Birla Institute of Technology and Science, Pilani, Rajasthan 333 031

Comprehensive Quiz **I Semester 2016-2017** **A**

Course Title: Chemistry Laboratory **Course Number: CHEM F110** **Time: 60 minutes**

Max. Marks: 50 **CLOSED BOOK** **Date: 30.11.2016**

Note: There are **two** pages with **25** questions in all. Indicate the most appropriate answer by entering **A, B, C or D (block capital letters only)** in the box provided on the right hand side.

Do not overwrite. Do not use pencil. Each correct answer will be awarded two (2) marks and **0.5 mark will be deducted for every wrong answer**.

ID No.: _____ **Section Number:** _____

Name: _____ **Name of Instructor:** _____

Number of (X) correct Answer: **(Y) Wrong Answer:** **(Z) Not attempted:**

Q.1: Degree of dissociation of which of the following compounds cannot be determined without Kohlrausch's law

(A) NH_4OH (B) $LaCl_3$ (C) CH_3COONa (D) KOH

Q.2: The unit of molar conductivity is:

(A) C V^{-1} m^2 mol^{-1} (B) C V^{-1} s^{-1} m mol^{-1} (C) C V^{-1} s^{-1} m^2 mol^{-1} (D) C V^{-1} s^{-1} m^3 mol^{-1}

Q.3: The equivalent conductance of a 0.014 N solution of chloroacetic acid ($ClCH_2COOH$) is 109 $\Omega^{-1}cm^2$. The equivalent conductances of chloroacetate and hydrogen ions at infinite dilution are 40.2 and 348.8 $\Omega^{-1}cm^2$, respectively. The degree of dissociation of the acid is

(A) 0.103 (B) 0.279 (C) 0.312 (D) 0.481

Q.4: Each of the given complexes, (i) $K[Co(NH_3)_2(NO_2)_4]$, (ii) $[Fe(NH_3)_3(NO_2)_3]$, (iii) $[Cr(NH_3)_5(NO_2)]_3[Co(NO_2)_6]_2$ and (iv) $K_2[Cu(C_2O_4)_2].2H_2O$ were dissolved in water to prepare their respective 0.001 M solution. The correct order of molar conductivity exhibited by the complex solutions will be

(A) iii > i > ii > iv (B) i > ii > iv > iii (C) iii > iv > i > ii (D) iv > i > ii > iii

Q.5: Assuming the square planer geometry for the complex, $K_2[Cu(C_2O_4)_2].2H_2O$, the correct order of "*d*" orbital energy will be

(A) d_{yz}~d_{zx} < d_{xy} < d_{z^2} < $d_{x^2-y^2}$ (B) d_{yz}~d_{zx} < d_{z^2} < d_{xy} < $d_{x^2-y^2}$

(C) d_{yz}~d_{zx}~d_{xy} < d_{z^2} < $d_{x^2-y^2}$ (D) d_{yz}~d_{zx} < d_{xy} < $d_{x^2-y^2}$ < d_{z^2}

Q.6: The experimental data for the reaction: A + B → C + D, is as follows:

Reaction	[A] (M)	[B] (M)	Rate (mol L^{-1} s^{-1})
1	0.010	0.030	6.00×10^{-4}
2	0.010	0.075	1.50×10^{-3}
3	0.055	0.030	1.82×10^{-2}

The order of the reaction w.r.t. reagent **A** will be

(A) 0 (B) 1 (C) 2 (D) 3

Q.7: The percentage reduction in intensity of incident light passing through a solution having path length (L) = 1/ε.c; where 'ε' is molar extinction coefficient, and 'c' is concentration, will be:

(A) 1 (B) 10 (C) 90 (D) 100

Q.8: The role of KSCN in iodometric titration is to

(A) oxidize hypo (B) reduce I_2 (C) expel trapped I_2 (D) remove O_2

Q.9: Complete the chemical equations by identifying **Q**, **R** and **S**

$I_2 + Na_2S_2O_3 \rightarrow NaI + \mathbf{Q}$

$CuSO_4 + KI \rightarrow \mathbf{R} + \mathbf{S} + K_2SO_4$

(A) **Q** = $Na_2S_4O_6$; **R** = Cu_2I_2 ; **S** = I_2 (B) **Q** = $Na_2S_2O_4$; **R** = CuI_2 ; **S** = I_3^-

(C) **Q** = $Na_2S_2O_4$; **R** = Cu_2I ; **S** = I_3^- (D) **Q** = $Na_2S_2O_6$; **R** = CuI ; **S** = I_2

Q.10: A sample of water (35 ml) was titrated with 0.01M EDTA solution. If the complete titration (i.e., to reach the end point) with EBT required 9.70 ml of EDTA solution, the total hardness of the water sample (in ppm of $CaCO_3$) is…… .(At. Wt. of Ca = 40)

(A) 277 (B) 208 (C) 232 (D) 248

Q.11: EDTA forms the most stable complex with ..... (At. No:; Mg =12, Ca = 20, Fe = 26, Co = 27)

(A) Ca^{2+} (B) Mg^{2+} (C) Fe^{2+} (D) Co^{2+}

Q.12: Which one of the following statements is wrong?

(A) By measuring the potential of a glass electrode, the pH of a solution is determined.

(B) A solution stabilizing the pH below 7 is called acid buffer.

(C) The pH of a buffer solution containing equal concentration of a weak acid and its conjugate base is equal to pKa of the acid.

(D) Ammonium chloride solution has a pH higher than 7.

Q.13: Which of the following combination of substances may be added to water so as to prepare 1 L of a buffer solution?
(A) 1 mole of CH_3COOH and 0.5 mole of HCl (B) 1 mole of NH_4OH and 0.5 mole of NaOH
(C) 1 mole of NH_4Cl and 0.5 mole of HCl (D) 1 mole of CH_3COOH and 0.5 mole of NaOH

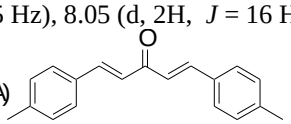
Q.14: During titration of a weak acid (K_a = 2.0 X 10^{-5}) using a strong base, the pH of the solution when half of the acid is neutralized, will be
(A) 4.2 (B) 4.4 (C) 4.7 (D) 5

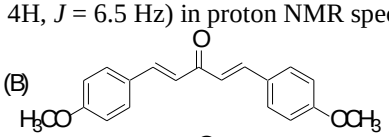
Q.15: Which of the following is not classified as a dicarboxylic acid?
(A) Oxalic acid (B) Tartaric acid (C) Citric Acid (D) Succinic acid

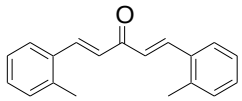
Q.16: The red precipitate, formed when glucose is heated with "Fehling's solution" is
(A) cupric hydroxide (B) cuprous hydroxide (C) cupric oxide (D) cuprous oxide

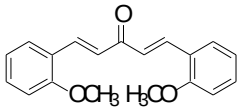
Q.17: An organic compound produces an orange precipitate when treated with 2,4-dinitrophenylhydrazine. Which compound is consistent with this observation?
(A) *n*-Pentanal (B) Pentanoic acid (C) Methyl pentanoate (D) Pentamide

Q.18: The correct structure of a compound exhibiting spectral data δ = 3.75 (s, 6H), 7.34 (d, 2H, *J* = 16 Hz), 7.81 (d, 4H, *J* = 6.5 Hz), 8.05 (d, 2H, *J* = 16 Hz), 8.32 (d, 4H, *J* = 6.5 Hz) in proton NMR spectroscopy is

(A) 

(B) 

(C) 

(D) 

Q.19: The following reaction was performed under two conditions, (i) an increase in amount of H_2 and (ii) an increase in total pressure:

$$H_2\,(g) + 1/2O_2\,(g) \rightleftharpoons H_2O\,(g)$$

The correct inference about this reaction equilibrium at 25 °C will be
(A) amount of H_2O will increase in condition (i) and (ii)
(B) amount of H_2O will decrease in condition (i) and (ii)
(C) amount of H_2O will increase for condition (i) and decrease for condition (ii)
(D) amount of H_2O will decrease for condition (i) and increase for condition (ii)

Q.20: A reaction mixture is composed of 1.0 mol of PCl_3 and 2.0 mol of Cl_2. Assume x be the amount of PCl_5 (g) at equilibrium for the reaction: $PCl_3\,(g) + Cl_2\,(g) \rightleftharpoons PCl_5\,(g)$. What would be the partial pressure of PCl_5 (g) if the total pressure is P.
(A) $\frac{x\,P}{(3-x)}$ (B) $\frac{x\,P}{(1-x)}$ (C) $\frac{x\,P}{(2-x)}$ (D) $\frac{(1-x)\,P}{(3-x)}$

Q.21: The number of moles of water released during one mole synthesis of dibenzalacetone is/are ……
(A) 1 (B) 2 (C) 3 (D) 4

Q.22: Which one is the best electrophile for cross-aldol reaction with acetone?
(A) Acetophenone (B) Benzaldehyde (C) 4-Methoxybenzaldehyde (D) 4-Fluorobenzaldehyde

Q.23: Keeping the identical condition of stationary and mobile phase that you used in your TLC experiment, if the three compounds namely benzoic acid, acetophenone and m-nitroacetopheneone are eluted, then the R_f value of
(A) benzoic acid > m-nitroacetophenone > acetophenone
(B) acetophenone > benzoic acid > m-nitroacetophenone
(C) acetophenone > m-nitroacetophenone > benzoic acid
(D) benzoic acid > acetophenone > m-nitroacetophenone

Q.24: To prepare 1 g of dibenzalacetone, the required amount of benzaldehyde is
(A) 0.906 g (B) 1.104 g (C) 0.453 g (D) 2.207 g

Q.25: In a reversible chemical reaction at equilibrium, if the concentration of any one of the reactants is doubled at constant temperature and volume, then the equilibrium constant will
(A) be halved (B) remain unchanged (C) be doubled (D) become one-fourth

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