國立高雄師範大學 100 學年度學士班轉學生招生考試試題

系所別：化學系三年級

科　目：分析化學（第一頁，共二頁）

※注意：1. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，於本試題上作答者，不予計分。
2. 限用藍色或黑色之鋼筆、原子筆作答，除製圖外，以鉛筆或其他顏色作答者不予計分。

1. Consider a set of replicate measurements of water sample: 3.5, 3.1, 3.1, 3.3, and 2.5 ppm. Calculate the (a) mean (b) median (c) standard deviation (d) coefficient of variation （10%）

2. (a) Calculate the pH of a solution that is 0.2 M in formic acid (HCOOH) and 0.3 M in sodium formate. $K_a = 1.8 \times 10^{-4}$
   (b) Calculate the pH change that takes place when a 100 mL portion of 0.05 M NaOH is added to 400 mL of the above buffer solution.（10%）

3. Please distinguish the difference between（10%）
   (a) equivalent point and end point
   (b) primary standard and secondary standard

4. 50.0 mL of 0.05 M NaCl was titrated with 0.1 M $AgNO_3$ solution. Please calculate the pAg value of the solution after addition of the following volume of $AgNO_3$：(a) 10 mL (b) 25 mL (c) 26 mL. AgCl, $K_{sp} = 1.82 \times 10^{-10}$.（15%）

5. Please define the following terms：（20%）
   (a) Differentiating solvent
   (b) Water hardness
   (c) precision
   (d) Buffer capacity

（背面有題　續翻背面）

6. Calamine, which is used for the relief of skin irritations, is a mixture of zinc and iron oxides. A 1.022 g sample of dried calamine was dissolved in acid and diluted to 250 mL. Potassium fluoride was added to a 10.00 mL aliquot of the diluted solution to mask the iron; after suitable adjustment of the pH, Zn^{2+} consumed 38.71 mL of 0.01294 M EDTA. A second 50.00 mL aliquot was suitably buffered and titrated with 2.40 mL of 0.002727 M ZnY^{2-} solution：

   $Fe^{3+} + ZnY^{2-} \rightarrow FeY^{-} + Zn^{2+}$

   Calculate the percentages of ZnO (MW=81.39 g/mol) and Fe_2O_3 (159.69 g/mol) in the sample.（10%）

7. Calculate the cell potential for（10%）

   $Zn \mid Zn^{2+}$ (0.0955 M) $\| Co^{2+}$ (6.78×10^{-3} M) $\mid Co$

   $Co^{2+} + 2e^{-} = Co(s)$　$E^0 = -0.277$ V

   $Zn^{2+} + 2e^{-} = Zn(s)$　$E^0 = -0.763$ V

8. The solubility products for a series of iodides are（15%）

   CuI　$Ksp = 1 \times 10^{-12}$

   AgI　$Ksp = 8.3 \times 10^{-17}$

   PbI_2　$Ksp = 7.1 \times 10^{-9}$

   List these four compounds in order of decreasing molar solubility in

   (a) water

   (b) 0.10 M NaI

   (c) A 0.010 M solution of the solute cation