國立中山大學102學年度碩士暨碩士專班招生考試試題

科目名稱：環境化學【環工所碩士班乙組】　　題號：433003

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）　　共1頁第1頁

不得在試卷上作答

1. What would happen when sodium persulfate is in contact with trichloroethylene? Try to write down the relevant chemical reaction equation(s) and describe the relevant reaction mechanism(s). **(20%)**

2. Using iron species as examples, try to describe how chemical coagulation and elctrocoagualtion work in wastewater treatment. **(20%)**

3. Formation of nanoparticles by homogeneous nucleation basically is resulted from a supersaturation of growth species in the solution. Suppose the change of Gibbs free energy per unit volume of the solid phase, ΔG_v, is described by the following equation:

$$\Delta G_v = - (kT/\Omega) \ln(C/C_o) = - (kT/\Omega) \ln(1+\sigma)$$

where C is the concentration of the solute, C_o is the equilibrium concentration or solubility, Ω is the atomic volume, and σ is the supersaturation defined by $(C- C_o)/C_o$. Based on the above-indicated concept, try to describe the criterion for the formation of nanoparticles in terms of ΔG_v. **(10%)**

4. 天然水中之膠體或濁度常可加入三價鋁鹽或鐵鹽經混凝後去除，試述其機制。(10分)

5. 一pH=9.0之水樣中含有244 mg/L之HCO_3^-及120 mg/L之CO_3^{2-}。試求該水樣之鹼度為若干mg $CaCO_3$/L。[HCO_3^-之式量=61、CO_3^{2-}之式量=60、$CaCO_3$之式量=100](15分)

6. 一飲用水之pH = 7.00，今加入5.25 mg/L之次氯酸(HOCl)滅菌，若pH值不改變，試估算在此水中未解離成次氯酸根離子(OCl^-)之HOCl之百分比。[Cl之原子量=35.5；O之原子量=16.0；H之原子量=1.00；$HOCl \rightarrow H^+ + OCl^-$，$K_a = 3.0\times10^{-8}$ M](15分)

7. 在紫外線充足之環境下，大氣中之NO、碳氫化合物、O_2易相互反應，提高大氣中之臭氧及過氧乙醯硝酸酯(PAN)濃度。試以相關之化學反應方程式說明臭氧及PAN濃度升高或形成之現象。(10分)