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**Department: Chemistry**

**College: Education**

**University: Salahaddin**

**Subject: Practical Coordination Chemistry**

**Course Book:**

**Lecturer's name: Dr Salim NA Saber**

**Academic Year: 2024 - 2025**

**Course Book**

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| **1. Course name** | Practical Coordination Chemistry | |
| **2. Lecturer in charge** |  | |
| **3. Department/ College** | Chemistry / Education | |
| **4. Contact** | Salim.saber@su.edu.krd | |
| **5. Time (in hours) per week** | 2/w | |
| **6. Office hours** | 3/w | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | My principal research interests lie in the field of biochemistry and the synthesis of bioactive metal complexes. I am currently investigating the anti-oxidant and anti-cancer drugs which are extracted from plants for my Ph.D. Using the latest separation techniques for purification and GC-MS and 1D, and 2D NMR to detect drug structure | |
| **9. Keywords** | **Coordination Chemistry , Transition metal , Ligand** | |
| **10. Course overview:**  In chemistry, a coordination complex or metal complex, is a structure consisting of a central atom or ion (usually metallic), bonded to a surrounding array of molecules or anions (ligands, complexing agents). The atom within a ligand that is directly bonded to the central atom or ion is called the donor atom. Polydentate (multiple bonded) ligands can form a chelate complex. A ligand donates at least one pair of electrons to the central atom / ion. Compounds that contain a coordination complex are called coordination compounds. The central atom or ion, together with all ligands form the coordination sphere. Coordination refers to the "coordinate covalent bonds" (dipolar bonds) between the ligands and the central atom | | |
| **11. Course objective:**  Classification is an important science process skill. In the interactive simulation, students will classify elements based on their physical and chemical properties. This process is part of a larger realm, which is the unifying concept of systems order and organization. According to The National Science Education Standards, “The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigation can be referred to as 'systems'." The periodic table represents such a system. Systems can be organized into a way that is useful. The standards point out that the “Types of organization include the periodic table of elements and the classification of organisms. Physical systems can be described at different levels of organization-such as fundamental particles, atoms, and molecules | | |
| **12. Student's obligation**  The role of students very important in learning process and they must participate in class activates such questions and answers lecturer should advice students don't absence in the lectures because it reflect on them negativily . Home works are important such as writing report about scientific subjects or doing representation by data show and seminars in class and evaluate the ability of their presentation and personality. The students should attend all the lectures, should pass the final exam and do all the tests and quizzes, should participate in discussion and question and answer activity. | | |
| **13. Forms of teaching**  Using the following means in teaching process . hand out, practical Experiment , Discussions | | |
| **14. Assessment scheme**  Students assessment by doing at least 4 tests during the course and a number of quizzes, Report and home work  ‌ | | |
| **15. Student learning outcome:**   1. Explain the history and Introduction of coordination compound 2. Explain the type of ligand and naming of the complexes 3. Explain the historical development of the periodic table elements, dobrener tried, new land octave, mendeelev 's periodic law. 4. Chemical bonding, types of bonds in chemical and coordination compounds 5. Uses and application of complex compound. 6. Studying the chemical structure, type of hybrid, type of color and geometrical shape of the complex and their chemical reaction. 7. Distinguish between the complexes. | | |
| 1. J.C. Bailer, Jr. (ed.), The Chemistry of Coordination Compounds, Reinhold, New York, 1956. 2. A.A. Grinberg in D.H. Busch and R.F. Trimble, Jr. (eds.), The chemistry of complex compounds, Addison-Wesley, Reading, Mass., 1962. 3. Nomenclature of inorganic chemistry " J.Am. Chem. Soc., 82,5523(1960). 4. T. Moeller, Inorganic Chemistry, Wiley-Interscience, New York, 1952. 5. Kleinberg, W.J. Argersinger, Jr., and E. Griswold, Inorganic Chemistry, Heath, Boston, 1960. 6. F.A. Cotton & G. Wilkin son, Advanced Inorganic Chemistry, Wiley-Inter-Science, New York, 1962 7. Experimental Inorganic Chemistry: by Dr. Issam J.S allomi, College of Education University of Mosul (1982). 8. Coordination Chemistry: by Dr. Issam J. Sallomi, University of Mosul (1980) 9. Experimental Inorganic Chemistry: by Palmar W. (1987). 10. F. Basolo and Ronald C. Johnson, Coordination Chemistry (The Chemistry of Metal Complexes) W.A. Benjamin, INC., 1964. | | |
| **17. The Topics:** | | **Lecturer's name** |
| 1. Week(1): Introduction to Coordination chemistry 2. Week(2):Preparation of tris (acetylacetonato) manganese (III) [Mn(acac)3] 3. Week(3) : Preparation of Potassium trioxalatochromate(III) trihydrate K3[Cr(C2O4)3].3H2O 4. Week(4): Determination of C2O4˭ (oxalate) in K3[Cr(C2O4)3].3H2O complex 5. Week (5): Exam. 6. Week(6): Preparation of Potassium dioxalatodiaquachromate(III) dehydrate Cis- K[Cr(C2O4)2(H2O)2].2H2O 7. Week(7): Preparation of trans-Potassium dioxalatodiaquachromate (III) trihydrate Trans- K[Cr(C2O4)2(H2O)2].3H2O 8. Week(8): Detection of Cis-K[Cr(C2O4)2(H2O)2].2H2O and Trans-K[Cr(C2O4)2(H2O)2].3H2O complex 9. Week(9): Preparation of hexaamminenickel(II) chloride [Ni(NH3)6]Cl2 10. Week(10): Determination of Nickel in [Ni(NH3)6]Cl2 Complex by (DMG) 11. Week(11): Exam. 12. Week(12): Preparation of tris(ethylenediamine)nickel(II) chloride dihydrate [Ni(en)3]Cl2.2H2O 13. Week(13): Preparation of Tetra-amminecopper(II) sulphate.hydrate [Cu(NH3)4]SO4.H2O 14. Week(14): Preparation of hexa-amminecobalt(III) chloride [Co(NH3)6]Cl3 15. Week(15): Preparation of chloropentaamminecobalt(III) chloride [Co(NH3)5Cl]Cl2 16. Week(16): Exam. 17. Week(17): Preparation of nitropentaamminecobalt(III) chloride [Co(NH3)5NO2]Cl isomer. 18. Week(18): Determination of M:L by Mole Ratio Method 19. Week(19): The method of continues variations (Job's Method) for determin ation of Stoichiometry . 20. Week(20): Preparation [Fe(acac)3] complex. 21. Week(21): Determination of ammonia in [Cu(NH3)4]SO4.H2O complex. 22. Week(22): Determination of copper in [Cu(NH3)4]SO4.H2O complex 23. Week(23): Exam . 24. Week(24): Preparation [VO(acac)2] complex. 25. Week(25): Preparation K3[Al(C2O4)3].3H2O complex. 26. Week(26): Study of Cu(II) and EDTA complex formation 27. Week(27): Preparation of Schiffbase complexes with Ni2+, Cu2+ and Mn2+ metal ions 28. Week(28): Azodye complexes with transition metal ions 29. Week(29): Azodye complexes with Ln(III) metal ions 30. WeeK(30): Study Stability constant of [Ln(PAN)3]complex | | Dr Salim NA Saber  **2 hours** |
| **19. Examinations:**  Compositional: In this type of exam the questions usually starts with Explain how, What are the reasons for...?, Why...?, How....? Examples: - Explain the Type of hybrid and geometrical shape of the complex. -Compare between cis and trans isomer. -Distinguish of cis and trans complex by chemical reaction  Calculation the percentage yield of the complexes  Write the definition and naming of the complex  Complete the following reaction  Write three uses of the following complexes  Compare the following complex according to their stability. | | |
| **20. Extra notes:** | | |
| **21. Peer review** | | |