Changing in Ohio
5th Grade

Meghan Knapp/Trent Grove

References:

Blast off on Ohio Science, Book 5. Profiles Corporation. 1998

Benchmarks:

SLC 8: Propose and/or evaluate an investigation of simple physical and/or chemical changes.

CPS Benchmark: A) Students will identify physical and chemical changes and compare their properties.

Objectives:

Students will be familiarized with more abstract chemical/physical changes that are directly connected to Ohio. Students will use their knowledge of chemical and physical changes to distinguish these two, even though they may not be familiar with the procedures.

Materials:

- motor oil
- Vaseline
- gasoline
- kerosene
- spoon
- Clear bowl
- Sheet metal
- steel kitchen utensil

Initial Demonstration:

Set out the petroleum based products and ask the students what they have in common.

Target Observations:

- These substance are oily or greasy
- Some students may know they all come from crude oil. If not, tell them.

Target Model:

- Many different products can be made with crude oil.

Procedure:

Have the students describe the properties of crude oil. You may want to remind them of images they might have seen of oil wells or that it was once called "black gold". Basically it is a thick (viscous) black liquid that is flammable. Have the students describe the properties of the products in front of you. What are some of the physical changes they can describe?

Tell the students than a man from Cleveland, William Burton (good time for a map of Ohio, can the students find Cleveland?), invented a process called "cracking". It involves high pressure and temperature. How can the students tell if this is a chemical change or just a physical change? Have the students review their notes on chemical and physical changes.

Students should note that new substances were formed and that they all have different properties than crude oil. See if the process is easily reversible. Try mixing a sample of each product in a bowl to see if you can recombine them to form "crude oil."

We don't know how cracking works. However, we know something about the substances before and after. From this knowledge we can determine that cracking is not easily reversible, and that new substances with new properties are formed. From this information, we can discern that cracking is a chemical change.

Target Revised Model:

- Many different products can be made from Crude Oil. The process to make them, called cracking, is a chemical change.

Procedure:

Show the students a steel kitchen utensil. Ask them if they know what it is made of. (Steel). Ask the students how they would make a utensil such as this one from a lump of steel. (Many will probably say to melt it down and pour it into a mold). Show the students the sheet metal. Assume it is also made of steel. We need sheets like this to make machines and cars and things for factories. How would you make a nice flat sheet like this?

Tell the students that a man named John Tytus from Middletown, Ohio, invented a process for making strips of "rolled steel" that made it much easier and cheaper to make cars. How can we tell if this is a physical change or a chemical change?

Have the students describe the properties of the sheet metal and the kitchen utensil (which will be our "lump"). The objects are different sizes and shapes, but they are both made from shiny, silver colored metal that strong but flexible. Some of the physical properties changed, but no new substances were formed.

Even though we don't know how to make "rolled steel" we know something about the steel before and after it is rolled. We can tell that the shape may change, but that the substance does not change. This is only a physical change.

Target Revised Model:

- Rolled steel is made by a physical change- the shape changes, but the material is still steel.

Summary:

Making petroleum products from crude oil involves chemical changes- new substances are formed. Rolling steel into flat sheets is a physical change because only the shape changes- the material remains the same.