

# Matter, Heat and Insulation Secondary

Name \_\_\_\_\_

Phenomenon #1: Look at the picture of waxy crude oil. List 3 questions you have about it.

- 1.
- 2.
- 3.

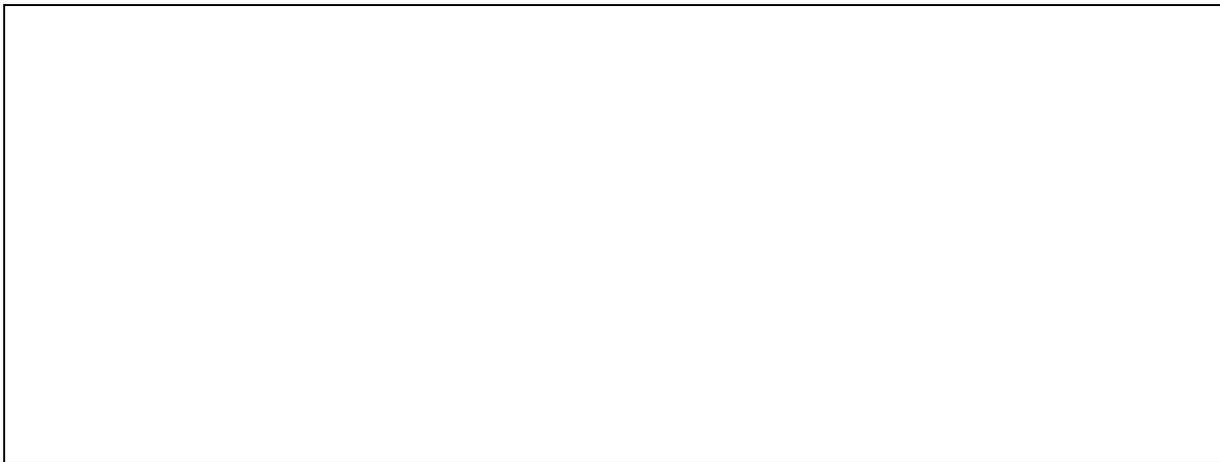
Phenomenon #2: List 3 structural designs that you think the hot beverage thermos has that enables it to keep hot chocolate warm for a long time.

- 1.
- 2.
- 3.

## Materials:

Using these ideas and materials, you will design a container to keep your water hot. You will need one film canister/cup, hot water, bubble wrap, cotton balls, other insulating materials, a roll of tape per group, and a thermometer.

Initial Container Design: Draw the container below as you will use it for your first experiment. The hot water, entire container, and insulation materials must be included and labeled.



## Evidence Section

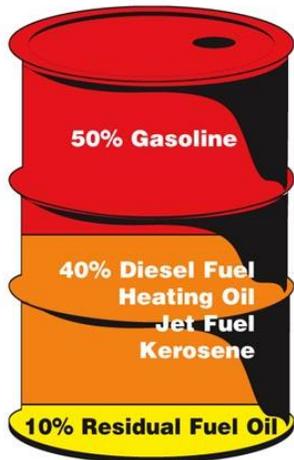
Data Table (your evidence from the experiment): Measure and record the water temperature in the container every 5 minutes. While waiting, work through the scenarios that follow this data table.

Container #	Temp Start	Temp 5 min.	Temp 10 min.	Temp 15 min.	Temp 20 min.	Temp 25 min.
Trial #1						

Answer research questions as a group while you wait.

1. Why does the waxy crude oil cool off when it is brought out of the ground?
2. What problems would that make for [transportation](#) of the waxy crude oil?
3. Using this diagram, write several summary statements about what crude oil is used to make.

Typical U.S. Refinery Yield from a Barrel of Crude Oil



4. Why would a cross-section of a pipe carrying waxy crude oil look like this?



5. How can what you learn from your design help engineer an oil pipeline that enables the better flow of waxy crude oil?

**Redesign your second container** with its insulation and sketch it here. Please label all the changes that you are going to make. Write a statement describing how the structure of different materials allows them to function as insulators.

Container #	Temp Start	Temp 5 min.	Temp 10 min.	Temp 15 min.	Temp 20 min.	Temp 25 min.
Trial #2						

