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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 structureconsisting of a central atom or ion (usually metallic), bonded to a surroundingarray 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 donoratom. Polydentate (multiple bonded) ligands can form a chelate complex. Aligand donates at least one pair of electrons to the central atom / ion.Compounds that contain a coordination complex are called coordinationcompounds. The central atom or ion, together with all ligands form thecoordination 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. Thisprocess is part of a larger realm, which is the unifying concept of systems order andorganization. According to The National Science Education Standards, “The naturaland designed world is complex; it is too large and complicated to investigate andcomprehend all at once. Scientists and students learn to define small portions for theconvenience of investigation. The units of investigation can be referred to as'systems'." The periodic table represents such a system. Systems can be organizedinto a way that is useful. The standards point out that the “Types of organizationinclude the periodic table of elements and the classification of organisms. Physicalsystems can be described at different levels of organization-such as fundamentalparticles, 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 ofquizzes, 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, dobrenertried, 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 andgeometrical shape of the complex and their chemical reaction.
7. Distinguish between the complexes.
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| 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 ofcomplex 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.
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| **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 Potassiumtrioxalatochromate(III) trihydrate K3[Cr(C2O4)3].3H2O
4. Week(4): Determination of C2O4˭ (oxalate) inK3[Cr(C2O4)3].3H2O complex
5. Week (5): Exam.
6. Week(6): Preparation of Potassiumdioxalatodiaquachromate(III) dehydrate Cis-K[Cr(C2O4)2(H2O)2].2H2O
7. Week(7): Preparation of trans-Potassiumdioxalatodiaquachromate (III) trihydrate Trans-K[Cr(C2O4)2(H2O)2].3H2O
8. Week(8): Detection of Cis-K[Cr(C2O4)2(H2O)2].2H2O andTrans-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]Cl2Complex 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'sMethod) 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 withNi2+, 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 reactionCalculation the percentage yield of the complexesWrite the definition and naming of the complexComplete the following reactionWrite three uses of the following complexesCompare the following complex according to their stability. |
| **20. Extra notes:** |
| **21. Peer review** |