Title: Chemicals in Oil

By Jim Lokken

Theme: Crude oil contains many chemicals that make it both useful and dangerous.

Objectives:

- Students will identify chemicals found in crude oil.
- Students will become familiar with the Merck Index for chemicals.

Duration: 25-35 minutes

Age Range: 7th-12th

Materials:

- Merck Index Booklets
- Notebooks or paper
- Pencils
- Gum drops
- Toothpicks

Background:

Chemicals are everywhere. They are in the smallest villages and the biggest cities. They are used in many jobs; sometimes they are dumped or left lying around. Many cause no health problems, but others are poisonous or carcinogenic (cause cancer) or are very flammable or corrosive. It is important for students and adults to understand the chemicals around them and their dangers. Use the MERCK INDEX, the chemist's dictionary which can be found in every library in the state of Alaska.

Introduction:

Explain to students that chemicals are everywhere. They are in the smallest villages and the biggest cities. They are used in many jobs; sometimes they are dumped or left lying around. Have students brainstorm some of the chemicals they encounter frequently at home, work, play, and school.

Explain that many chemicals cause no health problems, but others are poisonous or carcinogenic (cause cancer) or are very flammable or corrosive. It is important for students and adults to understand the chemicals around them and their dangers.

Bring out the MERCK INDEX, which can be found in local libraries across the state.

Explain that North Slope crude oil contains hundreds of different chemicals. When refined, the crude oil is be separated into different fractions (component parts of the mixture) and each of these fractions contains different types of chemicals, but crude oil may contain many, if not all, of the chemicals found in the fractions. To become familiar with the Merck Index and the toxicity of crude oil, have students look up the following chemicals found in oil and write down a description of the dangers associated with them.

hexane

naphthalene

toluene

benzene

ethylbenzene

xylene

All of these chemicals are hydrocarbons, made up primarily of Carbon and Hydrogen; some also contain Oxygen and Nitrogen. Have students construct a gum drop and toothpick model of at least one of these chemicals. The molecular structure of these chemicals is included in the Merck Index or can be searched easily online at https://www.rsc.org/Merck-Index/.

Wrap-Up:

Discuss the dangers of these chemicals with students. Which is the most dangerous? What petroleum products are that chemical used in? Ask students if they have ever encountered these chemicals in their lives. How does it make students feel to know that these useful chemicals are also potentially dangerous? Have students brainstorm a list of ways to reduce their exposure to these chemicals.

Evaluation:

Assess student notebook entries for completeness, neatness, and accurate work by comparing them with the official Merck Index entries. Evaluate molecular models for accuracy.

Chemicals In Oil

Concepts of Physical Science: Students develop an understanding of the concepts, models, theories, universal principles, and facts that explain the physical world.

SB3 Students develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems.

The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by:

[8] SB3.2 exploring through a variety of models (e.g., gumdrops and toothpicks) how atoms may bond together into well defined molecules or bond together in large arrays

Science and Technology: Students develop an understanding of the relationships among science, technology, and society.

SE1 Students develop an understanding of how scientific knowledge and technology are used in making decisions about issues, innovations, and responses to problems and everyday events.

The student demonstrates an understanding of how to integrate scientific knowledge and technology to address problems by:

[6] SE1.1 recognizing that technology cannot always provide successful solutions for problems or fulfill every human need