

1. Please explain the relationship between Volatile Organic Compounds (VOCs) emitted by mobile pollution sources and ozone, as well as PM_{2.5}. (10 points)
2. If a factory emits sulfur dioxide (SO₂) at a concentration of 200 mg/m³, with an average exhaust humidity of 10%, and a wet basis average exhaust rate of 300 Nm³/min, with an oxygen content of 18% and an O₂ reference standard of 6%. Please calculate the corrected concentration of SO₂ (ppm)? the actual dry basis exhaust rate (Nm³/min)? the corrected dry basis exhaust rate (Nm³/min)? and the SO₂ emission rate (kg/hr)? (Assume the environmental conditions: 1 atm, 25°C) (10 points)
3. Composting and anaerobic digestion are common methods for treating organic waste. Please explain the similarities and differences between these two technologies. (5 points) If there is 1 ton of organic waste with the chemical composition of C₆H₁₂O₆, how much biogas will be produced through anaerobic digestion? (5 points)
4. Bio-Energy Carbon Capture Utilization and Storage (BECCUS) and Carbon Capture and Storage (CCS) are both technologies aiming at capturing carbon dioxide to prevent it from entering the atmosphere. Please explain the similarities and differences between BECCUS and CCS technologies. (10 points)
5. Explain the differences between Net Zero, Carbon Negative, and Carbon Neutral, and rank these three stages in order. (10 points)
6. 檢測人員使用 300 mL 的 BOD 瓶，在 20 °C 下對一水資源中心的進流污水進行生化需氧量(BOD)的檢測。所得數據如下：

樣品序號	污水體積 (mL)	起始溶氧 (mg/L)	培養天數 (day)	最終溶氧 (mg/L)
1	1	8.8	5	8.1
2	1	8.8	5	8.1
3	5	8.8	5	5.8
4	5	8.8	5	5.6
5	20	8.8	5	0
6	20	8.8	5	0

- (a) 請計算該水樣的 BOD₅。 (10 points)
 - (b) 我國地面水體分類及水質標準中，針對陸域地面水體(河川、湖泊) BOD 項目的分類標準如下：甲類: BOD < 1 mg/L、乙類: BOD < 2 mg/L、丙類: BOD < 4 mg/L、丁類: BOD < 8 mg/L、戊類: BOD < 10 mg/L。請分析此 BOD 分類標準的合理性。 (10 points)
 - (c) 請說明何謂再生水，並列舉一再生水之處理流程。 (10 points)
7. 已知水在不同溫度下的離子積常數(K_w)如下表，請計算 40°C 之中性 pH 值。(10 points)

T (°C)	K _w	pK _w (= -log K _w)
10	0.293 × 10 ⁻¹⁴	14.53
15	0.457 × 10 ⁻¹⁴	14.34
20	0.681 × 10 ⁻¹⁴	14.17
25	1.008 × 10 ⁻¹⁴	14.00
30	1.471 × 10 ⁻¹⁴	13.83
40	2.916 × 10 ⁻¹⁴	13.54
60	9.550 × 10 ⁻¹⁴	13.02
80	25.12 × 10 ⁻¹⁴	12.6

8. 環境部已針對金表、電鍍及製革等產業的高濃度氨氮廢水排放進行加嚴管制，請列舉一種廢水中氨氮的去除方法並說明其原理。 (10 points)

試題隨卷繳回