

淡江大學 102 學年度碩士班招生考試試題

239

系別：化學學系

科目：普通化學

考試日期：3月10日(星期日) 第2節

本試題共五大題，共壹頁

應按題目順序作答，列出答題推導步驟。共計五大題，每大題二十分。

- Draw diagram of a voltaic cell constructed by: Cu(s), Zn(s), Cu(NO₃)₂ solution, Zn(NO₃)₂ solution, KNO₃ solution, two beakers, one salt bridge and copper wire.
 - Indicate the cathode and its half-cell reaction, anode and its half-cell reaction, moving direction of cation, anion, and electron in your diagram,
- Give molecular orbital descriptions and energy level diagram of [C₂²⁻] species.
 - Draw Lewis structure of the following species: SF₄, SO₂, and SO₄²⁻. Name and draw the type of hybrid orbital using for the central sulfur atom.
- Translate and explain the following sentences.
"The second law of thermodynamics is a profound principle of nature which affects the way energy can be used. There are several approaches to stating this principle qualitatively. Here are some approaches to giving the basic sense of the principle. 1. Heat will not flow spontaneously from a cold object to a hot object. 2. Any system which is free of external influences becomes more disordered with time. This disorder can be expressed in terms of the quantity called entropy."
- Estimate the pH value of a 100 mL aqueous solution containing 20 gram acetic acid and 41 gram sodium acetate. The acidity of acetic acid, K_a = 1.8 × 10⁻⁵.
 - Chlorine gas can be produced by reaction of MnO₂ with NaCl in H₂SO₄ solution. Write the balanced chemical reaction equation.
- Draw the condensed structural formulas for the following compounds: glucose, isopropyl alcohol, acetaldehyde, benzoic acid, and acetone.
 - What is chiral compound? Give one example and draw the possible optical isomers of organic compound to explain it.

atomic weight : C = 12 , H = 1 , O = 16 , Na = 23; log 2 = 0.3