Set A

2698BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI (RAJASTHAN)
COMPREHENSIVE EXAMINATION, SEMESTER I (2017-18)
CHEM F110: Chemistry Laboratory Quiz (Closed Book) **Marks: 75**
Time: 1h (10:00 – 11:00 AM) **Date: 30th Nov., 2017**

Marks obtained

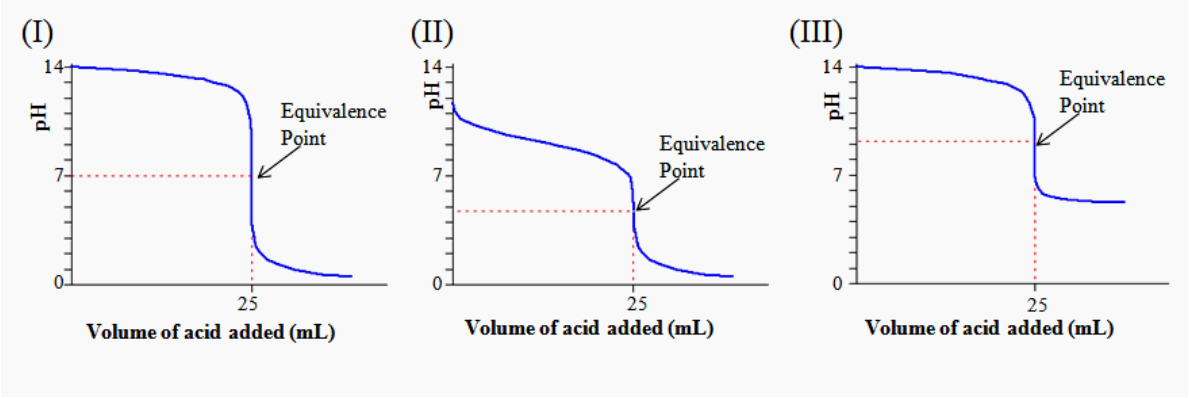
Instructions: I. There are total 30 questions. II. Answer all the questions. III. Each correct answer: 2.5M; each wrong answer: -0.5M. IV. Change of answer must be endorsed by invigilator's signature. V. Mobile phone is not allowed during examination.

Important data: Atomic Masses: Cu = 63.5g/mol; Molecular Weights: Acetone = 58.08; Benzaldehyde = 106.121; Dibenzalacetone: 234.29; HCl = 36.5; KOH = 56g/mol; $N_A = 6.023 \times 10^{23}$

Name: _____; **ID:**_____; **Sec:** ___; **Instructor:**_____

Q.1 The plots of pH *vs.* Volume of acid added for acid-base titrations are shown below. Which of the following statements is correct?

C



(A) Plot I:Weak acid and Strong base; Plot II: Strong acid and Weak base; Plot III: Strong acid and Strong base;
(B) Plot I:Strong acid and Strong base; Plot II: Weak acid and Weak base; Plot III: Weak acid and Strong base;
(C) Plot I:Strong acid and Strong base; Plot II: Strong acid and Weak base; Plot III: Weak acid and Strong base;
(D) Plot I:Strong acid and Weak base; Plot II: Weak acid and Strong base; Plot III: Strong acid and Strong base

Q.2 A solution of acetic acid (pKa = 4.75) has a pH of 6.75. What will be the ratio of acid to conjugate base?

(A) 1:10000 (B) 100:1
(C) 1:100 (D) 10000:1

C

Q.3 NaOH is added to a 500mL of 2M acetic acid. If the pKa value of acetic acid is 4.8, what volume of 2M NaOH must be added so that the pH of the solution is 4.8?

(A) 2000mL; (B) 1000mL; (C) 500mL; (D) 250mL

D

Q.4 The colours of free Eriochrome Black T indicator and its complex with calcium ions are, respectively

(A) blue and colourless (B) blue and wine red
(C) wine red and colourless (D) wine red and blue

B

Q.5 The coordinating atoms (Oxygen: O, Nitrogen:N, Carbon: C) of the hexadentate EDTA ligand are

(A) 4 O and 2 N (B) 2 N and 4 C
(C) 3 O and 3 N (D) 2 N, 2 O and 2C

A

Q.6 In a complexometric titration, 25.0 mL of 0.015 M calcium carbonate solution requires 30.0 mL of EDTA solution to reach equivalence point. The molarity of EDTA is

(A) 0.0125 (B) 0.00625

A

(C) 0.025 (D) 0.018

Q.7 In the confirmatory test of tartaric acid with Tollen's reagent, silver ions (Ag^+) act as

B

(A) reducing agent (B) oxidizing agent (C) catalyst (D) dehydrating agent

Q.8 An orange precipitate is obtained when a small amount of Blue cheese is treated with 2,4-dinitrophenylhydrazine. Based on the above information, which among the following could be the possible constituent present in Blue cheese?

(A) *n*-Pentanal (B) Pentanoic acid

A

(C) Methyl pentanoate (D) 2-Pentanol

Q.9 Which one of the followings is the correct structure of greenish yellowish green fluorescence solution obtained by pouring a small portion of cooled alkaline reaction mixture of the acid catalyzed reaction between succinic acid (1 eq.) and resorcinol (2 eq.).

B

Q.10 Calculate the approx amount of copper in the analyte if 10 mL of 0.1 N $Na_2S_2O_3$ solution was consumed up to the equivalence point of the titration in iodometric estimation of copper experiment?

(A) 0.0635 g (B) 0.0317 g

A

(C) 0.635 g (D) 0.317 g

Q.11 In estimation of copper by iodometry experiment during the standardization of $Na_2S_2O_3$ solution one small full test tube of KSCN and starch solution were added at the end of the titration when the solution color was pale yellow. Why the indicator was added comparatively late in the titration?

(A) Indicator form a soluble complex with $Na_2S_2O_3$;

(B) Indicator gives a water-insoluble complex with iodine;

B

(C) Indicator form an insoluble complex with KSCN;

(D) Indicator has no role and iodine catalyses hydrolysis of starch

Q.12 Two possible sources of error can influence the outcome of the iodometric titration. One is the aerial oxidation of acidic iodide solution i.e., iodide in acid medium is slowly oxidized by oxygen in air. This error can be reduced by which of the following method:

(A) By keeping the reaction vessel in dark;

(B) By adding sufficient glacial acetic acid in the reaction vessel;

C

(C) By adding sufficient $NaHCO_3$ in the reaction vessel;

(D) By adding sufficient $Na_2S_2O_3$ in the reaction vessel

Q.13 If 10 moles of acetone is reacted with 5 moles of benzaldehyde under alkaline condition to afford maximum amount of dibenzalacetone. The number of moles of water produced during the reaction will be

(A) 20 (B) 10

C

(C) 5 (D) 2.5

Q.14 Which one is the best electrophile for cross-aldol reaction with acetone?

(A) acetophenone (B) acetaldehyde

(C) 4-ethoxybenzaldehyde; (D) 4-chlorobenzaldehyde

D

Q.15 To prepare 5 g of dibenzalacetone, the optimum amount of benzaldehyde should be (assuming 100% conversion)

(A) 5.52 g (B) 4.53 g

(C) 2.26 g (D) 11.03 g

B

Q.16 The structure of the Schiff's base you prepared by mechanochemical synthesis is

(A) (B)

D

(C) (D)

Q.17 The term Rf used for TLC analysis is the abbreviation for

(A) Resistance Factor (B) Retention Factor

(C) Resolution Factor (D) Residence Factor

B

Q.18 In context to the washing of the Schiff's base with cold dry ethanol, which of the following statements is NOT correct?

(A) Removal of excess starting materials; (B) Removal of soluble impurities;

C

(C) Removal of Schiff's base as soluble product for later crystallization;

(D) Removal of water, as dry ethanol is hygroscopic

Q.19 Consider the reactions: (I) A → B; and (II) C → D with the rates as R_1 and R_2, respectively and the rate constants as k_1 and k_2, respectively. If R_1 is independent of [A] and k_2 is independent of [C], then the orders of the reactions (I) and (II), respectively, are: (ambiguity is there)

(A) 0 and 0 (B) 1 and 0

(C) 0 and 1 (D) 1 and 1

Q.20 The kinetics of a first order reaction R → P is studied using a UV-visible spectrophotometer, where R is a coloured substance, whereas P is colourless. The absorbance at the (lambda-max) of R would be found to _____ with time.

(A) decrease exponentially; (B) decrease linearly;

(C) remain unchanged; (D) increase exponentially

A

Q.21 Kinetics of iodination of acetone was studied using spectrophotometry. If C and C_0, respectively are instantaneous and initial concentrations of iodine and I_0 and I, respectively are the intensities of incident and transmitted beams, then which of the following statements is true?

(A) $C/C_0 \ \alpha \ I/I_0$; (B) $C \ \alpha \log I_0/I$;

(C) $C_0/C \ \alpha \log I/I_0$ (D) $C \ \alpha \ \exp(- I/I_0)$

B

Q.22 For a reaction $3H2 + N2 \leftrightarrow 2NH3$, If extra NH_3 is added at equilibrium, what will happen?

(A) There won't be any change in the reaction;

(B) To restore Equilibrium, reaction will shift to product side;

(C) To restore Equilibrium, reaction will shift to reactant side;

(D) Reaction will stop completely

C

Q.23 Determine the moles of water in 10 mL of 5 N HCl. Suppose weight of 10 mL 5 (N) HCl is 7.2 g. Assuming del $V_{mix} = 0$

(A) 1 mole; (B) 0.29 mole

(C) 0.89 mole (D) 2 mole

B

Q.24 Determine Kc for a reaction $X\,(g) + 3Y\,(g) \leftrightarrow 2Z$ (g); A one litre flask contains 5.2 moles of Z, 0.1 moles of X and 0.1 moles of Y when the system comes to equilibrium. Calculate the equilibrium constant for the above reaction.

(A) 5.2×10^5 (B) 2.7×10^5

(C) 3.5×10^5 (D) 1.5×10^5

B

Q. 25 The relationship between the equivalent conductance (λ) and specific conductance (K) of an electrolytic solution with volume, V cm^3 containing electrolyte of 1 gm equivalent is

(A) λ = K x V / 1000; (B) λ = K x 1000 / V;

(C) λ = K x V ; (D) λ = K / V

C

Q. 26 Choose the correct option for the variation of equivalent conductance and specific conductance of a strong electrolyte with dilution

(A) Both will increase;

(B) Equivalent conductance will increase while specific conductance will decrease

(C) Equivalent conductance will decrease while specific conductance will increase;

(D) Both will decrease

B

Q.27 The CGS units of specific conductance and equivalent conductance are, respectively

(A) mho cm^{-1} and mho cm^2 $equivalent^{-1}$; (B) mho cm^2 and mho$cm^2$$equivalent^{-1}$

(C) mho cm^{-1} and mho cm^{-1} $equivalent^{-1}$ (D) mho cm^2 and mho cm^{-1} $equivalent^{-1}$

A

Q.28 Saponification values of the oils P, Q, R, S are 140, 116, 78 and 215 respectively. The correct order of their molecular weights in increasing order will follow:

(A) P<Q<R<S (B) S<P<R<Q

(C) S<P<Q<R (D) R<Q<P<S

C

Q.29 The saponification value of 1 g fat sample that consumed 10 mL of 0.5 N KOH during hydrolysis is

(A) 186 (B) 210

(C) 140 (D) 280

D

Q.30 The number of moles of monobasic fatty acid anions released during saponification of one mole of a fat sample is

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

C