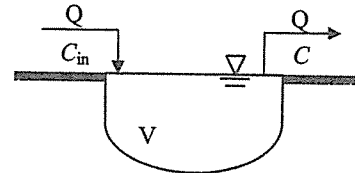


1. Please explain the following terms and their related environmental concerns. (15%)

- (a) Particulate Matter 2.5
- (b) Artificial Eutrophication
- (c) Dense Non-Aqueous Phase Liquid

2. Consider a lake with 20000 m^3 has been receiving a polluted stream with a pollution concentration of 40 mg/L . The stream that flows into and out of the lake has a flow rate of $100 \text{ m}^3/\text{day}$. Assuming the pollution is completely mixed in the lake,

C_{in} = the concentration of the pollutant in the incoming stream
 C = the concentration of the pollutant in the outgoing stream
 Q = the stream inflow and outflow rate
 V = the volume of the lake



(a) Use the symbols given above to derive the mass balance equation of the pollutant in the system. Describe any assumption you use. (6%)

(b) If the pollutant is a conservative substance, determine the output concentration of the pollutant as a function of time. (7%)

(c) If the pollutant is a nonconservative substance and undergoes first-order photochemical decay ($r = kC$) with a k value of 0.01 day^{-1} , find the steady-state concentration of the pollutant in the outgoing stream. (7%)

3. (a) 請描述自然界中的氮循環(Nitrogen cycle)與其循環轉化過程。 (8%)

(b) 請說明在污水處理流程中，以生物處理程序去除氮化物的原理與反應機制。 (7%)

4. (a) 請繪圖說明傳統式活性污泥法之流程圖(flow diagram)。 (10%)

(b) 就(a)產生之廢棄污泥擬訂一個處理(treatment)及處置(disposal)方案，並說明您選擇該方案之理由。 (10%)

5. (a) 請繪圖說明何謂氧垂曲線(Oxygen Sag Curve)?並申論其在河川污染防治上之應用。 (10%)

(b) 如有一條河川之再曝氣係數(coefficient of reaeration)為 0.4 day^{-1} (base e)，流速為 0.85 m/sec 。現於河川之某一處排入一股有機廢水，而在放流口下游之河水第一階段最終生化需氧量(first-stage ultimate BOD)為 20 mg/L ，耗氧係數(coefficient of deoxygenation)為 0.2 day^{-1} (base e)，缺氧量(oxygen deficit)為 0 mg/L 。試以 Streeter-Phelps equation 估算在放流口下游 48.3 公里處的溶氧量(假設該河水之飽和溶氧量為 10 mg/L)? (10%)

6. 試述噪音控制之基本法則及進程(stage)。 (10%)

試題隨卷繳回