

**Department of Geology**

**College of Science**

**University of Salahaddin-Hawler**

**Subject: Geochemistry (Practical)**

**Course Book – *Fourth year* (Year 4)**

**Lecturer's name: Dr. Awaz Kareem Rasul.**

 **Zhin Saaeb (M. Sc)**

**Academic Year: 2022/2023**

Course Book

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| 1. Course name | Practical Geochemistry |
| 2. Lecturer in charge | Dr.Awaz Kareem Rasul |
| 3. Department/ College | Geology -Science |
| 4. Contact | **e-mail: awaz.rasul@su.edu.krd****Tel: 07504496509** |
| 5. Time (in hours) per week  | Theory: 2 Practical: 3  |
| 6. Office hours | Availability of the lecturer to the student during the week |
| 7. Course code |  |
| 8. Teacher's academic profile  | Graduated at the Department of Geology, Salahaddin University/ Coll of Science (1991-1992). \* Worked as an assistant at the Salahaddin University/ College of Science (1993-1994)).\* M.Sc. student in geochemistry at the Salahaddin University, (2002-2003). Thesis title “Geochemistry study of recent sediments of Greater Zab River, Kurdistan Region- NE Iraq”.\* Ph.D. student and Teaching at the Salahaddin University, (2012-2013). Thesis title “Hydrochemistry and Geochemistry of recent sediments of Lesser Zab River and Dokan Resevoir, Kurdistan Region-NE Iraq”.\* During my work I carried out three of published researches and scientific reports. \* From 1993 till now I gave many courses in the Department of Geology such as Rock Forming Mineral, Crystallography, Geochemistry and theory of General Geology in Agriculture college. |
| 9. Keywords | General Geology |
| 10. Course overview: Desired Course Outcomes:1.The student should be able to define the main topics of Geochemistry. 2.The student should be able to identify and understand the chemistry of the natural world and the chemical evolution of the Earth.. 3.The student should know what is the thermodynamics and thermal equilibrium and *also the* Laws of thermodynamics, Entropy, Enthalpy, Gibbs free energy and reaction curve.4.The student should be able to know how Calculate hypothetical that salt combination from water analysis. And to find out the Ca/Mg ratio in carbonate rocks and in water or any solution.5.The student should be know the Radioactive isotope geochemistry and using it for different purpose.6. The student should be know the principle of Geochemical exploration - kinds of exploration Geochemistry.7. The student should going to field for collecting Samples of soil to apply Statistical of data.and determine the S-shape, Background, anomaly and Threshold. Forms of Teaching:Different forms of teaching will be used to reach the objectives of the lecture: power point presentations for main topics and definitions and summary of conclusions, different method of geochemistry and any other illustrations, besides worksheet will be designed to let the chance for practicing on several aspects of the course in the classroom, There will be classroom discussions and the lecture will give enough background to translate, solve, analyze, and evaluate problems sets, and different issues discussed throughout the course.To get the best of the course, it is suggested that you attend classes as much as possible, read the required lectures, teacher’s notes regularly as all of them are foundations for the course. Lecture’s notes are for supporting and not for submitting the reading material including the handouts. Try as much as possible to participate in classroom discussions, preparing the assignments given in the course.The core materials of the course consists of the above books, articles from media and internet, and lecture’s notes, make sure you read all the materials and prepare well before going for the exams. Students are encouraged to search for any other materials that may help improve their English language ability in reading and writing Total Grading of Course: practical exam: 35% (Quizzes 5% and preparation laboratory and attendance: 10% Effort/participation/: 5% , the exam:15%) Theoretical exam: 15%Final theoretical exam: 50%  |
| 11. Course objective:: The studying of this course, the students will be able to understand the geochemistry of the elements that are represented in the periodic table. Chemical characteristic and distribution of these elements in the lithosphere, is the aim for understanding the element. The other part of the course will be deal with the isotopes (radioactive and stable). The students would be employed this subject in the estimation of the age of the formation of the studied rocks and prediction of the climate during the deposition and in some times the salinity of the water under which the minerals are deposited.  |
| 12. Student's obligation1-Attendance of the lectures.2-Attedance of labs.3 Following the references.4-Preparing reports if asked..  |
| 13. Forms of teaching Different forms of teaching will be used to reach the objectives of the course: power point presentation will illustrate to show the main points like titles and definitions and summary of conclusions, black board to clarify ideas, office work by designing work sheet to solve and analyse geochemistry problems discussions and homework’s , all figures that related to the lectures. Furthermore, sometimes students will be asked to prepare research papers on selective topics, these topics need to be from printed media or internet. There will be classroom discussions at the last ten minutes of the labs. To get the best of the course, it is suggested that you attend classes as much as possible, read the required lectures before the time of lecture, teacher's notes regularly as all of them are foundations for the course. Try as much as possible to participate in classroom discussions.  |
| 14. Assessment schemeThere will be two examination via the course, quizzes some times, in addition the student should be ready for negotiation if asked by the lecturer in both theory or practical classes  |
| 15. Student learning outcome:In the last years many oil companies come to Kurdistan Region for oil exploration and production, in a wide areas along the region, so several geologist are followed these companies and others are work with the geological survey where the mineral resources are available in the region. Some of the students after graduation they employed in water resources companies in public and private sectors.  |
| 16. Course Reading List and References‌:1) White, W.M. 2005, Geochemistry, John Hopkins University Press, 701p.2) Brownlow, A.H., 1979, Geochemistry, Prentice-Hall, Inc., New Jersey, 498p. 3) Krauskopf, K., 1967, Introduction to geochemistry, McGraw-Hill, Inc., New York, 721p. Students are encouraged to search for the Journals and internet that may help them in this course, such as:a) Geochemica et Cosmochemica Acta*.*b) Chemical Geology c) Geochemical exploration4. Geochemistry in Mineral Exploration, 2nd Edition, 1981, New YorkBy: Ross A. W., Hawkes H. E. and Webb J. S.5. Introduction to Exploration Geochemistry, 2nd Edition, 1980, USABy: Levinson A. A. 6. Essentials of Geochemistry, 2nd Edition, 2010, Jones and BartlentBy: Walther J. V. |
| 17. The Topics: Practical Geochemistry | Lecturer's name |
| **Week Subject and Reading** | Dr. Awaz Kareem and Zhin Saaib |
| Week 1: Introduction to thermodynamics (system, phase, components, thermal equilibrium).  Week 2: Laws of thermodynamics, Entropy, Enthalpy, Gibbs free energy and reaction curve.Week 3: Quiz for lab 1 and 2; Relative mobility of elements. Week 4: Calculation of hypothetical salt combination from water analysis.Week 5: Calculation of insoluble residue (I.R. %) by practical method. Week 6: Quiz for lab 3 and 4; Calculation of Ca/Mg ratio in water by EDTA method.  Week 7: Calculation of Ca/Mg ratio in carbonate rocks by EDTA method. Week 8: Calculation of K and Na by using flame photometer.Week 9: Quiz for lab 7 and 8; radioactive isotope geochemistry (Rb-Sr system).Week 10: Radioactive isotope geochemistry (U-Pb system)Week 11; Radioactive isotope geochemistry (K-Ar system).Week 12: Practical midterm examination.Week 13: principle of Geochemical exploration - kinds of exploration Geochemistry Week 14: Principles of trace analysis, dispersion and mobilityWeek 15: Going to field for collecting SamplesWeek 16: The procedure of samples analyzed.Week 17: Decomposition of samples.Week 18: Statistical representation of data.Week 19: determine the S-shape and BackgroundWeek 20: Determine the anomaly and Threshold.Week 21: Assessment soil pollution of the soil Week 22: writing the ReportWeek 23:Presentation of the report. Week 24:Second practical exam. |  |
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| 20. Extra notes: |
| 21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ Assistant Prof. Dr. Hikmat Safi and Prof Dr. Faraj Tobia  |