分析化學選擇題共 5 題, 每一小題 10 分, 答錯有倒扣.

(一) ( )An aqueous glycerol solution weighing 153.2 mg was treated with
50.0 mL of 0.0899 M Ce^{4+} in 4 M $HClO_4$ at $60^\circ C$ for 15 minutes to oxidize the
glycerol ($CH_2OHCHOHCH_2OH$, MW 92.095) to formic acids (HCO_2H)
The excess Ce^{4+} required 10.05 mL of 0.0437 M Fe^{2+} to reach a ferroin end point.
What is the weight percent of glycerol in the unknown?
(1)15.3wt% (2)20.4wt% (3)25.4wt% (4)30.5wt% (5)35.2wt% (6)40.4wt%

(二)( )The titration solution in the cell below had a total volume of 50.0 mL
and contained 0.100 M Mg^{2+} and 1.00E-5 M $Zn(EDTA)^{2-}$ at a pH of 10.00,
S.C.E.$\|$ Zn(s) | titration solution
What will be the cell voltage when 10.0 mL of 0.100 M EDTA has been added?
(1)-1.132V (2)-1.245V (3)-1.364V (4)-1.482V (5)-1.535V (6)-1.694V

(三)( )From the half-reactions below, calculate the solubility product of
$Mg(OH)_2$.
Mg^{2+} + 2 e^- <===> Mg(s) $\quad\quad\quad$ E^o = -2.360 V
$Mg(OH)_2(s)$ + 2 e^- <===> Mg(s) + 2 OH^- $\quad$ E^o = -2.690 V
(1)5E-14 (2)5E-13 (3)6E-13 (4)6E-12 (5)7E-12 (6)7E-11

(四)( )An aqueous solution containing ~1 g of oxobutanedioic acid (MW 132.073)
per 100 mL was titrated with 0.09432 M NaOH to measure the acid molarity. What
will be the pH at each equivalence point?
(1)4.46 & 9.42 (2)3.46 & 8.42 (3)2.46 & 7.42 (4)4.46 & 10.42 (5)3.46 & 7.42
(6)3.64 & 7.28

(五)( )How many milliliters of 0.113 M HBr should be added to 52.2 mL of
0.0134 M morpholine to give a pH of 8.00?
(1)5.33 mL (2)2.37 mL (3)6.89 mL (4)1.01 mL (5)3.74 mL (6)4.68 mL

(註)For morpholine, Ka = 3.22E-9
(註)For oxobutanedioic acid, Ka1=2.8E-3; Ka2=4.3E-5
(註)$E^o(Zn^{2+}/Zn)$= - 0.762V;
(註) MgY^{2-}: K_f = 6.2E8;
(註) ZnY^{2-} : K_f = 3.2E16;
(註) E(SCE) = 0.241V

無機化學問答題共 5 題, 每一小題 10 分.

(一)Write the electron configuration beyond a noble gas core for Fe

(for example, F = (He) $2s^2 2p^5$)

(二)Given syntheses for cis- and trans- $[Pt(NH_3)_2Cl_2]$, starting with $[Pt(NH_3)_4]^{2+}$

or $[PtCl_4]^{2-}$

(三)Which of the following mixtures would be expected to have maximum

boiling points and which to have minimum boiling points? Explain the reasons.

(a) Methyl acetate and chloroform

(b) C_6H_{12} and C_2H_5OH

(四)Give the valence electron count for the for the following species.

Which ones conform to the EAN rule? Show your counting procedure.

(a)$Co_2(CO)_8$ (b)$[Co(CN)_5]^{2-}$ (c) $[Mn(CO)_5]^-$

(五)Give the oxidation number, formal charge, and hybridization of the central

atom in NO_3^- and ClO_3^-. What are the molecular shapes?