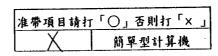| 准帶項目請打「○」否則打「×」	
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本試題共 2 頁

****************請按題序作答並標示清楚答案之題號*************

第一部份：選擇題 （單選，每題3分，共15分）

1. Which of the following is not an intermolecular force that affects the structure of a protein?
   A. hydrogen bonds　　B. dispersion forces　　C. activation energy　　D. ionic forces
   E. dipole-dipole forces

2. An electron in a certain atom is in the n = 3 quantum level. Which choice lists possible values of both l and m_l that it can have?
   A. $l = 3, m_l = 3$　　B. $l = 2, m_l = 3$　　C. $l = 1, m_l = 2$　　D. $l = 0, m_l = 0$　　E. $l = 3, m_l = 1$

3. Which ion has the largest radius?
   A. Na^+　　B. S^{2-}　　C. Ca^{2+}　　D. Cl^-　　E. F^-

4. Which type of organic compound does not contain a carbonyl group?
   A. ketones　　B. carboxylic acids　　C. esters　　D. aldehydes　　E. ethers

5. Given that the normal freezing point of ammonia is −78 °C. Predict the signs of ΔH, ΔS and ΔG for ammonia when it freezes at −85 °C and 1 atm.

	ΔH	ΔS	ΔG
A.	−	−	−
B.	−	+	−
C.	−	−	0
D.	+	+	0
E.	+	−	+

第二部份：填充題 （每個空格4分，共40分）

1. In the coordination compound [Pt(NH$_3$)$_2$Cl$_2$], the *sum* of coordination number (C.N.) and oxidation number (O.N.) of the metal atom is __(a)__.

2. The unit for a second-order rate constant is __(b)__. Use M, molarity, and s, second, to express the answer.

3. Refer to the following equation
$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$$
   (1) The production of ammonia is an endothermic reaction. Will heating the equilibrium system increase, decrease or do not change the amount of ammonia produced? __(c)__
   (2) If we use a catalyst which way will the reaction shift? __(d)__

4. Arrange H_3AsO_3, H_3PO_4 and H_3AsO_4 in order of increasing acid strength. __(e)__

5. A __(f)__ uses a spontaneous redox reaction to produce a current that can be used to do work.

◀注意背面尚有試題▶

系別：化學系二年級　　　　科目：普　通　化　學

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6. __(g)__ is the measure of polarity magnitude of a bond or of a molecule.

7. The molecular formula of Teflon is __(h)__.

8. A complex with the composition $[MA_2B_2]X_2$ is found to have no geometrical isomers. Both A and B are monodentate ligands. The geometrical structure of the complex is __(i)__.

9. The ground state electron configuration for the selenium atom is __(j)__.

第三部份：計算問答題（共 45 分）

1. Describe and explain the method of preparing a buffer solution with high buffer capacity and pH value of 5.　(10%)

2. Two moles of ideal gas expands from (1 atm, 1 L) to (0.2 atm, 5 L) by way of isothermal free expansion . Calculate ΔE, the change of the internal energy, and W, work, in this process.　(10%)

3. Ethyl acetate can be synthesized from ethanol and acetic acid. When two moles each of ethanol and acetic acid are allowed to react at 100 °C in a sealed tube, equilibrium is established when two thirds of a mole of each of the reactants remains. Calculate the equilibrium constant.　(10%)

4. Describe or define the following terms:
   (a) Concentration cell　(5%)
   (b) Electronegativity　(5%)
   (c) Pauli exclusion principle　(5%)