

編號: 469 系所: 環境醫學研究所甲組

科目: 環境化學

本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

1. Please draw a chart to describe the nitrogen cycle in the ecosystem (10%), and then describe the role of organism in the nitrogen cycle. (5%)
2. What are the reasons that soap is environmentally less harmful than alkyl benzene sulfonate (ABS) surfactant used in detergents? (10%)
3. Please describe the effects of air/fuel ratio on pollutant emissions from an internal combustion piston engine. (15%)
4. What evidences had been stemmed to confirm that iron and manganese gain entrance to water supplies through changes produced in environmental conditions as results of biological reactions? (15%)
5. Please explain why the results of BOD and COD for the same sample are always different? (10%)
6. A buffer is made by combining NaHC_2O_4 and $\text{Na}_2\text{C}_2\text{O}_4$ to give concentration of 0.01M for NaHC_2O_4 and 0.02M for $\text{Na}_2\text{C}_2\text{O}_4$. $\text{pK}_{\text{A}1}$ is 1.25 and $\text{pK}_{\text{A}2}$ is 4.28. Please calculate the initial pH and buffer intensity of this buffer? (12%) If 0.001M NaOH was added to this buffer, what is the pH of this buffer? (8%)
7. Balance the following equations: (15%, 3% for each)
 - a. $\text{MnO}_2 + \text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{MnSO}_4 + \text{H}_2\text{O} + \text{Cl}_2 + \text{Na}_2\text{SO}_4$
 - b. $\text{FeSO}_4 + \text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + \text{Cr}_2(\text{SO}_4)_3 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$
 - c. $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{H}_2\text{O} + \text{Ca}(\text{HCO}_3)_2 \rightarrow \text{Al}(\text{OH})_3 + \text{Ca SO}_4 + \text{H}_2\text{O} + \text{CO}_2$
 - d. $\text{HClO} \rightarrow \text{HClO}_3 + \text{HCl}$
 - e. $\text{H}_2\text{C}_2\text{O}_4 + \text{KMnO}_4 + \text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + \text{MnSO}_4 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$