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## Environmental chemistry education: Beyond the horizon of present knowledge

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### Abstract

Paper describes approach for consideration by chemistry departments to promote environment chemistry beyond chemistry, particularly when interest in science education is gradually declining among the students. Other than development of a vision of education in environmental chemistry the challenge lies in taking chemistry out of the laboratory and showing the students its importance in the world around us. This is true as environmental chemistry is nothing but interface between chemical behavior of the atmospheric, hydrological and terrestrial systems and human activity. It should not be confused with green chemistry which seeks to reduce potential pollution at its source. Popularization by way of rich examples in course contents on how pollutants behave in environment and have an impact on humans can be a way forward. This approach will help students understand, how they can apply their chemistry education to the principles and practices of environmental and industrial control thus enhancing their carrier-prospective.

**Keywords:** Pollutants, environmental education, human activities, redesign chemistry curriculum, sustainable environment

### 1. Introduction

What is Environmental Chemistry?

It is the interface between chemical behavior of the atmospheric, hydrological and terrestrial systems and human activity.

It can be defined as the study of the sources, reactions, transport, effects, and fates of chemical species in the air, soil, and water environments; and the effect of human activity on these. Many chemicals are used to improve the quality of our lives, however some chemicals are toxic and their harm to the environment and our health far outweighs their benefit to the society. Environmental chemistry is an interdisciplinary science that studies the behavior of pollutants with respect to their environmental fate and effects on the environment. It should not be confused with **green chemistry** which seeks to reduce potential pollution at its source. Guiding us through the chemical composition of the three key environmental systems - the atmosphere, hydrosphere, and terrestrial environment – it can explain the chemical processes which occur within and between each system. Focusing on general principles, students are to be introduced to the essential chemical concepts which underpin an understanding of the air, water, and soil and how they behave.

When interest in science education is gradually declining among the students talking about advances in science subjects becomes irrelevant. Other than development of a vision of education in environmental chemistry the challenge lies in taking chemistry out of the laboratory, and shows the students its importance in the world around us.

**2. Popularization by way of rich examples in course contents on how pollutants behave in environment and have an impact on humans can be a way forward. These can include e.g.:**

- Heavy metal contamination of land by industry. These can then be transported into water bodies and be taken up by living organisms.

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- Nutrients leaching from agricultural land into water courses, which can lead to algae blooms and eutrophication.
- Urban runoff of pollutants washing off impervious surfaces (roads, parking lots, and rooftops) during rain storms. Typical pollutants include gasoline, motor oil and other hydrocarbon compounds, metals, nutrients and sediment (soil).
- Making students aware of various environment issues such as global warming, greenhouse effect, rise in sea water level, improper monsoon, ozone layer depletion, acid rain etc.
- It is also important to make the students familiar with municipal waste and recycling programs so that proper disposal of harmful products such as batteries and plastics can be done.

### 3. There can be ample interesting case studies in and around our cities-



- Impact of drinking water high in arsenic content
- Urban run-off over such polluted surfaces contaminate our natural resources
- Air Pollution from industrialisation
- Leachate from unauthorized solid waste dumps is a potential source that can pollute ground water

Need of the hour is to take students out of class-room and revisit our curriculums to new trends.



In this way environmental chemistry can be an exciting field which combines knowledge and expertise of many streams viz. analytical instrumentation, computers, electronics, biology, sociology, law and of course management and chemistry. Students will be encouraged to take the lead in creating new environmental awareness.

### 4. Conclusions

Environment issues cannot be solved with the application of science and technology alone. Young minds need to be taught the actual correlation between all sciences to bring meaningful progress towards global sustainable development. Wherever possible, strategies for reducing consumption of energy and material and greater use of renewable resources should be incorporated in design and construction. By shifting polluting manufacturing units from rich developed countries to poor developing countries does not resolve the problem of pollution. Therefore the students at grass root level must be empowered with essential knowledge to face these challenges. Many scientists have recommended teaching chemistry in the context of real world issues. Providing environmental chemistry education will help students understand, how they can apply their chemistry education to the principles and practices of environmental and industrial control thus enhancing their carrier prospective and help revive their interest in science education

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