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CHEMISTRY

BOOKS - GURUKUL BOOKS & PACKAGING CHEMISTRY (HINGLISH)

MARCH 2015

Section I

1. An n-type and p-type silicon can be obtained by doping pure silicon with.

A. Germanium

B. Boron

C. Arsenic

D. Antimony

Answer: B

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2. Amongst the following identify the criterion for process to be at equilibrium

A. $\Delta G < 0$

B. $\Delta G > 0$

C. $\Delta S_{\text{total}} = 0$

D. $\Delta S < 0$

Answer: C

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3. Colligative property depends only on . . . . . in a solution.

A. Number of solute particles

B. Number of solvent particles

C. NAture of solute particles

D. Nature of solvent particles

Answer: A

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4. The charge of how many coulomb is required to deposit 1 g of sodium metal (molar mass 23.0 g mol^{-1}) from sodium ions is

A. 2098

B. 96500

C. 193000

D. 4196

Answer: D

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5. Composition of malachite mineral is

A. $CuO \cdot CuCO_3$

B. $Cu(OH)_2 \cdot CuCO_3$

C. $CuO \cdot Cu(OH)_2$

D. $Cu_2O \cdot Cu(OH)_2$

Answer: B

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6. The element that does NOT exhibit allotropy is

A. As

B. Sb

C. Bi

D. N

Answer: C

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7. Derive an expression for the intergated rate equation for the first order reaction.

A. $K = 2.03t\log_{10}\frac{[A]_0}{[A]_t}$

B. $K = -\frac{1}{t}\ln\frac{[A]_t}{[A]_0}$

C. $K = \frac{2 \cdot 303}{t} \log_{10} \frac{[A]_t}{[A]_0}$

D. $K = \frac{1}{t} \ln \frac{[A]_t}{[A]_0}$

Answer: C

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8. Define the following terms :

(a) Enthalpy of fusion

Enthalpy of atomization

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9. van't Hoff equation is

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10. Explain impurity defect in stainless steel with diagram.

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11. Derive the relation between half life and rate constant for a first order reaction.

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12. Draw neat and labelled diagram of dry cell.

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13. Explain the structure of sulphur dioxide.

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14. What is calcination ? Explain it with reactions.

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15. Arrange the following reducing agents in the order of increasing strength under standard state condition. Justify the answer.

Element	$Al(s)$	$Cu(s)$	$Cl(aq)$	$Ni(s)$
E°	$-1.66V$	$0.34V$	$1.36V$	$-0.26V$

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16. Determine whether the reactions with the following ΔH and ΔS values are spontaneous or non-spontaneous. State whether the reactions are exothermin or endothermic.

(a) $\Delta = -110kJ, \Delta S = +40JK^{-1}$ at $400K$

(b) $\Delta H = +40kJ, \Delta S = -120JK^{-1}$ at $250K$

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17. 1.0×10^{-3} kg of urea when disso,ved in 0.0985 kg of a solvent, decreases freezing point of the solvent by $0.211K$. 1.6×10^{-3} kg of another non-electrolyte solute when disso,ved of 0.086 kg of the same solvent depresses the freezing point by 0.34 K. 0.35 K. Calculate the molar mass of the another solute. (Given molar mass of urea = 60)

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18. Sucrose decomposes in acid solution into glucose and fructose according to the first order rate law, with $t_{1/2} = 3.00hr$. What fraction of sample of sucrose remains after $8hr$?

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19. Explai how does nitrogen exhibit anomalous behaviour amongst group 15 elements.

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20. Niobium crystallises as body centered cube (BCC) and has density of $8 \cdot 55 kg / dm^3$. Calculate the atomic radius of niobium. (Given : Atomic mass of niobium = 93). Write one statement of first law of thermodynamics and its mathematical expression. Write the reactions involved in the zone of reduction in blest furnace during extraction of iron.

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21. Write molecular formulae and structures of the following compounds :

(a) Dithionic acid

(b) Peroxy monosulphuric acid

(c) Pyrosulphuric acid

(d) Dithionous acid

Calculate E_{cell} and ΔG for the following at $28^\circ C$:

$Mg(s) + Sn^{2+}(0 \cdot 04M) \rightarrow Mg^{2+}(0 \cdot 06M) + Sn_{(s)}\, E^0_{\text{cell}} = 2 \cdot 23V$

Is the reaction apontaneous ?

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Section Ii

1. Identify the product 'D' in the following sequence of reactions :

$$H_3C - CH_2 - CH_2 - Cl \xrightarrow[KOH]{Alc} 'B' \xrightarrow{HBr} 'C' \xrightarrow[\text{Ether}]{Na} 'D'$$

A. 2,2, dimethylbutane

B. 2,3-dimethylbutane

C. Hexane

D. 2,4-dimethypentane

Answer: C

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2. Which of the following complexes will give a white precipitate on treatment with a solution of barium nitrate ?

A. $\left[Cr(NH_3)_4SO_4\right]Cl$

B. $\left[Co(NH_3)_4Cl_2\right]NO_2$

C. $\left[Cr(NH_3)_4Cl_2\right]SO_4$

D. $\left[CrCl_2(H_2O)_4\right]Cl$

Answer: C

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3. What is geometry of chromate ion ?

A. Tetrahedral

B. Octahedral

C. Trigonal planar

D. Linear

Answer: A

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4. Primary and secondary nitroalkanes containing $\alpha - H$ atom show property of -

A. Chain isomerism

B. Tautomerism

C. Optical isomerism

D. Geometrical isomerism

Answer: B

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5. In phenol carbal atom attached to -OH group undergoes :

A. sp^3 hybridisation

B. sp hybridisation

C. sp^2 hybridisation

D. No hybridisation

Answer: C

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6. Identify the strongest acid amongst the followings :

A. Chloroacetic acid

B. Acetic acid

C. Trichloroacetic acid

D. Dichloroacetic acid

Answer: C

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7. Which of the following vitamins is water soluble ?

A. A

B. D

C. E

D. B

Answer: D

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8. FRIEDEL CRAFT ACYLATION

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9. How is ethyl amine prepared from methyl iodide ?

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10. What are antibiotics? Give two examples.

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11. Explain, why are boiling points of carboxylic acids higher than corresponding alcohols.

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12. How are polymers classified on the basis of molecular forces?

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13. What are interstitial compounds ? Why do these compounds have melting points than corres-ponding pure metas ?

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14. Write the structures and IUPAC names of the following compounds :

(a) Adipic acid (b) α - methyl butyraldehyde.

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15. Explain with example, branched and linear polymers.

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16. On the basis of valence bond theory explain the nature of bonding in $[CoF_6]^{3-}$ ion. Write the IUPAC name of $\left[Co(NO_2)_3(NH_3)_3\right]$.

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17. What is meant by lanthanoids contraction ? What effect does it have on the chemistry of element which follow lanthanoids ?

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18. Write mechanism of Aldol addition reaction.

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19. Define carbohydrates. What are reducing and non reducing sugars ?

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20. Write a note on Gabriel phthalimide synthesis.

What are biodegradable polymers and non-bio-degradable polymers ? Write one example of each.

Exampain cationic detergents.

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21. How is carbolic acid prepared from the following compounds :

(i) Aniline

(ii) chlorobenzene and steam at 698 K ?

Draw structure of DDT. Write its environmental effects.

Mention two physical properties of carbolic acid.

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