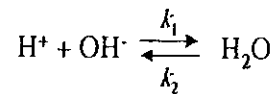


國立中山大學九十四學年度博士班招生考試試題

科目：環境工程與科學【環工所】

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1. Select the correct statement(s) below: (15%)
 - (a) In a viscous fluid flow, a favorable pressure gradient is the one in which pressure gradient increases with downstream distance.
 - (b) In a boundary layer, the normal diffusion is much smaller than the stream-wise diffusion.
 - (c) A flow with secondary flow usually has stronger mixing effect than the one without secondary flow.
 - (d) The distinct feature of atmospheric (or planetary) boundary layer is that flow is turbulent constantly.
 - (e) In free atmosphere, the wind vector is parallel to the constant-pressure surface.
2. 世界各國(包括台灣)正大力推動奈米科技，試回答下列問題：
 - (1) 何謂奈米材料？(5%)
 - (2) 舉例說明奈米科技在環境工程中的三個次領域其可能應用性。(10%)
3. 已知反應式如下，試證明水之 $pK_w = 14$ 與中性 $pH = 7$ ，假設離子強度效應忽略。(10%)



$$[H_2O] = 55.5 \text{ mol/L}, k_1 = 1.4 \times 10^{11} \text{ L/mol.s}, k_2 = 2.5 \times 10^{-5} \text{ 1/s (25}^\circ\text{C)}.$$

4. 已知 $HOCl$ 之 $pK_a = 7.45$ (25°C)，試計算自來水水樣 $[HOCl]$ 之濃度在 $pH = 7.5$ 為在 $pH = 8.5$ 之大約倍數？(10%)
5. 試述垃圾焚化及其排氣處理流程。(10%)
6. What is health and risk assessment? Please describe the concept of applying health and risk assessment to derive soil and groundwater remediation goals. (10%)
7. Please use the concept of "treatment train" to develop a remedial system for chlorinated-solvent contaminated groundwater remediation. (10%)
8. 與往年比較，我國去年(93 年)整體空氣品質有何明顯變化？又造成此變化的可能原因為何？另試闡述潮州空氣品質監測站之 PSI 值經常超過 100 之可能原因為何？又以前何種污染物為主？(10%)
9. 試說明大陸沙塵暴之發生源地位於中國大陸何處？其傳輸路徑為何？又其好發季節為何時(以月份表示)？試繪圖說明大陸沙塵暴來襲前後懸浮微粒粒徑分佈 (particle size distribution) 之變化情形(以 $dC/d(\log d_p)$ vs. d_p 繪圖)。(10%)