

6.1 STANDARD DISTILLATION

How does the process of distillation compare to a real refinery?

MATERIALS

- Safety goggles and aprons for each student
- 1 alcohol thermometer, maximum temp 110° C
- 1 two-hole stopper to fit Erlenmeyer flask
- 1 condenser (design and scale will determine glass tubing needed to connect to the flask)
- 1 hot plate
- 1 ring stand
- 25 small containers for collecting condensate (small medicine cups or beakers, each capable of holding about 5 ml of liquid)
- 1 10 ml graduated cylinder
- 100 ml of sample mixture (mouthwash) plus an additional 5 ml set aside in a sample cup marked "original"
- Waterproof marker

DIRECTIONS

1. Create a table for recording temperature.
2. Pour 5 ml of water into one small cup, and mark the level with a permanent marker.
3. Duplicate this mark at the correct height on the remaining sample cups. Number the cups 1–25.
4. Obtain one more cup and mark it "original." Use it to obtain a sample of the mouthwash, and note the substance's physical properties of color and odor.
5. Assemble apparatus as shown in the figure by placing 100 ml of mouthwash in the flask.

6. Turn the hot plate to "high." Heat the mixture to 80° C. Reduce heat to a medium setting.
7. Begin sample collection and data recording at 80° C.
 - a. Record the temperature when the first drop of liquid enters the cup.
 - b. When 5 ml of liquid has been collected, record the temperature and quickly replace cup 1 with cup 2; repeat until 5 ml of liquid remains in the distilling flask. Turn off the hot plate.
 - c. Observe and record the volume, appearance, and odor of each fraction.

REFLECTION

1. Do these fractions differ by any other properties?
2. How do the fractions differ from the original liquid?
3. Which samples are the most similar in terms of temperature of collection?
4. How does a technician use distillation in analyzing a sample of crude oil?

