-2, 4-dinitro benzene $\xrightarrow[368K \quad H^+]{aq.alkali}$?

(b) Benzaldehyde $\xrightarrow{50\% \text{ KOH}}$?

Acetone + phenylhydrazine $\xrightarrow{H^+}$?

10. Write a preparation of phenol from cumene ? What happens when phenol is heated with zinc dust ?

11. What are racemates ?

What is the action of the following reagents on glucose ?

(a) Bromine water (b) Hydroxylamine

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12. What are elastomers ?

Distinguish between thermoplastic polymers and thermosetting polymers.

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13. What is the action of the following on lanthanoids ?

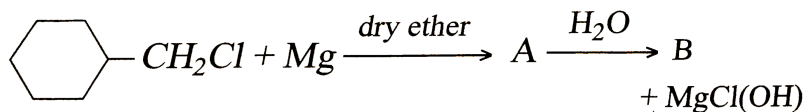(a) water (b) sulphur, heat

(c) nitrogen, heat

14. Draw the structures of Veronal and Thymine.

15. Identify A and B from the following reaction and rewrite complete reaction :

$$\langle \bigcirc \rangle - CH_2Cl + Mg \xrightarrow{dry\ ether} A \xrightarrow{H_2O} B$$
$$+ MgCl(OH)$$

16. Write the preparation of benzoic acid from the following :

(a) styrene (b) benzamide (c) dry ice

17. Write resonance structures of aniline. What is the action of benzene diazonium chloride on ethanol ?

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18. Write the formula for pentaammine chlorocobalt (III) sulphate.

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19. A polymer which contains ester linkage is :

A. Teflon

B. Buna-N

C. Dextron

D. Neoprene

Answer: C::D

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20. An antihistamine drug is :

  A. Salvarsan

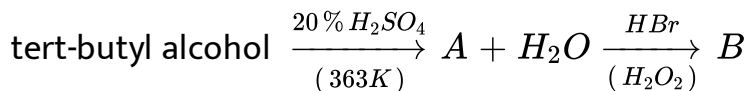 B. Chloramphenicol

  C. Seldane

  D. Prontosil

Answer: A::C::D

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21. Select and write the most appropriate answer from the given alternatives for each sub-question :

Identify A and B respectively in the following reaction :

tert-butyl alcohol $\xrightarrow[(363K)]{20\% \, H_2SO_4}$ $A + H_2O$ $\xrightarrow[(H_2O_2)]{HBr}$ B

   A. 2-methylpropene, 1-bromo-2-methylpropane

   B. 2-methylpropene, 2-bromo-2-methylpropane

   C. 2-methylpropane, 1-bromo-2-methylpropane

   D. 2-methylpropane, 2-bromo-2-methylpropane

Answer: A

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22. The ligand triethylene tetramine is :

A. monodentate

B. bidentate

C. tridentate

D. tetradentate

Answer: A::D

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23. Pyrolusite ore is :

A. MnO

B. MnO_2

C. Mn_2O_7

D. Mn_2O_3

Answer: B

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24. Select and write the most appropriate answer from the given alternatives for each sub-question :

$$C_2H_5 - Br + NaI \xrightarrow{\text{dry acetone}} C_2H_5 - I + NaBr$$ The above reaction is :

A. Wurtz reaction

B. Balz-Schiemann reaction

C. Swarts reaction

D. Flinkelstein reaction

Answer: A::C::D

25. The functional group present in triacylglycerol is :

A. alcohol

B. ether

C. ester

D. amine

Answer: C

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