

Exploration Geochemistry

Course Syllabus

Course code: 27040400

Student Targeted at: Geology and Resources Exploration Engineering

Duration: Four years

Credit: 2

I. Course description & Aims

Exploration geochemistry is a compulsory course for geology and resources exploration engineering. Its aim is to introduce, on the basis of the knowledge and basic theory of geochemistry, the geochemical principle, method, technology, application conditions, the effects of exploration, and the work results of geochemical anomaly interpretation evaluation so that students will be able to apply it to predict concealed deposits in the mineral exploration. Meanwhile, this course also introduces the application of geochemical data to the agriculture, environment, oil and gas etc.

II. Basic Requirements

The aim of this course is to enable students to systematically master the basic principles and methods of exploration geochemistry. By learning of this course, students should be able to apply it to carry out the effectiveness of this method, and grasp the method of element analysis and data quality evaluation, and know the data processing and the geochemical mapping, as well as master the method of multivariate anomalistic information selection, circumscribing the geochemical anomalies and anomaly interpretation. And students will be able to finish the medium and small working design.

III. Course Contents

1. Contents

0 Introduction

Chapter 1 Geochemical basic theory

1.1 Geochemical background and anomaly

1.2 The distribution of the element in the crust

1.3 The migration of the elements

1.4 Geochemical indicator and evaluation

Chapter 2 Lithogeochemical survey

- 2.1 Formation of primary halo
- 2.2 Primary geochemical anomaly of the hydrothermal deposit
- 2.3 Axial zonality succession
- 2.4 Primary geochemical anomaly of the magmatic deposit
- 2.5 Application of lithogeochemical survey
- Chapter 3 Pedogeochemical survey
 - 3.1 Soil and the distribution of elements in the soil
 - 3.2 Pedogeochemical prospecting
- Chapter 4 Stream sediment survey
 - 4.1 Formation and development of dispersion train
 - 4.2 Sampling point layout of stream sediment survey
 - 4.3 Application of stream sediment survey
- Chapter 5 Hydrogeochemical survey
 - 5.1 Normal chemical composition in natural water
 - 5.2 Formation of hydrochemical anomaly
 - 5.3 Application of hydrogeochemical survey
- Chapter 6 Gas survey
 - 6.1 Formation of gas anomaly
 - 6.2 Mercury halo
 - 6.3 Other gas anomaly
- Chapter 7 Other geochemical methods and the new methods
 - 7.1 Biogeochemical survey
 - 7.2 Enclosure geochemical method
 - 7.3 Stable isotope geochemical method
 - 7.4 Airborne geochemical method
 - 7.5 Geochemical exploration new method
- Chapter 8 Geochemical investigation working process
 - 8.1 Reconnaissance, experiment and working planning
 - 8.2 Sample layout
 - 8.3 Collection of sample
 - 8.4 The processing of the sample
- Chapter 9 Geochemical sample analysis
 - 9.1 The characteristics of geochemical samples and requirements
 - 9.2 Analytic error and quality control
 - 9.3 Introduction to the main analysis method
- Chapter 10 Data processing and the interpretation of geochemical anomaly
 - 10.1 Data processing
 - 10.2 The interpretation of geochemical anomaly
- Chapter 11 The application of geochemical exploration to the environment, agriculture, oil and gas exploration
 - 11.1 The application of geochemical exploration to the oil and gas exploration
 - 11.2 The application of geochemical exploration to the environment and agriculture

2. Assignments

- (1) Geochemical data processing technique
- (2) The application of exploration geochemistry in mineral exploration

3. Experiments

- (1) Research on the regularity of the primary halo zoning
- (2) Sampling point layout of stream sediment survey
- (3) Quality evaluation of the data for geochemical analysis
- (4) The determination of geochemical background and anomaly threshold
- (5) Geochemical map construction
- (6) Appraisal of geochemical anomalies

4. Practice

Geochemical data processing and map construction for one a week

IV. Schedule

1. Schedule

Lectures	Lecturing Hours				Remarks
	Teaching hour	Lecturing	Experiment	Computer	
Introduction	2	2			
Chapter 1	2	2			
Chapter 2	8	6	2		
Chapter 3	4	4			
Chapter 4	2	2			
Chapter 5	2	2			
Chapter 6					
Chapter 7	2	2			
Chapter 8	4	2	2		
Chapter 9	2	2			
Chapter 10	10	2	8		
Chapter 11	2	2			
Total	40	28	12		

2. Teaching method

on the basis of teaching basic principle and method, the application examples was introduced so as to deepen students' memory and deep understanding, and to make students really be able to use it in practice.

3. Course Evaluation

At the end of this course, students will be evaluated on their classroom participation, experiment results, and the final examination. The formula is: Class participation (10%) + Experiment (20%) + Final test (70%) = Course result (100%).

V. Textbooks & Reference Books

1、Jiang Jingye. Applied Geochemistry, Wuhan: China University of Geosciences Press, 2006 (in Chinese).

2、Wang Chongyun et al. Geochemical Prospecting, Beijing: Geological Publishing House, 1987 (in Chinese).

3、Ruan Tianjian, Zhu Youguang. Geochemical Prospecting, Beijing: Geological Publishing House, 1985 (in Chinese).

4、Han Yinwen, Ma Zhendong. Geochemistry, Beijing: Geological Publishing House, 2003 (in Chinese).

5、Liu Yingjun. Geochemistry of the Element, Beijing: Science Press, 1984 (in Chinese).

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Department Chair:

School Dean: