淡江大學 107 學年度日間部寒假轉學生招生考試試題

系別: 水環系環工組三年級

科目:環境化學

31-1

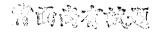
考試日期 1月13日(星期日) 第2節

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- A. Multiple choice Questions (5 points per question)
- 1. The pH and HCO₃⁻ concentration of an idea solution is 8.33 and 61 mg/L, respectively. What is the concentration of CO₃²-? (A) 10^{-5} M (B) 10^{-3} M (C) 6 mg/L (D) 60 mg/L. (pK_{a1}=6.35; pK_{a2}=10.33)
- 2. Cr₂O₇²⁻ is a strong oxidant used for chemical oxygen demand (COD) analysis. What is the equivalent weight (E.W.) of Cr₂O₇²⁻? (A) 216 (B) 72 (C) 36 (D) 18. (Atomic weight: Cr: 52)
- 3. A water sample contains 246 mg/L of sodium acetate (C₂H₃NaO₂). What is the Total organic concentration (TOC) of the sample? (A) 246 mg/L (B) 123 mg/L (C) 92 mg/L (D) 72 mg/L.
- 4. Which is the most appropriate ionic exchange resin for treating Cr(VI) wastewater with pH of higher than 10.5? (A) weak-acid cation resin (B) weak-base anion exchange resin (C) strong-acid cation exchange (D) strong-base anion exchange.
- 5. What is the substance in drinking water that could cause blue baby syndrome? (A) Hardness (B) Nitrate (C) Trihalomethanes (D) Color.
- 6. What's the possible functional groups for the exchange sites of a weak-acid cation exchange resin? (A) Amino group (B) Amine group (C) carboxylic group (D) sulfonic group.
- 7. For the electrolysis of a hydrochloric acid solution, which of the following statement is correct? (A) $H_{2(g)}$ produced in anode (B) $Cl_{2(g)}$ produced in anode (C) $N_{2(g)}$ produced in cathode (D) $O_{2(g)}$ produced in cathode.
- 8. A water sample contains 10 mg/L of nitrate ions. Express the nitrate concentration as nitrate-nitrogen? (A) 2.26 mg/L (B) 5.46 mg/L (C) 10 mg/L (D) 14 mg/L. (Atomic weight: N: 14)
- 9. Which of the following is not the water quality parameter for calculating river pollution index (RPI)? (A) Nitrate (B) Dissolved oxygen (C) BOD (D) SS.
- 10. What is Total Kjeldahl Nitrogen (TKN)? (A) Nitrate + Nitrite (B) Nitrate + Nitrite + total ammonia (C) total organic nitrogen + Nitrate + Nitrite (D) total organic nitrogen + Total ammonia



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- B. Computational Questions (50 points total)
- 1. A 100-mL sample was titrated to determine its alkalinity. The sample requires 8.5 mL of 0.01 M H₂SO₄ to reach phenolphthalein end point and requires **additional** 12 mL to reach bromocresol green end point. What are the **hydroxide**, **carbonate**, and **bicarbonate alkalinity** of the sample (mg/L as CaCO3)? (10 points for each answer, 30 points total)
- 2. Following table shows the anions and cations contained in a water sample. What's the concentration of sulfate ions in this water due to the charge neutralization? (10 points) What is the hardness of the sample in the unit of mg/L as CaCO₃? (10 points) Assume H⁺ and OH⁻ concentrations are negligible. (Atomic weight: Cl=35.5; S=32, Na =23; Ca=40; Mg=24.3; Fe=55.8)

Ions	Concentration (mg/L)	Ions	Concentration (mg/L)
C1-	90	Na ⁺	23
SO ₄ ² -	?	Ca ²⁺	60
		Mg ²⁺	10
		Fe ²⁺	7