

103 學年第一學期「化學實驗一」課程綱要

一、課程編號：203-11510-01, 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：

第一學期

週	實驗名稱	配合普化課程內容
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	C5 第一組陽離子定性分析	酸、鹼、平衡、沉澱反應
5	C6 第二組陽離子定性分析	酸、鹼、平衡、沉澱反應
6	C8 中和滴定	當量點、酸、鹼、平衡
7	C9 電位法之應用	當量點、酸、鹼、平衡
8	C10-1 緩衝溶液	當量點、酸、鹼、平衡
9	C11 反應熱之測定	熱化學、卡計、黑斯定律
10	C12 維生素 C 之定量	氧還反應、滴定
11	C13 溶解度積之測定	計量化學、溶解度積
12	C16 分光光譜法之應用－微量鈷離子定量	錯離子、光譜化學
13	C20 從廢鋁罐製備明礬	兩性化合物、錯合物及結晶

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	C17 高溫超導體之製備	氧高溫超導體、固態反應法
4	C19-1 碘鐘實驗－反應級數及活化能之測定	初期反應速率法
5	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
6	C21 直接甲醇燃料電池	氧化還原反應、能源、電化

		學
7	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
8	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
9	C23 蒸餾	有機化學
10	C24 分餾	有機化學
11	C25 萃取及有機酸在水與有機溶劑間之分佈	酸鹼、滴定、有機
12	C26 再結晶與熔點測定	溶液、共熔點
13	C27 層析法	薄層及管柱層析

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

Chemistry Lab. (I) (II) (2014-2015)

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>

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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 Lab (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	C5. Qualitative analysis of cation group 1
5	C6. Qualitative analysis of cation group 2
6	C8. Preparing standard acid and base
7	C9. Using a pH-meter for an acid-base titration
8	C10. The buffer solutions
9	C11. Heat of reaction
10	C12. Quantitative analysis of vitamin C
11	C13. Determination of solubility product constant of silver acetate
12	C16. Spectrophotometric analysis of cobaltous ions
13	C20. Preparation of alum from aluminum can

Chemistry Lab (II)

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