科目;普通化學

## 

第一部份:選擇題 (每題5分,共25分)

- 1 How many of the following electron configurations for the species in their ground state are wrong?
  - L Ca:  $1s^22s^22p^63s^23p^64s^2$
  - II. Cr: [Ar] 4s<sup>1</sup>3d<sup>5</sup>
  - III V·  $[\Delta r] 3s^2 3d^3$
  - IV. As:  $[Ar] 4s^2 3d^{10} 4p^3$
  - V.  $P \cdot 1s^2 2s^2 2p^6 3s^2 3p^5$
  - (A)1 (B) 2 (C) 3
- (E) 5
- 2 How many of the following result(s) in an increase in the entropy of the system?

(D) 4

- $NaBr_{(s)} \longrightarrow Na^{+}_{(aq)} + Br_{(aq)}$
- II  $CO_2(1 \text{ atm}, 298 \, ^{\circ}\text{C}) \longrightarrow CO_2(1 \text{ atm}, 373 \, \text{K})$
- 111. NII<sub>3</sub>(500 torr, 300 K) -> NII<sub>3</sub>(1 atm, 300 K)
- IV.  $CH_3OH_{(g)} + (3/2)O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(f)}$
- $2O_{7(g)} + 2SO_{(g)} \longrightarrow 2SO_{3(g)}$
- (A) 1 (B) 2 (C) 3
- 3 Which of the following is the strongest oxidant?

$$Ag^{+} + e^{-} \longrightarrow Ag_{(s)}$$

$$E^{o} = 0.799 \text{ V}$$

$$AgCl_{(s)} + e^{-} = Cl^{-} + Ag_{(s)}$$

$$E^0 = 0.222 \text{ V}$$

$$Ag(S_2O_3)_2^{3} + e^2 \implies Ag_{(5)} + 2S_2O_3^{2} = E^0 = 0.017 \text{ V}$$

- (A) Ag
- (B) AgCI
- $(C) \wedge g(S_2O_3)_2^3$
- $(D) \Lambda g'$
- (F) CI
- 4 Which ion is planar?
  - $(\Lambda) N \Pi_4$
  - (B) SO<sub>3</sub><sup>2</sup>
  - (C) CO<sub>3</sub>2-
  - (D) ClO<sub>3</sub>
  - (E) all are planar

学注意背面尚有試題》

系別: 化學學系二年級

科目:普通化學

5 Hydrogen bonding between C=O group	s and N—H groups in the backbone of a protein determines
the analysis of the state of th	If many little be thanked a son or a pro-
(Λ) primary structure.	The delign of the control of the control of the second
(B) secondary; structure.	
(C) tertiary structure	
(D) quaternany structure.	
(F) all of these or any	
* Asset	
第二部份:解釋名詞 (每題 5 分,共 30	分)
$\eta_{j,j}$	
1 Colligative property	
2 Electronegativity	
3 Heisenberg uncertainty principle	
4 Dipole moment,	
5 State function	
6. Condensation polymerization	
Company of the second second	
第三部份:問答題(共45分)	
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$\pm$ The initial concentration of $N_2O_5$ for the	following first-order reaction is I (mole/L).
$2N_2O_5 \longrightarrow 4NO_2 + O_2$	•
(a) Derive the integrated rate law to exp	press the reactant concentration [N2O5] as a function of time.
(Use k as the rate constant in your d	erivations.) (6%)
(b) Derive $t_{1/2}$ , the reaction half-life of $f$	
<sup>2</sup> Describe how to use the acid-base titration capacity. (10%)	on method to prepare a buffer solution with high buffer
3 (a) Write down the Schrödinger's equation	on and define each term in the equation. (10%)

1. Derive the relation between the cell potential Ecell and the cell reaction quotient Q for a Galvanic cell.

(b) What is the physical meaning of a wave function? (5%)

Define each term in your derivation. (10%)