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**Department of Chemistry**

**College of Science**

**University of Salahaddin**

**Subject: Analytical Chemistry**

**Course Book – *2ndYear***

**Lecturer's name: M.Sc. Bery Muhammed Rahman**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **Statistics and gravimetric analysis- practical** | | |
| **2. Lecturer in charge** | **Bery Muhammed Rahman** | | |
| **3. Department/ College** | **chemistry/ College of Science** | | |
| **4. Contact** | **e-mail: bery.rahman@su.edu.krd** | | |
| **5. Time (in hours) per week** | **Practical: 16 hours (Sunday and Monday)** | | |
| **6. Office hours** | **Wednesday: 8:30 – 12:30**  **Thursday: 8:30 – 12:30** | | |
| **7. Course code** |  | | |
| **8. Teacher's academic profile**  **Academic achievements and Qualifications: (starting from the most recent degree)**   |  |  |  |  | | --- | --- | --- | --- | | From- To | Degree | College-University | Country | | 2011-2015 | M. Sc. in Analytical Chemistry, Department of Chemistry | College of Science- University of Salahaddin | Iraq | | 2003-2007 | B.Sc. Chemistry, Department of Chemistry, | College of Science- University of Salahaddin | Iraq |   **Experiences: (starting from the most recent position), please mention Year, Position and Place**   |  |  |  |  | | --- | --- | --- | --- | | From- To | Post | Department -College | University | | 2015-present | Assistant Lecture | Geology Department-College of Science | Salahaddin University | | 2017-present | Assistant Lecture | Environmental science Department-College of Science  +Biology Department-College of Science | Salahaddin University | | 2018-present | Assistant Lecture | Chemistry Department-College of Science +Geology Department-College of Science | Salahaddin University | | 2019-present | Assistant Lecture | Environmental science Department-College of Science | Salahaddin University | | 2020- present | Assistant Lecture | Chemistry Department-College of Science | Salahaddin University | | 2021-present | Assistant Lecture | Chemistry Department-College of Science | Salahaddin University | | 2022 -present | Assistant Lecture | Chemistry Department-College of Science  +physic department -college of science | Salahaddin University | | 2023 -present | Assistant Lecture | Chemistry Department-College of Science | Salahaddin University | | | | |
| **9. Keywords** | **Analytical chemistry, Quantitative Analysis, Gravimetric analysis** | | |
| **10. Course overview:**  This course describes the specific steps of gravimetric analysis, including preparing the solution in proper form for precipitation, the precipitation process and how to obtain the precipitate in pure and filterable form, the filtration and washing of the precipitate to prevent losses and impurities, and heating the precipitate to convert it to a weighable form. It gives calculation procedures for computing the quantity of analyte from the weight of precipitate. It also provides some common examples of gravimetric analysis. The course provides fundamental principles of analytical chemistry, the correct procedure to handle, analyze, interpret and calculate experimental analysis. | | | |
| **11. Course objective:**  The student should take all explanation about Gravimetric Methods of Analysis, Types of Gravimetric Methods, and Steps of a gravimetric analysis: precipitation, digestion, filtration, washing, drying, weighing, and calculation. | | | |
| **12. Student's obligation**  For each course the students are required to do at least one exam for practical course besides other assignments. For every experiment the student must prepare full text paper which includes theory, calculation and discussion. All exams have marks, Full report also has marks, Quizzes also have mark, Activities in Lab. seminar and working count marks and mark for attendance too. | | | |
| **13. Forms of teaching**  Our lecture is depending directly on showing the strong point in the lecture via data show depending on the power point program. More explanation and calculation with students by using white broad. | | | |
| **14. Assessment scheme**  Exams have 12 marks, seven marks on the reports, seven marks on the quizzes, six marks on the seminar and three marks on the activity.  **Theory / practical exam : 15%**  **Classroom participation and assignments 20%**  **Which distributed as follows?**  **Report: 7%**  **Quiz: 7%**  **Seminar: 6%**  **Final Mark: 35% for practical.** | | | |
| **15. Student learning outcome:**  Analytical chemistry plays a very important role in the chemistry field, all student after graduate they working in some labs, industrial companies, hospitals and in all these institution they need principles of analytical chemistry and they use all assessment of data. For this reason analytical chemistry is exists in all four stages in our department. Now if we see all labs which are randomly distributed in our community all of them are depending on analysis the samples which came from different sources. | | | |
| **16. Course Reading List and References‌:**  1. Analytical Chemistry by Gary D. Christain, 5th edition  3. Fundamentals of Analytical Chemistry by Douglas A. Skoog  4. Quantitative Chemical Analysis by Kolthofe- Sanell  5. Modern Analytical Chemistry by David Harvey  6. Principles and Practice of Analytical Chemistry, F.W. Fifield  7. Validation and Qualification in Analytical Laboratories, Ludwig Huber  8. A Text Book of Quantitative Analysis; By: Vogel.  9. Quantitative Chemical Analysis; By: Kolthoff.  10. Quantitative Analysis; By: Alexeyev. | | | |
| **17. The Topics:** | | **Lecturer's name** | |
| ***First course program***  -Introduction of gravimetric analysis.  -Explanation of main concepts in G.A  -Gravimetric determination of water of hydration in crystallized CuSO4.5H2O or BaCl2.2H2O.  - Gravimetric determination of Water of Hydration in crystallized substance (Unknown)  -Gravimetric determination of hygroscopic water in hygroscopic substances.  -Gravimetric determination of Sulphate as barium sulphate (BaSO4)  -Gravimetric determination of Sulphate as barium sulphate (unknown)  -Gravimetric determination of Chloride as silver chloride  -Gravimetric determination of Chloride as silver chloride (unknown)  -Gravimetric determination of fluoride as lead chlorofloride.  -Gravimetric determination of fluoride as lead chlorofloride (unknown).  Gravimetric determination of Calcium as calcium oxalate.  *-*Gravimetric determination of Calcium as calcium oxalate (unknown).  **-Seminar**  **-Lab Examination**  **Second course program**  -Gravimetric determination of Cobalt.  Gravimetric determination of Cobalt (unknown)  Gravimetric determination Copper.  Gravimetric determination Copper (unknown).  Gravimetric determination of Bismuth.  Gravimetric determination of Bismuth (unknown).  Gravimetric determination of Lead (Pb)  Gravimetric determination of Lead (Pb) (unknown).  Gravimetric determination of Nickel  Gravimetric determination of Nickel (unknown).  Gravimetric determination of Molybdenum  Gravimetric determination of Molybdenum (unknown)  Gravimetric determination of Aluminium  Seminar  **Lab Examination** | | | M.Sc. Bery Muhammed Rahman      Week 1  Week 2  Week 3  Week 4  Week 5  Week 6  Week 7  Week 8  Week 9  Week 10  Week 11  Week 12  Week 13  Week 14  Week 15  Week 1  Week 2  Week 3    Week 4    Week 5  Week 6  Week 7  Week 8  Week 9  Week 10  Week 11  Week 12  Week 13  Week 14  Week 15 |
| **18. Practical Topics (If there is any)** | |  | |
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| **19. Examinations:**  **Q1**- Complete the following?   1. Allowing the precipitate at room temperature or heating to stand in contact with the liquid that formed in it, to obtain complete precipitation is called \_\_\_\_\_\_\_\_\_\_\_\_\_. 2. The solubility of the precipitate can be minimizing by\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a chemical compound of salt that contains water,   example\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .   1. The water present in Ca(OH)2 is the type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . 2. The precipitate form of chloride is \_\_\_\_\_\_\_\_\_\_ in the determination of chloride by precipitation gravimetry. 3. : Is the process of pouring the liquid above the precipitate through the filter to increase filtration rate.   Q2- Give the reason for the following with a suitable equation if found:  1- Adding a large excess of Ag+ in the gravimetric determination of chloride is avoided.  2- The gravimetric determination of sulfate is performed in acidic medium.  Q3- Naturally occurring gypsum is a hydrated salt calcium sulphate  CaSO4.XH2O. A 67.5gm sample of gypsum is heated in a crucible until a constant mass is obtained. The mass of anhydrous salt (CaSO4) was found to be 53.4gm, calculate   1. The percent by mass of water in the gypsum sample 2. What is the formula of gypsum | | | |
| **20. Extra notes:** | | | |
| **21. Peer review** | | | |