※ 考生請注意：本試題不可使用計算機。　 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Draw the chemical structure of 2, 3, 7, 8-tetrachlorodibenzo-*p*-dioxin, and state its environmental formation and significance. (10 points)

2. State what Freon is. CF_2Cl_2 (CFC-12) is one common compound of Freon. Use chemical reaction equations to describe the reactions involved in ozone depletion in the stratosphere. (10 points)

3. In environmental engineering design, often we use distribution parameters (for example, air-water distribution or organic-water distribution) to evaluate whether an organic chemical pollutant can be removed by treatment processes such as air stripping or sorption (e.g., activated carbon).　Describe the air-water and water-solid (or organic phase) distribution coefficients that are generally used. (10 points)

4. Define what an acid-base buffer is and state one of its characteristics.　Given a buffer with pKa = 3, 7, and 9, to what pH values would you use it to buffer? (10 points)

5. Hypochlorous acid (HOCl) is a common disinfectant used in water treatment.　It has a Ka = 2.7×10^{-8}. At pH = 7, what is the ratio of [HOCl]/[OCl⁻]? If you want to shift the ratio to 0.5, what [H⁺] would you adjust to? (10 points)

6. Define chemical oxygen demand and its role in water quality.　State the typical oxidant, catalyst, and inorganic interference and interference removal method. (10 points)

7. Describe in detail the four major components in "Risk Assessment". (10 points)

8. Describe the typical treatment units involved in a typical secondary wastewater treatment plant. (10 points)

9. List 5 common air pollutants used in regulation and its sources. (10 points)

10. Ever increasing environmental problem is in recent decade further impacted by the climate change, particularly global warming.　As an environmental engineer, state 5 methods related to environmental engineering and science scope that you would do to relieve the global warming impact.　Please briefly explain why. (10 points)