

COURSE LEARNING OUTCOMES AND OUTLINE

Prefix and Course Number: CHEM 116

Course Title: Reactions: Our Actions and Inactions

Version Date: 9/21/18

Course Learning Outcomes:

After completion of this class the students will be able to:

1. Explain the formation of ions from atoms. Describe, name and discuss the formation of ionic and molecular compounds and compare/contrast their physical and chemical differences.
2. Construct the 3-D arrangement of molecular compounds and examine the correlation of structure to activity of these molecules.
3. Investigate the effects of acids, bases and pH changes on the formation of acid rain.
4. Discuss how the physical and chemical properties of gases cause climate change and environmental health hazards.
5. Describe and critique the role the different families of organic compounds play in our world.
6. Examine nuclear reactions and identify their effect on humans and the environment.
7. Research, investigate, examine, critique various topics associated with the interaction of the chemical compounds/reactions discussed above with the world in general, such as:
 - a. Heavy Metals in Water Bodies
 - b. Climate change
 - c. Plastics and Polymers on land and oceans
 - d. Pharmaceutical Drugs in Humans and in Fish
 - e. Food Additives
 - f. Pesticides and Herbicides
 - g. Air Pollution, indoor and outdoor
 - h. Nuclear Reactions Pollution

Course Outline:

1. Introduction: Chemistry as a basic science
2. Discovery and constitution of the atom
3. Elements, Periodic table, Electronic Configuration, electromagnetic spectrum
4. Formation of metal cations and anions: Environmental impact and health issues of heavy metals being present in all water bodies.
5. Ionic compounds. Electrolytes.
6. Molecular compounds; the correlation of the three dimensional shape of molecular compounds to climate change and human body. The value of the water molecule for life.
7. Acids and Bases, pH, formation of acid rain.
8. Gas laws. Greenhouse gases, airborne particulates, ozone layer, gaseous contaminants,
9. Introduction to basic Organic chemistry and its role in the environment.
Petroleum related products such as,
 - a. Polymers; their detrimental impact on the environment, animals and humans, (plastics, rubber, motor oil, jet fuels, gasoline).
 - b. Pesticides ,Herbicides devastating effects on plants ,animals and humans.
 - c. Pharmaceutical drugs, toxicity to humans, animals and fish.
 - d. Paints
 - e. Fuel oils and Oil spills
 - f. Flame retardants
 - g. PCBs polychlorinated biphenyls
10. Basic Principles of electrochemistry. Disposal of batteries and their toxicity.
11. Nuclear chemistry; Nuclear power plants, thermal pollution, nuclear waste, nuclear medicine, nuclear weapons, nuclear accidents and their impact on our world.