

題號： 268

國立臺灣大學 107 學年度碩士班招生考試試題

科目： 環境化學及環境微生物學

題號： 268

節次： 7

共 1 頁之第 1 頁

1. The water dissociation constant (k_w) at different temperature is shown below.

T (°C)	K_w	p K_w
0	0.114×10^{-14}	14.94
10	0.293×10^{-14}	14.53
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
50	5.476×10^{-14}	13.26
60	9.550×10^{-14}	13.02

- (a) Determine the "neutral pH" of water at 40 °C. (10 points)
- (b) Can the pH of a solution possibly be 0? Explain your answer in details. (10 points)
2. (a) Define ionic strength and its importance in reaction kinetics. (10 points)
- (b) Calculate the ionic strength of the solution containing the following ions: $\text{Ca}^{2+} = 2 \text{ mM}$, $\text{Na}^+ = 2 \text{ mM}$, $\text{Cl}^- = 4 \text{ mM}$, $\text{SO}_4^{2-} = 1 \text{ mM}$. (10 points)
3. Define "point of zero charge or pH_{pzc} " of a mineral and its importance in adsorption of contaminants in the environment (10 points)
4. Please define the following terms and briefly describe the measuring methods: (5 points each)
- fecal coliform
 - fecal streptococcus
 - Escherichia coli*
 - assimilable organic carbon
 - sludge volume index
5. What are the major roles of *Zoogloea* spp. in biological wastewater treatment? (10 points)
6. Please describe the process of common chemiosmotic ATP synthesis in bacterial cells. (15 points)

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