



Department ofGeneral Science

College ofBasic education

University of ...Salahaddin.....

Subject: Inorganic chemistry.....

Course Book – (Year 2)

Lecturer's name :Dr. Shahnaz Abdulhamed Hamad

Lecturer's name : Gulkhater Hammad Sharif

Academic Year: 2023/2024

Course Book

1. Course name	Inorganic chemistry
2. Lecturer in charge	Dr. Shahnaz abdulahamid Hamad
3. Department/ College	General Science/Basic education
4. Contact	e-mail: shahnaz.hamad@su.edu.krd Tel: (optional) 07503963751
5. Time (in hours) per week	Theory: 2
6. Office hours	4 hours
7. Course code	
8. Teacher's academic profile	<p>2010 PhD in Medicine, The University of Sydney, Australia</p> <p>The Title of the theses is "New multivalent platinum complexes with a cis - geometry for terminal metal centres"</p> <p>1994 M Sc in Analytical chemistry, University of Salahaddin, Erbil, Iraq.</p> <p>1988 B Sc, University of Salahaddin, Erbil, Iraq.</p> <p>Teaching Experience</p> <ul style="list-style-type: none"> • Undergraduate lecturer, Acid base balance, Discipline of Biomedical Science, The University of Sydney (2009) • Practical undergraduate classes, Discipline of Biomedical Science, The University of Sydney (2007 - 2009) • Assistant Lecturer on Analytical Chemistry, Department of Chemistry Sciences, College of Education, Salahaddin University (1992-1996). <p>Duties: teaching, examination, marking, laboratory supervision and thesis project supervision.</p> <p>Publications</p> <p>(1) Huq F and Al Qassab S. (2007) Molecular modelling and metabolism of Raloxifene, Int. J. Pure and Appl. Chem. 2 204.</p> <p>(2) Hamad, S., Beale, P., Yu, J., Fisher, K., Huq, F. (2012), and Activity of $[\text{Cis-PtCl}(\text{NH}_3)_2]_2\mu\{\text{T}(\text{Hydroxypyridine})_2(\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2)_2\}\text{Cl}_4$ in the Human Tumour Models. Medicinal Chemistry. 8(3), 384-391</p> <p>(3) Shahnaz A Hamad, Philip Beale, Jun Qing Yu, Keith Fisher, Fazlul Huq (2014) Synthesis and activity of three new trinuclear platinum complexes with cis- geometry for terminal</p>

	<p>metal centres, Journal of Biomedical Science. 21:41</p> <p>(4) 4- Shahnaz A Hamad, Philip Beale, Jun Qing Yu, Fa (2014)</p> <p>Synthesis and Antitumour Activity of a New T Platinum Compound[$\{cis-PtCl(NH_3)_2\mu\{trihydroxypyridine\}_2 H_2N(CH_2)_5NH_2\}_2]$ Cl_4 in Ovarian Cancer Cells, ANTICANCER RESEARCH 1930 (2014)</p> <p>Conference participations</p> <p>(1) 14th International Conference on Biological Inorganic Chemistry (ICBIC14) in Nagoya, Japan at July 2009</p> <p>(2) Sydney Cancer Conference 2008 ~ July 24-26, 2008, The University of Sydney</p> <p>(3) The Biennial Health Research Conference 2006 (From Cell to Society), 9th - 10th of November at Blue mountain. Sydney, Australia</p> <p>(4) Faculty of Health Sciences Higher degree Research Students Colloquium, 1-2 December, 2005, Sydney, Australia</p>
<p>9. Keywords</p>	<p>Valence bond theory, quarks, Periodic table and quantum theory and ionization energy</p>
<p>10. Course overview:</p> <p>Inorganic chemistry is the study of the synthesis, reactions, structures and properties of compounds of the elements.</p> <p>This course will be taught in a second semester course for year two, covering the basic concepts in structure, bonding, and properties that underlie the field. The objective of this course is for students to understand how to use valence bond theory, crystal field theory, and molecular orbital theory to describe bonding in inorganic compounds, learn periodic development in redox and acid-base equilibria, and learn the structures of solid elements and simple compounds. Building on this foundation we will develop a conceptual framework for understanding the stability and basic concepts of quantum chemistry. The elements will be discussed according to their position in periodic table, all groups and periods individually. We will also connect the chemistry of inorganic materials to some of their current and emerging applications.</p> <p>By the end of this course the student should know many of the elements in the periodic table and a good back ground of quantum basics. This course will also help students understand the connection between inorganic chemistry and their applications.</p>	
<p>11. Course objective:</p> <p>Students are expected to :</p>	

- Understand the developing atom theory and previous experiments that lead scientists to have knowledge of fundamental substances such as electrons and quarks. including Rutherford , bohr and shrdenger .
- Be able to build molecular orbital diagrams for molecules.
- Use molecular orbital theory to predict molecular geometry for simple triatomic systems
- Reduce molecular structure for several specific systems in terms of orbital overlap and bonding.
- Understand the type of bonding including sigma and π -bonding.
- Develop full knowledge about the periodic table and characterisation of elements.

12. Student's obligation

All students should read ahead for both lectures and labs, and complete all required preparation . The students are expected to attend all the lecturers and have the course hand outs prior to the lecturer .Always they have to be ready for any unexpected tests.

13. Forms of teaching

The course handouts will be provided for student prior to the lecturer, data show and white board will be used.

14. Assessment scheme

— Examination: 2 main exams	
Theory	15marks
— Practical	30marks
— Quizzes, activities	(5.0 marks)
— Final exam	50 theory
— Total marks: (100%)	

15. Student learning outcome:

- By the end of the course, students will be expected to understand full concept of concentration and their types, buffers, titration and their types and indicators ,chromatography, correctly prepare standard solutions and use appropriate calibration methods, be common with the correct use of volumetric glassware to prepare solutions and perform titrations.

All basic analytical chemistry which will be needed to teach chemistry especially for the secondary schools with a good skill in calculation and solving problems .

16. Course Reading List and References:

- 1- Basic inorganic chemistry, by F.Albert cotton
- 2- Advanced inorganic chemistry by Cotton and wilkinson
- 3- Coordination chemistry by Fred basolo

Scientific webs and journals

17. The Topics:	Lecturer's name
<p>Course content by the weeks:</p> <ol style="list-style-type: none"> 1- Atomic structure and valency, Present atomic theory development of the atomic theory, 2- Bohr theory for hydrogen atom, Rutherford model 3- Valence bond theory, valency of carbon atom, types of bonds 4- Energy levels in atom, Dalton's theory ,Structure of electron shell, Schrodinger equations charge cloud distribution 5- Fundamental particles, Quarks, hadrons, mesons 6- .Hybridization : definition, types , Sp ,SP2 , SP3, SP3d, with examples 7- Molecular orbital theory, multiple bonding , electron deficiency. 8- Quantum number: definition of quantum numbers, the basic number(n),orbital shape number(l), magmatic direction number(m), electron spin number(s) .Applications on quantum numbers 9- Physical picture of atomic orbitals, Geometrical structures of simple inorganic compounds; linear, trigonal and tetrahedral structures. 10- Oxidation states, bonding in the elements 11- .Introduction to the periodic table, Ionization energy and electron affinity, electonegativity. and atomic radii 12- Periodic table: Chemistry of the non transition elements, hydrogen compounds, hydrogen bonding 13- Introduction to the periodic table, Ionization energy and electron affinity, 14- Electonegativity. and atomic radii 15- The types of bonding in the elements , Covalent bonding , ionic bonding and multiple bonding 16- Periodic table: Chemistry of the non transition elements, hydrogen compounds, hydrogen bonding 	<p>Dr Shahnaz/ 2hours Per week</p> <p>1st week</p> <p>2nd week</p> <p>3th week</p> <p>5th week</p> <p>6th week</p> <p>7th week</p> <p>8th week</p> <p>9th week</p> <p>10th week</p> <p>11th week</p>

17- First, second, Third, Groups in periodic table ; their specification and chemistry	12 th week
18- The elements of Group 15, Chemistry of nitrogen compounds	13 th week
19- The elements of 16, Chemistry of oxygen compounds	14 th week
18. Practical Topics (If there is any)	
1-Course book	Lecturer's name: Gulkhater Hammad Sharif Week 1
2-Refining Crude Table salt (NaCl)	
3- Separation of ions	Week 2 , 3
4-Determination of $K_2Cr_2O_7$ Solubility in Water at Different Temperatures	Week 4
5- Preparation of Copper (I) Chloride (CuCl)	Week 5
6-Preparation of Copper (I) Iodide(CuI)	Week 6
7-Determination of Equivalent Weight of Zinc(Zn)	Week 7
8-Preparation of Chromium alum(Double salt) $KCr(SO_4)_2 \cdot 7H_2O$	Week 8
9- Hardness of Water	Week 9
10- Determination of Total Hardness of Water	Week 10
11- Determination of Permanent Hardness of Water	Week 11, 12
19. Examinations:	
1- fill out the blanks:	
a. _____ ligand has two groups available for coordinate covalent bonding	

2 . Answer the following :

a- Write electron configuration of C(atomic number is 6) and Describe the type of hybridization of ethylene CH₂=CH₂

3.. Write the reasons behind each of the followings :

a- Why is the ionisation energy increases crossing the periodic table?

20. Extra notes

21. Peer review