

所別：環境工程研究所碩士班 甲組 科目：環境化學及環境微生物學

Environmental Chemistry

1. Explain the following terms : (15%)
 - (a) Beer's law
 - (b) The second law of thermodynamics
 - (c) Arrhenius law
 - (d) Phenolphthalein alkalinity
 - (e) Tyndall Effect
2. (a) Write a balanced chemical equation for the oxidation of Mn^{2+} to MnO_4^- by ozone under acidic conditions. (Start from each half reaction)
(b) Calculate the standard potential for the reaction under standard conditions.
($E_{\text{O}_3/\text{O}_2} = 2.07 \text{ V}$; $E_{\text{MnO}_4^-/\text{Mn}^{2+}} = 1.49 \text{ V}$)(10%)
3. The $\text{pK}_{\text{a}2}$ value of phosphoric acid (H_3PO_4) is 7.2. If now we use KH_2PO_4 and K_2HPO_4 to make a buffer solution of $\text{pH} = 6.5$, what is the required molar ratio of $[\text{K}_2\text{HPO}_4]/[\text{KH}_2\text{PO}_4]$? (5%)
4. Explain the purpose of addition of each following chemical in the BOD dilution water. (a) CaCl_2 , (b) FeCl_3 , (c) K_2HPO_4 , (d) NH_4Cl , and (e) MgSO_4 . (10%)
5. Draw a figure to illustrate the nitrogen speciation (transform of nitrogen species) after the point of pollution as a function of time (or distance down stream) and explain why. (10%)

注意：背面有試題

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環境微生物學

1. 請簡述革蘭氏染色 (Gram stain)之步驟，並說明革蘭氏陰性與陽性菌細胞壁之組成差異。(15%)
2. 微生物學家通常利用外形 (morphology)，培養特徵 (Cultural characteristics)及生理特性來鑑定微生物，請說明如何利用生理特性測試來鑑別大腸桿菌與產氣桿菌。(15%)
3. 以大腸桿菌作為環境污染之指標微生物有何優點？(10%)
4. 請說明原核原生物與真核原生物(Procaryotic and Eucaryotic)間細胞組成差異。(10%)