

※ 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。

- Give the chemical structure and describe the usage of the following chemicals in the industry. (20%, 4% for each)
 - Endosulfan
 - Short chain chlorinated paraffins (SCCPs)
 - Bisphenol A
 - 3,3',4,4',5,5'-Hexa brominated biphenyls (PBBs)
 - Vinyl acetate
- 由於大量燃燒化石燃料而使得大氣中 CO_2 濃度節節上升，大氣中 CO_2 濃度與酸雨之形成有關，若在一大氣壓， 25°C 下，大氣中 CO_2 濃度上升至 400 ppm 時，若其溶於水中達平衡狀態下，請計算平衡時水中之 pH 值。(20%)
 - 一大氣壓， 25°C 下， CO_2 溶水之亨利常數 $H=3.4*10^{-2}$ ($\frac{\text{mole}}{\text{L} \times \text{atm}}$)
 - $\text{H}_2\text{CO}_3 \rightleftharpoons \text{H}^+ + \text{HCO}_3^-$ $K_{c1}=2.33*10^{-8}$
 - $\text{HCO}_3^- \rightleftharpoons \text{H}^+ + \text{CO}_3^{2-}$ $K_{c2}=2.13*10^{-4}$
- Balance the following equations: (20%, 4% for each)
 - Oxidation of I^- to I_2 and reduction of MnO_2 to Mn^{2+}
 - Oxidation of $\text{S}_2\text{O}_3^{2-}$ to SO_4^{2-} and reduction of Cl_2 to Cl^-
 - Oxidation of NH_4^+ to NO_3^- and reduction of O_2 to H_2O
 - Oxidation of CH_3COO^- to CO_2 and reduction of Cr_2O_7^- to Cr^{3+}
 - Oxidation of $\text{C}_6\text{H}_{12}\text{O}_6$ to CO_2 and reduction of NO_3^- to N_2
- Please explain why the results of BOD and COD for the same sample are always different? (10%)
- Please describe the formation mechanism of primary and secondary $\text{PM}_{2.5}$? (20%)
- Please explain the formation mechanism of "Crown corrosion" in the public sewage system? (10%)