

## 100 學年第二學期「化學實驗二」課程綱要 (100/12/12)

一、課程編號：203-11510-02

二、教科書：國立台灣大學化學系，「化學實驗一暨化學實驗二」，第三版，國立台灣大學出版中心，台北，2009.

Department of Chemistry, National Taiwan, *University Experiments in General Chemistry*, NTU Press: Taipei, 2009.

教學網頁：<http://www.ch.ntu.edu.tw/~genchem99/index.htm>

<https://ceiba.ntu.edu.tw/921edtech>

三、成績評量方式：

- 實驗精神（態度）佔50%
- 實驗報告佔50%

四、預修課程：先修或併修「普通化學一、二」。

五、課程進度：

第二學期 化學實驗二

週	實驗名稱	配合普化課程內容
1	C0 報到分組、安全簡介	
2	C14 高錳酸鉀的氧化還原滴定	氧還反應
3	C15 水溶液中銅的電解重量測定法	電化學
4	C17 高溫超導體之製備	氧高溫超導體、固態反應法
5	C19-1 碘鐘實驗－反應級數及活化能之測定	初期反應速率法
6	C19-2~4 碘鐘實驗－反應級數及活化能之測定	積分作圖法、活化能與催化劑
7	C21 直接甲醇燃料電池	氧化還原反應、能源、電化學
8	C22 溫度計之校正及可溶性物質分子量之測定	依數性質、凝固點下降
9	C28 金奈米粒子合成及吸收光譜鑑定	奈米材料、表面電漿共振波帶、氧化還原反應
10	E_New 有機分子模型	有機分子模型、電腦分子模擬、立體異構物
11	C23 蒸餾	有機化學
12	C24 分餾	有機化學
13	C25 萃取及有機酸在水與有機溶劑間之分佈	酸鹼、滴定、有機
14	C26 再結晶與熔點測定	溶液、共熔點
15	C27 層析法	薄層及管柱層析

第一學期

週	實驗名稱	配合普化課程內容
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1	C0 實驗室安全簡介	
2	C1 氮氣之莫耳體積	計量化學、理想氣體、分壓定律
3	C2 化合物化學式的決定	計量化學、氧還反應
4	C3 酸鹼指示劑與 pH 值測定 C4 溶解度法則	pH 值、酸、鹼、鹽 溶解度法則
5	C5 第一組陽離子定性分析	酸、鹼、平衡、沉澱反應
6	C6 第二組陽離子定性分析	酸、鹼、平衡、沉澱反應
7	C7 容器體積的校準	參考(1)
8	C8 中和滴定	當量點、酸、鹼、平衡
9	C9 電位法之應用	當量點、酸、鹼、平衡
10	C10-1 緩衝溶液	當量點、酸、鹼、平衡
11	C11 反應熱之測定	熱化學、卡計、黑斯定律
12	C12 維生素 C 之定量	氧還反應、滴定
13	C13 溶解度積之測定	計量化學、溶解度積
14	C16 分光光譜法之應用－微量鈷離子定量	錯離子、光譜化學
15	C20 從廢鋁罐製備明礬	兩性化合物、錯合物及結晶

參考書：Harris, D. C. *Quantitative Chemical Analysis*, 5<sup>th</sup> ed., 1999, W. H. Freeman and Co.: New York.

### **Chemistry Lab. (II) (2012)**

Textbook: Department of Chemistry, National Taiwan University, *Chemistry Laboratory (I), (II)*, 3rd ed., Taipei, 2009.

Website: <http://www.ch.ntu.edu.tw/~genchem99/index.htm>

<https://ceiba.ntu.edu.tw/921edtech>

#### **Objective:**

Chemistry Laboratory (I) and (II) are Integrated Laboratory courses to fulfill the requirements of Chemistry-majored students. The objectives are to demonstrate the principles of chemistry, teach the students various techniques used by chemists, and train the students to familiar with scientific methods.

#### **Course descriptions:**

The contents of Chemistry Laboratory (I) and (II) includes: stoichiometry, thermochemistry, acid-base, equilibrium, buffer solution, titration, electrochemistry, chemical kinetics, coordination compounds, spectrophotometry, materials science, and basic organic chemistry skills.

#### **Course requirements:**

Review the experiment before class. Follow the safety guidelines of Lab. Be familiar with Lab skills. Hand in reports on time. Attend the final exam at the end of semester.

**Grading:** Attitude: 50%; Report: 50%.

**Contents: Chemistry (II)**

1	Laboratory safety and work instructions
2	C14. Oxidation/reduction titrations with potassium permanganate
3	C15. Electrogravimetric analysis of copper
4	C17. Synthesis of Y-Ba-Cu superconductor
5	C19. Iodine clock - the study of chemical kinetics (I)
6	C19. Iodine clock - the study of chemical kinetics (II)
7	C21 Direct methanol fuel cell
8	C22. Molecular weight determination by freezing point depression
9	C28 Synthesis and characterizations of gold nanoparticles
10	E_New Molecular modeling and molecule visualizer
11	C23. Simple distillation
12	C24. Fractional distillation
13	C25. Extraction
14	C26. Recrystallization and melting point determination
15	C27. Chromatography

**Chemistry (I)**

Week	Experiments
1	Laboratory safety and work instructions
2	C1. Molar volume of nitrogen gas
3	C2. Determination of the empirical formula of cupric oxide
4	C3. Acid-base indicators and pH determination C4. Solubility Rules
5	C5. Qualitative analysis of cation group 1
6	C6. Qualitative analysis of cation group 2
7	C7. Calibration of volumetric glassware
8	C8. Preparing standard acid and base
9	C9. Using a pH-meter for an acid-base titration
10	C10. The buffer solutions
11	C11. Heat of reaction
12	C12. Quantitative analysis of vitamin C
13	C13. Determination of solubility product constant of silver acetate
14	C16. Spectrophotometric analysis of cobaltous ions
15	C20. Preparation of alum from aluminum can