Previous Year Question Paper

of

G.A.T.E. (XL) 2014

LIFE SCIENCES

XL: H Chemistry

Examination

(Original Question Paper with Answer Key)

GRADUATE APTITUDE TEST IN ENGINEERING

H : CHEMISTRY (COMPULSORY)

Q. 1 – Q. 5 carry one mark each.

Q.1 Hybridizations of nitrogen in NO_2^+, NO_3^-, NH_4^+ respectively are

(A) *sp*, sp^2 and sp^3 (B) *sp*, sp^3 and sp^2

(C) sp^2, *sp* and sp^3 (D) sp^3, sp^2 and *sp*

Ans. A

Q.2 Potassium metal crystallizes in the body-centered cubic structure. The number of atoms per unit cell is equal to

(A) one (B) two (C) three (D) four

Ans. B

Q.3 Assuming ideal condition, the solution that has the highest freezing point is

(A) 0.002 M aqueous solution of copper nitrate

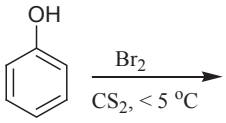
(B) 0.001 M aqueous solution of potassium dichromate

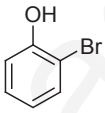
(C) 0.001 M aqueous solution of sodium chloride

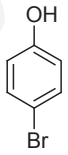
(D) 0.002 M aqueous solution of magnesium chloride

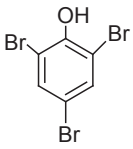
Ans. C

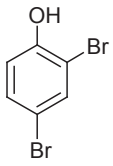
Q.4 The major product formed in the following reaction is



(A) 

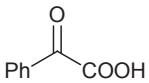
(B) 

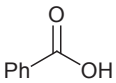
(C) 

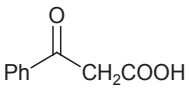
(D) 

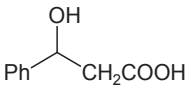
Ans. B

Q.5 The acid that undergoes decarboxylation most readily upon heating is

(A) 

(B) 

(C) 

(D) 

Ans. C

Q. 6 – Q. 15 carry two marks each.

Q.6 A ball of mass 330 g is moving with a constant speed, and its associated de Broglie wavelength is 1×10^{-33} m. The speed of the ball is _____ m s^{-1}. ($h = 6.6 \times 10^{-34}$ J s)

Ans. 1.9 to 2.1

Q.7 Diphosphonic acid ($H_4P_2O_5$) has no P–P bond. This acid is

(A) tetrabasic (B) tribasic (C) dibasic (D) monobasic

Ans. C

Q.8 The magnetic moment of an octahedral Co(II) complex is approximately 4.0 μ_B (atomic number of Co is 27). The CFSE for this complex, in Δ_o units, is _____ .

Ans. - 0.8 to -0.8

Q.9 The complex ion $[Cr(H_2O)_6]^{3+}$ (atomic number of Cr is 24) exhibits

(A) slightly distorted octahedral geometry
(B) tetragonally elongated octahedral geometry
(C) tetragonally compressed octahedral geometry
(D) perfect octahedral geometry

Ans. D

Q.10 Assuming ideal behavior, the density of fluorine gas at 20 °C and 0.3 atm is ____ g L^{-1}.
(Molecular weight of F_2 = 38 g mol^{-1}, R = 0.082 L atm mol^{-1} K^{-1})

Ans. 0.40 to 0.55

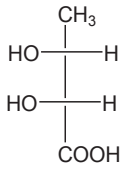
Q.11 For a first order reaction, the time required for 50% completion is 20 minutes. The time required for 99.9% completion of the reaction is _____ minutes.

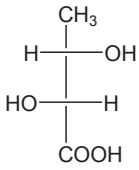
Ans. 190 to 240

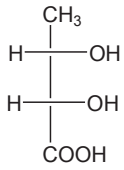
Q.12 At 298 K, the bond dissociation energies of C–H, C–C and C=C are 415, 344 and 615 kJ mol^{-1}, respectively. The enthalpy of atomization of carbon is 717 kJ mol^{-1} and that of hydrogen is 218 kJ mol^{-1}. The heat of formation of naphthalene at 298 K is _____ kJ mol^{-1}.

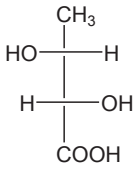
Ans. 440 to 470

Q.13 The Fisher projection that represents (2R,3S)-2,3-dihydroxybutanoic acid is

(A) 

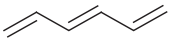
(B) 

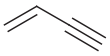
(C) 

(D) 

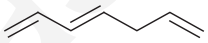
Ans. B

Q.14 A hydrocarbon that undergoes ozonolysis (reaction with ozone followed by reduction with Me_2S) to form formaldehyde and glyoxal is

(A) 

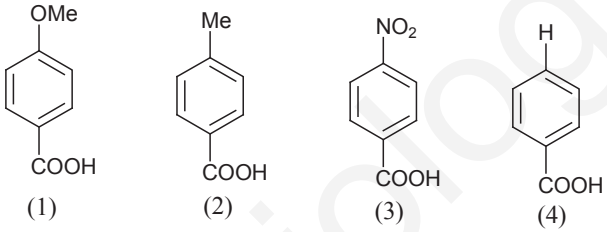
(B) 

(C) 

(D) 

Ans. A

Q.15 The order of acidity of the following acids is



(A) 3 > 2 > 1 > 4 (B) 1 > 4 > 3 > 2 (C) 4 > 3 > 2 > 1 (D) 3 > 4 > 2 > 1

Ans. D

END OF THE QUESTION PAPER

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