

Physical Change with Matter and Heat

Name _____

Phenomenon:

One of Utah's natural resources is waxy crude oil. Oil is found in many parts of Utah, but in locations like Uinta Basin (Duchesne, Uintah, Grand, Carbon counties) and Paradox Basin (San Juan County), the oil looks a lot different than you may think. Utah's oil is in a liquid form when it's underground. Once it reaches the surface, it changes into a hardened state.

Waxy Crude Oil Before Hardening



Waxy Crude Oil After Hardening



With your group, write down 3 questions you have about the liquid oil changing into the hardened solid waxy state.

- 1.
- 2.
- 3.

Engineers have to transport the waxy crude to refineries that are many miles away. One question they think about is what happens to the temperature and mass of the oil when it cools? In this activity, you will make measurements to find this answer. What tools should be used to measure temperature and mass?

Materials: thermometers, gram scale or balance, cup

Procedures:

1. Send one member of your group to get the wax from your teacher.
2. Place the cup on the scale and record the mass
3. Place the thermometer in the wax and take the temperature or listen as your teacher tells you the temperature in the heated wax.
4. Observe the cup to see what changes are taking place. When you think the wax has all hardened, re-record the mass and temperature.
5. Repeat these steps 2 more times with new wax.

Data:

Cup #	Starting Liquid Wax Mass (g)	Starting Temperature (degrees F)	Completely Solidified. Mass (g)	Ending Temperature	Change in Mass (g)	Change in Temperature (degrees F)
1						
2						
3						
Average						

Analysis:

1. How did the wax look when it was a liquid? How about when it was a solid?
2. What was the temperature difference from liquid to solid?
3. Why did we average temperatures and masses?
4. What happens as the wax hardens? Draw a picture of what the molecules may be doing during this physical change.
5. How did math help us understand the experiment?

6. Did the mass of the wax change when it changed forms?

Why?

Summary:

Scientists accept a law that says mass is “conserved” during physical and chemical changes. That means mass does not change.

What **claim** can you make about the Law of Conservation of Mass?

What **evidence** do you have to support it?

What **reasoning** did you use?