1. Please use the chemical reaction formula to explain the destruction of the ozone layer. (10 pts)

2. Assuming ΔH does not change with temperature. Please calculate the following equilibrium constants at 298K and 350K. (10 pts)

$$CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$$

	$CaCO_{3(s)}$	$CaO_{(s)}$	$CO_{2(g)}$
ΔHf° (Kcal/mole)	-288.5	-151.9	-94.5
S° (cal/mol-k)	22.2	9.5	51.1

3. Please describe the meaning of buffer index. There is water containing 0.3mole/L acetic acid and 0.2mol/L acetate, and it has been adjusted to pH = 5.0 using NaOH. How much mole/L NaOH should be added to adjust the pH of the water to be 5.2? (10 pts)

4. Please describe salinization, sodication and alkalization. (10 pts)

5. The pH of rainwater is 5 and contains 1 mg/L of total ammonia nitrogen (NH_3 - N). What is the volume concentration (ppm) of ammonia in the atmosphere? (Assuming the rainwater can be completely balanced with the atmosphere.) (10 pts)
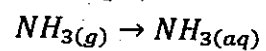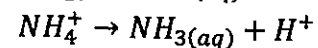
$$NH_{3(g)} \rightarrow NH_{3(aq)} \qquad K = 10^{1.76} \, M/atm$$
$$NH_4^+ \rightarrow NH_{3(aq)} + H^+ \qquad Ka = 10^{-9.24} M$$

6. Why methanogens are mostly strict anaerobic and methanotrophs are mostly aerobic organisms? Are there aerobic methanogens or anaerobic methanotrophs exist? Why? (20 pts)

7. Why soil system has the most diversified microbial population compare to fresh water or deep sea? (10 pts)

8. Sulfate reducing bacteria & sulfide oxidation bacteria are the two primary groups of organisms found in biocorrosion. Which one is predominately found in cast iron drinking water pipes and which one is predominately found in concrete sewer pipes? Why? (20 pts)

<div align="center">試題隨卷繳回</div>