國立臺灣大學 114 學年度碩士班招生考試試題

※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

1. a. Describe the importance of redox reactions in water and explain the role of oxidation-reduction potential (ORP) as an indicator of water quality. (10%)
   b. Discuss the redox behavior of iron (Fe) and manganese (Mn) in water and their impact on drinking water quality. (5 %)

2. a. Explain the differences between bioconcentration and biomagnification with examples or illustration. (10 %)
   b. Define LD_{50} in toxicity assessments and its significance and limitations (5 %).

3. Describe how to use high-performance liquid chromatography (HPLC) in the analysis of polycyclic aromatic hydrocarbons (PAHs) in river water samples, including sample pretreatment and detection principles (e.g., separation, and quantification). (10 %)

4. Explain the basic principles of atomic absorption spectroscopy (e.g., flame atomizers and graphite furnace atomizers), including the role of the light source and the mechanism of the absorption phenomenon. (10 %)

5. Explain the following terms: (a) Acidity, (b) TSS, (c) BOD, (d) THMs. (20 %)

6. What is the pH value for acid rain? Please explain why this value is defined according to the calculation from a CO_2-HCO_3-CO_3 system in water. Assuming $P_{CO2} = 0.000339$ atm, Henry's law constant of CO_2 is 3.38×10^{-2} (mol/L*atm^{-1}), and $K_{a1} = 4.45 \times 10^{-7}$. (10 %)

7. What are persistent organic pollutants (POPs)? Please show five chemical names of POPs! (10 %)

8. One site was contaminated with 200 mg/kg polyfluoroalkyl substances (PFAS). If the required removal of PFAS is 90% and the first-order rate constant is 0.1 hr^{-1} at 20 °C, what is the required residence time for the removal of PFAS? (10 %)

試題隨卷繳回