

國立嘉義大學九十三年學年度

應用化學系碩士班招生考試（乙組）試題

科目：普通化學

注意：本試題可使用計算機

一、計算及問答題 (70%)

- Briefly describe the contribution by the following scientists in the development of fundamental chemical laws. (a) Antoine Lavoisier (b) Joseph Proust (c) John Dalton (d) Amedeo Avogadro. (16%)
- Determine the pH value for the following solutions. (a) 0.1M HCl (b) 0.1M CH₃COOH (c) 0.1M CH₃COONa (d) 1.0 × 10⁻⁷ M HNO₃. (K_a: 1.8 × 10⁻⁵) (20%)
- When 2.00 mol of SO₂(g) reacts completely with 1.00 mol of O₂(g) to form 2.00 mol of SO₃(g) at 25 °C and a constant pressure of 1.00atm, 198 kJ of energy is released as heat. Calculate the change of enthalpy (H) and internal energy (E) for this process. (20%)
- Arrange the following bonds according to increasing polarity :
H-H, O-H, C-H, N-H, F-H. (5%)
- Which of the following molecules have dipole moments, i.e. are polar?
(a) CH₄ (b) CO₂ (c) SeF₆ (d) CF₂Cl₂ (e) PCl₅. (3%)
- Write out the buffer systems in human body. (6%)

二、單選題(30%) (每題3分，答錯倒扣1分)

- After the reaction of 1 mole H₂ and 2 moles O₂ which species has greatest number of moles?
A) H₂ B) H₂O₂ C) O₂ D) H₂O
- 30g of phosphorous (30.97376 amu) react with 40 g oxygen (15.994 amu) gas to form an oxide. What is the molecular formula of the oxide?
A) PO B) PO₂ C) P₄O D) P₃O₅

- Which produces the greater volume of CO₂ 1 ml of each liquid is burned?
A) Methanol B) Ethanol C) Propane D) Same
- Shining a beam of light on a certain metal has no effect. What change would be most likely to eject electrons?
A) Increase intensity I B) Increase wavelength
C) Decrease frequency D) Decrease wavelength
- Which of the following has the lowest ionization energy (IE)?
A) Cl⁻ B) F⁻ C) Ar D) K⁺
- For which X does H₂ + X₂ → 2HX release the most energy?
A) Cl B) Br C) I D) Same
- In the following acid-base reaction, which species has the largest bond angle?
H₃O⁺ + NH₃ → NH₄⁺ + H₂O
A) H₃O⁺ B) NH₃ C) NH₄⁺ D) H₂O
- Which of the following has no electric dipole moment?
A) CH₂Cl₂ B) SO₂ C) BrF₃ D) BF₃
- Which of the following will react with Fe₂O₃ to produce molten Fe?
A) C(s) B) Fe(s) C) Al(s) D) Cu(s)
- Which strategy can best reverse CO blood poisoning?
Hemoglobin (O₂)₄ + 4 CO ⇌ Hemoglobin (CO)₄ + 4 O₂
A) Increase hemoglobin B) Increase pressure CO
C) Decrease hemoglobin D) Increase pressure of O₂