Department of ……Chemistry….

College of ……Education…

University of ……Salahuddin……

Subject: ……Inorganic Chemistry.....

Course Book – *Stage* 3

Lecturer's name – Nhiyat Hamadamen MSc

Academic Year: 2021/2022

Course Book

1. Course name	**Inorganic chemistry**
2. Lecturer in charge	**Nhiyat Hamadamen Hassan**
3. Department/ College	**Chemistry / education**
4. Contact	**e-mail:** nhiyat.hassan@su.edu.krd **Tel: (optional)**
5. Time (in hours) per week	**Theory: 18**
6. Office hours	**Wednesday 8.5-12.5**
7. Course code	
8. Teacher's academic profile	**Name : Nhiyat Hamadamen Hassan** **Permanent Address /** Chemistry Department, Faculty of Education – Science Departments, University of Salahaddin , Erbil, Iraq Mobil: + 9644774926 E-mail: nhiyat.hassan@su.edu.krd Nationality: Iraqi Date of Birth: 22-2-1985 Marital Status: Married, with 2children **Education** 2007 : B.Sc. General Chemistry, College of Education ,University of Salahaddin, Erbil, Iraq 2014 : M.Sc Inorganic Chemistry, Title of Theses: Synthesis ,and characterization of some complexes of bis(2-mercaptobenzimidazole) mercury (II) whith Ni(II),Pd(II) ,Ag(I) ,Pt(II) ,Pb(II)and their adducts ,University of Salahaddin, College of Education . Erbil, Iraq.

	Positions Held : 2008-2012: Chemistry Assistant at Chemistry Department, College of Education University of Salahuddin, Erbil, Iraq. 2014: M.Sc. University of Salahuddin, Erbil, Iraq 2014-2017: Demonstrator, Chemistry Department, College of Education University of Salahuddin, Erbil, Iraq . **Teaching Experience** • Practical Inorganic Chemistry, to 2nd year B.Sc. students. • Practical Inorganic Chemistry, to 3rd year B.Sc. students. • Teaching application, to 4th year B.Sc. • Practical Analytical Chemistry, to 1rst year B.Sc. students. **Other activates:** 1- Member of different comities in the College. 2- Leader of absent committee. 3- keeper laboratory in chemistry department
9. Keywords	**Coordination complex, Preparation, Geometrical shape, uses and application**

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.

-Naming coordination Compounds

- ***Geometrical Isomer***

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.

Dmitri Mendeleev was the first scientist to create a periodic table of the elements similar to the one we use today. You can see Mendeleev's original table (1869). This table showed that when the elements were ordered by increasing atomic weight, a pattern appeared where properties of the elements repeated periodically. This periodic table is a chart that groups the elements according to their similar properties The periodic table helps predict some properties of the elements compared to each other.

12. Student's obligation

The role of students very important in learning process and they must participate in class activites such quations and answers lecturer should adivice 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 datashow and seminers 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

Studentes 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 trid, 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.

16. Course Reading List and References:

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**
Week(1): Introduction to Coordination chemistry Week(2):Preparation of tris (acetylacetonato) manganese (III) $[Mn(acac)_3]$ **Week(3) :** Preparation of Potassium trioxalatochromate(III) trihydrate $K_3[Cr(C_2O_4)_3].3H_2O$ Week(4): Determination of $C_2O_4^{=}$ (oxalate) in $K_3[Cr(C_2O_4)_3].3H_2O$ complex Week (5): Exam. Week(6): Preparation of Potassium dioxalatodiaquachromate(III) dehydrate Cis-$K[Cr(C_2O_4)_2(H_2O)_2].2H_2O$	Nhiyat Hamadamen

Week(7): Preparation of trans-Potassium dioxalatodiaquachromate (III) trihydrate Trans-$K[Cr(C_2O_4)_2(H_2O)_2].3H_2O$ Week(8): Detection of Cis-$K[Cr(C_2O_4)_2(H_2O)_2].2H_2O$ and Trans-$K[Cr(C_2O_4)_2(H_2O)_2].3H_2O$ complex Week(9): Preparation of hexaamminenickel(II) chloride $[Ni(NH_3)_6]Cl_2$ Week(10): Determination of Nickel in $[Ni(NH_3)_6]Cl_2$ Complex by (DMG) Week(11): Exam. Week(12): Preparation of tris(ethylenediamine)nickel(II) chloride dihydrate $[Ni(en)_3]Cl_2.2H_2O$ Week(13): Preparation of Tetra-amminecopper(II) sulphate.hydrate $[Cu(NH_3)_4]SO_4.H_2O$ Week(14): Preparation of hexa-amminecobalt(III) chloride $[Co(NH_3)_6]Cl_3$ Week(15): Preparation of chloropentaamminecobalt(III) chloride $[Co(NH_3)_5Cl]Cl_2$ Week(16): Exam. Week(17): Preparation of nitropentaamminecobalt(III) chloride $[Co(NH_3)_5NO_2]Cl$ isomer.	

Week(18): Determination of M:L by Mole Ratio Method Week(19): The method of continues variations (Job's Method) for determin ation of Stoichiometry . Week(20): Preparation $[Fe(acac)_3]$ complex. Week(21): Determination of ammonia in $[Cu(NH_3)_4]SO_4.H_2O$ complex. Week(22): Determination of copper in $[Cu(NH_3)_4]SO_4.H_2O$ complex Week(23): Exam . Week(24): Preparation $[VO(acac)_2]$ complex. Week(25): Preparation $K_3[Al(C_2O_4)_3].3H_2O$ complex. Week(26): Study of Cu(II) and EDTA complex formation Week(27): Preparation of Schiffbase complexes with Ni^{2+}, Cu^{2+} and Mn^{2+} metal ions Week(28): Azodye complexes with transition metal ions Week(29): Azodye complexes with Ln(III) metal ions WeeK(30): Study Stability constant of $[Ln(PAN)_3]$ complex	
18. Practical Topics (If there is any)	
No practical topics	
19. Examinations:	

1. 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

2. Calculation the percentage yield of the complexes

3. Write the definition and naming of the complex

4. Complete the following reaction
5-Write three uses of the following complexes
6-Compare the following complex according to there stability.

20. Extra notes:

21. Peer review

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