Previous Year Solved Question Paper

of

G.A.T.E. (XL) 2013

LIFE SCIENCES

XL: H Chemistry

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING

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GATE XL 2013 (Chemistry)

H:CHEMISTRY (Compulsory)

Q. 1 – Q. 5 carry one mark each.

Q.1 $N(CH_3)_3$ and $N(SiH_3)_3$are congeners, but around N-atom the former has pyramidal geometry whereas the latter is nearly planar. The bonding responsible for planarity of $N(SiH_3)_3$is

(A)pπ–pπ (B) pπ–dπ (C) dπ–dπ (D) δ **Ans. B**

Q.2 The type of electronic transition responsible for the yellow colour of K_2CrO_4 is

(A)metal to ligand charge transfer
(B)ligand to metal charge transfer
(C)intra-ligand charge transfer
(D)d-d transition

Ans.B

Q.3 The given equation

$$\left(\frac{d(\Delta H)}{dT}\right)_p = \Delta C_p$$

where H, T and C_p are the enthalpy, temperature and heat capacity at constant pressure, respectively, is called

(A) Clausius-Clapeyron equation (B) Hess's law
(C) Kirchhoff's equation (D) Trouton's rule **Ans. C**

Q. 4 - Q. 5 are questions with numerical answer.

Q.4 The number of 2-center–2-electron bonds in anhydrous $AlCl_3$ is _____ **Ans. 8**

Q.5 When dissolved in water, the number of H^+ ions released from a molecule of $H_3BO_3$is _____

Ans. 1

Q. 6 - Q. 15 carry two marks each.

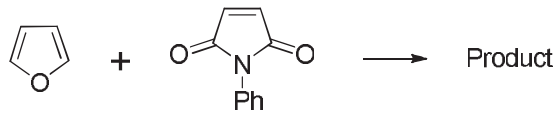
Q.6 In NaCl crystal, the arrangement and coordination number of the ions are

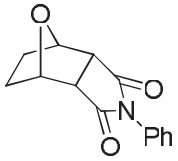
(A)fcc and 6 (B) fcc and 4 (C) hcp and 6 (D) hcp and 4 **Ans. A**

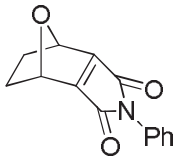
Q.7 The solubility product (K_{sp}) of $Ca_3(PO_4)_2$ is 1.3×10^{-32}. In a 0.02 M solution of $Ca(NO_3)_2$, the solubility of $Ca_3(PO_4)_2$ (in units of M) is

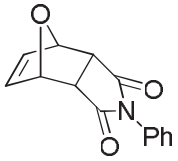
(A) 6.5×10^{-31} (B)1.6×10^{-26} (C) 8.0×10^{-16} (D) 4.0×10^{-14} **Ans.D**

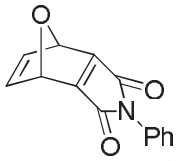
Q.8 Identify the **CORRECT** product in the following reaction:



(A) 

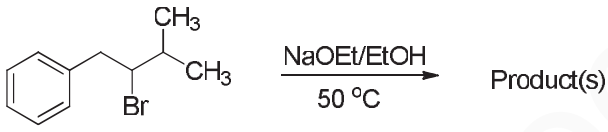
(B) 

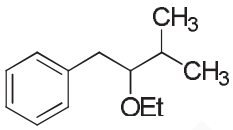
(C) 

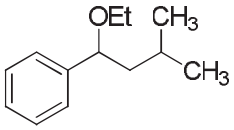
(D) 

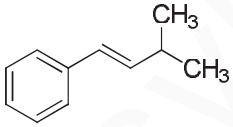
Ans. C

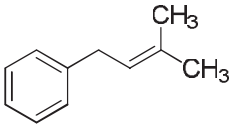
Q.9 The major product obtained in the following reaction is



(A) 

(B) 

(C) 

(D) 

Ans. C

Q. 10- Q. 11 are questions with numerical answer.

Q.10 Iodine forms an anionic species **Q** in aqueous solution of iodide(I^-). The number of lone pair(s) of electrons on the central atom of **Q** is _____

Ans. 3

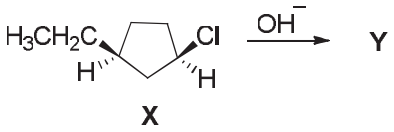
Q.11 The rate of a chemical reaction is tripled when the temperature of the reaction is increased from 298 K to 308 K. The activation energy (in kcal mol^{-1} K^{-1}, up to one decimal place) for the reaction is(Given R = 1.987cal mol^{-1} K^{-1}) _____

Ans. 19.8 - 20.2

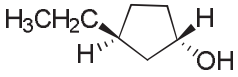
Common Data Questions

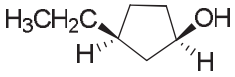
Common Data for Questions 12 and 13:

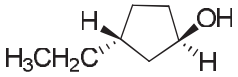
Consider the following S_N2 reaction of optically pure 1-chloro-3-ethylcyclopentane (**X**).

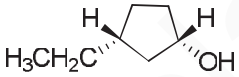


Q.12 The structure of **Y** in the above reaction is

(A) 

(B) 

(C) 

(D) 

Ans. A

Q.13 The absolute configuration of1-chloro-3-ethylcyclopentane (**X**) shown above is

(A) (1*S*,3*R*) (B) (1*S*,3*S*) (C) (1*R*,3*R*) (D)(1*R*,3*S*)

Ans. D

Linked Answer Questions

Statement for Linked Answer Questions 14 and 15:

The molar conductance at infinite dilution of sodium acetate, sodium sulfate and sulfuric acid solutions are 91.0×10^{-4}, 259.8×10^{-4} and 859.3×10^{-4} S m^2 mol^{-1}, respectively.

Q.14 The molar conductance at infinite dilution (in S m^2 mol^{-1})of acetic acid is

(A)1028×10^{-4} (B) 820.4×10^{-4} (C)690.5×10^{-4} (D)390.8×10^{-4}

Ans. D

Q.15 If the molar conductance of an acetic acid solution is15.2×10^{-4} Sm^2 mol^{-1},then the percentage (%) dissociation of acetic acid in the solution will be

(A) 3.89 (B) 2.20 (C) 1.85 (D) 1.48

Ans. A

END OF SECTION - H

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