Geology 4/528
Physical Geochemistry
SpringQuarter 2004

Professor: Dina L. López
210 Clippinger Laboratories
Phone: 593-9435
e-mail:lopezd@oak.cats.ohiou.edu

Office Hours:
Class:

Course Outline

Week	Lecture
1	**1. Contaminants in the environment** 1.1. Definition of contamination 1.2. Basic model of environmental pollution 1.3. Sources of contaminants 1.4. Classification of hazardous substances
2	**2. Transport of contaminants in air** 2.1. Introduction 2.2. Point-source Gaussian model for contaminant transport 2.3. Transport of contaminants from non-point sources 2.4. Indoor air contamination 2.5. Types of reactions for contaminants in the atmosphere
3	**3. Transport of contaminants in water** 3.1. Transport in surface waters 3.2. Transport in groundwaters 3.3. Biochemical processes in water **4. Contaminants in soils** 4.1 Composition and properties of soils 4.2 Sorption processes in sols 4.3 Fate of soil contaminants
4	**5. Inorganic Contaminants** 5.1. Oxidation-reduction reactions 5.2. Eh-pH diagrams. Stability fields 5.3. Metal complexes
5	**6. Non-metalic inorganic contaminants** 6.1. Ozone 6.1.1. Formation and physical properties 6.1.2. The ozone layer

	6.1.3 Diurnal variations of the ozone levels 6.2. Nitrogen oxides 6.2.1 Effect on the environment 6.2.2 Depletion of the ozone layer 6.2.3 Production of acid rain 6.3 Sulfur oxides 6.3.1. Sources 6.3.2. Acidification of surface waters 6.4. Chloride, bromide, arsenic, phosphorus
6	**7. Heavy metals** 7.1 Sources of heavy metals 7.2 Biochemical properties of heavy metals 7.3 Heavy metals in the environment: air, water, soil. 7.4 Examples of heavy metals: Beryllium, Strontium, Barium, Vanadium, Chromium, Cobalt, Nickel, Copper, Zinc. 7.5. Cadmium, mercury and lead.
7	**8. Radioactive contaminants**. 8.1. Types of radioactive emissions 8.2. Chemistry of Uranium 8.3. Thorium and Radium 8.4. Chemistry of Radon 8.5. Diffuse soil degassing of radon 8.6. Tritium
8	**9. Organic contaminants** 9.1. Smoke 9.2. Methane and other hydrocarbons 9.3. Urban pollution 9.4. Organic solvents 9.5. Detergents
9	9.6. Organohalides 9.7. Chlorinated pesticides 9.8. Doxins pollution 9.9. Effects of dioxins 9.10. Organophosphorus and carbamate pesticides
10	**10. Waste disposal and pollution** 10.1.Industrial and municipal waste 10.2. Landfills, composition of landfill leachate and gas

	10.3. Incinerators, gas emissions. 10.4 Long-term problems of abandoned pollution sources

a. List required texts and/or readings

Textbook:
Alloway, B.J. and Ayres, D.C., 1997. Chemical Principles of Environmental Pollution. Blackie Academic and Professional, 2nd Edition, London, 395 p.

Reference Texts:
Fetter, C.W., 1999. Contaminant Hydrogeology. Prentice Hall, New Jersey, 500 p.
Liu, David H.F., and Liptak, Bela G., 2000. Groundwater and Surface Water Pollution. Lewis Publishers, Boca Raton, 150 p.