BS192 : USL

Chemistry End Sem Examination

Q1: The rate constant (k) of a first-order reaction can be determined from

(a) From slope of Absorbance vs time plot
(b) From slope of ln $(\frac{C_0}{C})$ vs t plot
(c) From intercept of ln $(\frac{C_0}{C})$ vs t plot
(d) From absorbance peak wavelength

Q2: Which of the following is NOT a factor in calculating the molar extinction coefficient?

(a) Absorbance
(b) Thickness of the cuvette
(c) Height of the cuvette
(d) Concentration

Q3: What role does LED light play in the experiment?

(a) It increases the temperature of the solution
(b) It excites electrons in the photocatalyst to start degradation
(c) It dissolves the Fe_3O_4 nanoparticles
(d) It breaks down water into hydrogen and oxygen

Q4: The absorbance of a solution is found to be 0.75 in a 1cm cuvette. In $\epsilon = 150\ L\ mol^{-1}\ cm^{-1}$, calculate the concentration.

(a) 0.005 mol/L
(b) 0.050 mol/L
(c) 1.125 mol/L
(d) 11.25 mol/L

Q5: If the path length is increased from 1cm to 2cm, keeping the molar extinction constant, ϵ and the concentration, c constant, the absorbance will:

(a) Increase 4 times
(b) Remain the same
(c) Double

(d) Decrease by half

Q6: Which compound in the glow stick experiment is responsible for emitting visible light?

(a) Oxalyl chloride
(b) Hydrogen peroxide
(c) Diphenyl anthracene
(d) TCPO

Q7: TCPO decomposes in the presence of H_2O_2 to form a dioxetanedione intermediate. Which of the following is a key feature of this intermediate that enables chemiluminescence?

(a) It undergoes radical polymerization
(b) It is a highly conjugated compound with a largely resonance energy
(c) It is highly unstable and decomposes rapidly, releasing energy
(d) It absorbs visible light and becomes fluorescent

Q8: What is the primary reason that methanol is used in the purification step after synthesis of TCPO?

(a) It reacts with remaining oxalyl chloride to form esters
(b) It selectively dissolves unreacted starting material
(c) It recrystallizes TCPO
(d) It quenches the reaction and helps removing byproducts

Q9: Which of the following would most negatively impact the observed glow in the final chemiluminescent reaction?

(a) Using pure diethyl phthalate as the solvent
(b) Replacing TCPO with an unreactive phenol
(c) Slightly increasing hydrogen peroxide concentration
(d) Doing the experiment in dark

Q10: A chemist measures the volume of a 10.0 ml volumetric flask three times and records the following readings (in ml): 9.5, 9.7, 10.2. What is the sample standard deviation of these measurements?

(a) 0.25
(b) 0.30
(c) 0.40
(d) 0.50

Q11: To prepare 100 ml of 0.2 M $MgCl_2$ solution, how much $MgCl_2$ (molecular weight = 95.2 g/mol) is required?

(a) 0.95 g
(b) 1.90 g
(c) 0.95 mg
(d) 1.90 mg

Q12: In the FTIR spectrum of adipoyl chloride, what is the typical stretching frequency of the C-Cl bond?

(a) 1000-1200 cm^{-1}
(b) 1600-1700 cm^{-1}
(c) 600-800 cm^{-1}
(d) 2800-3000 cm^{-1}

Q13: In the ninhydrin fingerprint experiment, which functional group in body fluids reacts with ninhydrin to create a coloured fingerprint impression upon heating?

(a) Hydroxyl Group $(-OH)$
(b) Carboxyl Group $(-COOH)$
(c) Amino Group $(-NH_2)$
(d) Aldehyde Group $(-CHO)$

Q14: How many electrons are required to reduce 1 molecule of oxygen gas (O_2) to water (H_2O)?

(a) 4 electrons
(b) 2 electrons
(c) 6 electrons
(d) 1 electrons

Q15: In which of the following electrolytes will the rate of water hydrolysis be the fastest?

(a) 2 M $NaCl$
(b) 1 M $MgCl_2$
(c) 1 M $NaCl$
(d) 2 M $MgCl_2$

Answer Key

1. B	2. C	3. B	4. A	5. C
6. C	7. C	8. D	9. B	10. ABCD
11. B	12. C	13. C	14. A	15. D