Environmental Geology

Third class

Environmental Engineering Department

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Lecture 1

References

- 1- Stokes, W. L., and Judson, S., Introduction to Geology Physical and Historical, Prentic-Hall, Englewood Cliffs, N. J., 1968.
- 2- Gilluly, J., Waters, A. C., and Woodford, A. O., Principles of Geology, 3rd ed. San Francisco, W. H., Freman, 1968.
- 3- Dapples, E. C., Geology for Science and Engineering, New York, John Willy and Sons, INC., 1959
- 4- Charles Lyell, Principle of Geology, University of Chicago Press, 1990

Geology

- The Science that deals with the study of the earth. The study comprises:
- 1- Composition of the earth
- 2- Structure of the crust and the earth's interior
- 3- The process operating on and inside the earth
- 4- Evolution of life
- 5- Earth as part of the universe.

The main branches of geology

- 1- Crystallography: Study of crystals and crystalline material as far as external shapes (forms), and internal atomic structure.
- 2- Mineralogy: Study of the physical and chemical properties of the naturally occurring crystalline material. The study comprise the origin of minerals, their occurrence, identification, classification, and economical importance.

The main branches of geology

- 3- Petrology: The science that deals with the study of rocks. It comprise the study of their composition, texture, identification, classification, and occurrence.
- Petrography is a branch of petrology in which rocks are studied microscopically.
- 4- Paleontology: Deals with the study of life of past geological ages. It is based on the study of fossil remains of organisms (both animals and plants).

The main branches of geology

- 5- Stratigraphy: Treats of the formation, composition sequence, and correlation of the stratified rocks (mainly sedimentary) as parts of the earth's crust.
- 6- Structural geology: Study of the structural (as opposed to composition), features of rocks, of the geographic distribution of the features and their causes.
- 7- Dynamic (physical) geology: Deals with the causes and processes of geological changes, above (external), and below (internal) the surface of the earth.

The main branches of geology

- External processes include weathering, transportation, and deposition of material, and internal processes which include earth quakes, volcanoes, structural deformation of the crust, and geomorphology.
- 8- Historical geology: Deals with the history and formation of the rocks in the crust and the evolution of life since the formation of the earth to present.
- 9- Geochemistry: The study of the relative and absolute abundances of the elements in the earth, and the distribution an migration of the individual elements in the various parts of the earth.

The main branches of geology

- 10- Geophysics: A branch of experimental physics dealing with the earth, including its atmosphere and hydrosphere. It includes the science of dynamical geology, and it makes use of seismology, meteorology, oceanography, electricity, magnetism, and other earth sciences in collecting and interpreting earth data.
- Geophysical methods have been applied success fully to the identifications of underground structures of particulate type as for example, those associated with oil reservoirs.

Minerals

- Definition of minerals
- A solid element or compound that has been formed naturally by inorganic processes. Every mineral has a constant composition of elements in definite proportions. Each mineral has a unique crystalline structure that will distinguish it from another mineral even if the two composed of the same element or elements.

Identification of Minerals

- There are many physical properties that may be used for identification of minerals, some of them are:
- 1- Crystal form
- Each mineral has one or more characteristic crystal shape.
- 2- Hardness: Is a measure of the resistance that a smooth surface of a mineral being scratched.
- 3- Specific Gravity

Identification of Minerals

- 4- Color
- 5- Cleavage: Is the tendency of mineral to split (break)
- 6- Luster: The way a mineral look in reflected light
- 7- Streak: The color of the powdered mineral
- 8- Fracture: The way in which a mineral break when it does not have cleavage.
- 9- Transparency: The ability of a mineral to transmit light.
- 10-Other properties: Such as electrical, magnetic, thermal and radioactive properties.