

# 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

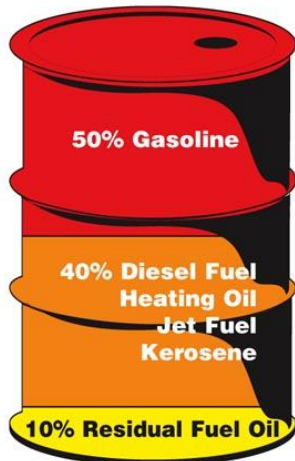
Data Table (your evidence from the experiment): Measure and record the water temperature in the container every 5 minutes. While waiting, work through the scenarios that follow this data table.

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?



- 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						

