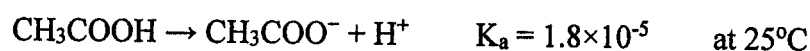


1. For a solution containing 0.01 M CaCl_2 and K_2SO_4 , please calculate (a) the ionic strength of the solution (5 points), and (b) the activity coefficients and activities of each ion in the solution (10 points).
2. A mass of 0.001 mole of acetic acid is added to water to make a one-liter solution at 25°C. Please answer the following questions: (a) what are the equilibrium concentrations of all species involved (5 points)? (b) What are the equilibrium concentrations of all species involved if 0.01 milli-mole of Sodium Acetate (CH_3COONa) is added in place of 0.001 mole of acetic acid (10 points). Ignore activity corrections.



3. In wastewater analysis, it is often to measure BOD, COD, and TOC .
 - (1) Please describe the purpose for those three measurements. (5 points)
 - (2) Please describe the similarity and difference among the results obtained from those three measurements. (10 points)
 - (3) What are the limitations or disadvantages from those three measurements. (5 points)
4. In wastewater analysis, what instrumental methods of analysis are useful to analyze each of the following:
 - (1) Metals; (2) Volatile organic compounds; (3) Nonvolatile organic compounds. (12 points)
5. Greenhouse effect is a globally environmental concern, using CO_2 as an example, explain the characteristic of wavelength of sun and molecule vibration in troposphere. (10 points)
6. (1) What are POPs? (5 points)
 - (2) List two chemicals on the list of Stockholm Treaty (6 points)
 - (3) Based on chemical structure and physical properties of POPs, explain the environmental behavior of POPs. (5 points)
7. For air quality,
 - (1) Describe the definition and unit of $\text{PM}_{2.5}$? (6 points)
 - (2) In addition to $\text{PM}_{2.5}$, list at least two chemical compounds in Air Quality Index (AQI) (6 points)

試題隨卷繳回