

## School of Chemistry

### Aims and Objectives: Session 2023-2024, Semester 1

#### Module CH1301: The Impact of Chemistry

**Course Title:** Chemistry and the Environment

**Duration:** 8 hours

**Lecturer:** Professor J. T. S. Irvine

**Aims:** To examine the impact that chemistry has on the environment.

**Objectives:**

1. **Principles.** Know what environmental chemistry covers, what an environmental chemist does and to know about related fields, and the history of environmental science. Understand the concepts of reservoir, source and sink for an environmental cycle, including being able to calculate the Residence Time for a chemical substance in the environment. Understand that persistence determines whether local vs. global pollution and to know of the types of pollutant and how they are controlled.
2. **Analytical Chemistry.** To be familiar with the broad principles of the analytical methodologies for measuring contaminant concentrations. To understand the different ways of defining concentration in different phases.
3. **Hydrological cycle and acid rain.** Know about the Hydrological cycle. Calculate the low residence time for water vapour in atmosphere and hence show that acid rain effects are regional not global. Calculate pH of rainwater for CO<sub>2</sub> saturated water in contact with air. Know of the effects of acid rain in poorly-buffered lakes, e.g. causes release of Al<sup>3+</sup> (affects fish gills) and also heavy metals. Suggest ways in which NO<sub>x</sub> and SO<sub>2</sub> can be removed from car exhausts and/or power station chimneys.
4. **Shale oil and gas.** Past, present and future.
5. **Recycling.** To know about how we deal with waste, landfill and incineration, recycling of metal, glass, paper, plastics, designing a recyclable product. Biomass Energy.
6. **Indoor pollution.** Know the origins and dangers of: formaldehyde, NO<sub>2</sub>, CO (and how to monitor it), passive tobacco smoking, in particular PAHs. Know the structure of asbestos and its hazards, where radon comes from and why it is hazardous to health.
7. **Our influence on the atmosphere.** Ozone holes, global warming and smog. Global perspectives