**Lesson Plan: Lecture 21**

**Introduction to Toxicology**

**Description**

This lecture introduces toxicology. Students will learn different toxicology terms, including definition, types of toxic compounds, and factors influencing toxicity. At the end of the lecture, students will revise potential toxicology endpoints to molecular features which are derived from the periodic table. In addition to periodic table trends, the lecture also introduces the concept of pKa and links it to a skin irritation through the class activity.

**Prior to Lecture**

Required Readings:

* Anastas, Paul T.; Warner, John C.; “Green Chemistry: Theory and Practice”; Oxford University Press: Oxford, 1998, Chapter 5.

Videos:

* [Toxicology - Toxic Substances](https://youtu.be/aw0_neqg3Eo)
* [Toxicology](https://youtu.be/X5x-RXLoLNU)
* [Dose and Exposure](https://youtu.be/LBk6y7aM7js)
* [Toxicology - Toxicity Categories](https://youtu.be/AJ9OvAqTjI0)
* [Toxicology - Factors Affecting Toxicity](https://youtu.be/ayOIWXTOheQ)
* [Toxicology – Chemical Interactions](https://youtu.be/YhCD_FGFCXA)
* [Concepts in Toxicology (optional)](http://www.webpages.uidaho.edu/etox/lectures/lecture03/index.htm)

**Topics to Cover in Lecture**

* Toxicology definition
* Toxicity types
* Factors affecting chemical toxicity
* Toxicology and the periodic table

**Class Exercise**

Relationship Between pKa and Skin Irritation:

This exercise links the chemical structure to pKa and a skin irritation potential. It requires students to look up data in the Berner et al., as well as seek SDS data sheet of the selected acids and bases. The activity can be shortened depending on the time available. Example SDS for nicotine is provided.

Module 1 Aqueous and Lipid Solubility (optional)

This exercise introduces other parameters such as log P and Kow and links them to solubility in water and lipids, and therefore penetration through the membranes. It also uses examples of a chemical class called Polychlorinated biphenyl's (PCB's) that were manufactured and used mainly as flame-retardant lubricants in the U.S. until they were banned by Congress in 1979. Students are asked to rank these PCBs based on Kow values.