Density Rod

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OBSERVE THE DENSITY ROD USING COLD WATER

Safety first: Always lower your density rod quickly into the center of the graduated cylinder.

Material provided: Density rod

Materials to collect: 250 mL Polymethylpentene beaker, 100 mL Polymethylpentene graduated cylinder, tap water, scissors, ice, Celsius thermometer, and string.

Procedures:

- Cut a piece of the string so that it is 50 cm long. Tie the string just below the knob of the density rod. Do not **remove** the string from the density rod as you will need it for additional activities.
- Fill the beaker with 100 mL of tap water. Put some ice cubes in it. Chill the water until it gets to 10 degrees C.
- Fill the graduated cylinder to the 60 mL line with tap water from the beaker. You will need to have your eyes lower to observe the 60 mL mark on the cylinder to measure the volume correctly. Record 60 mL on a sheet of paper.
- Predict what will happen when you insert the density rod into the graduated cylinder.
- Quickly lower the density rod into the center of the graduated cylinder using the string. Do not cause the water to splash out from the cylinder.
- When the density rod doesn't drop further in the water, rest the string on the side of the-cylinder. Observe the water level. Did anything happen to the water level?
- Record the height of the water now. What caused the water level to rise? . Record your answer.

Analysis:
The water level in the graduated cylinder went higher when the density rod was inserted. The density rod floats because cold water is more dense than warm water.

Critical Thinking:
If you weigh out 1 pound of Styrofoam and 1 pound of nails, which material would have a greater density?

OBSERVE THE DENSITY ROD USING HOT WATER

Safety first: Always wear your goggles when heating water and during the activity. Wear you lab mitt when removing the beaker from the hot plate and pouring the water.

Material provided: Density rod

Materials to collect: Hot plate, goggles, Partial Immersion Celsius thermometer (Red Alcohol), 250 ML Polymethylpentene beaker, distilled water, Wire gauze squares (ceramic center), 100 mL Polymethylpentene graduated cylinder, and lab mitt

Procedures:

- Put your goggles on.
- Fill the Pyrex beaker with 100 mL of distilled water.
- Insert the Celsius thermometer into the beaker. Observe the temperature of the water. Record the temperature.
- Place the beaker in the center of the hot plate. Turn the dial of the hot plate to the high position.
- Observe the thermometer until it reaches 70 degrees Celsius. Turn off the hot plate.
- Wearing your lab mitt, carefully pour 70 mL of hot water into the center of the graduated cylinder. Place your beaker in the center of the wire gauze.
- **Infer** what will happen when you insert the density rod into the graduated cylinder.
- Quickly lower the density rod into the center of the graduated cylinder using the attached string.

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- Observe the location of the density rod and watch it for five minutes. Record your observation.
- Observe the location of the density rod after 10, 15, and 20 minutes. Record your observation.

Analysis:
The hot water is less dense than cooler water so the density rod sinks. When the warm water reaches a certain temperature, the rod will rise to the surface because the density of the water became greater than the density rod.

Critical Thinking:
Is the density of the ocean water affected by the temperature?

OBSERVE THE DENSITY ROD USING HOT DISTILLED WATER AND VERY COLD WATER

Safety first: Always wear your goggles when heating water and during the activity. Wear you lab mitt when removing the beaker from the hot plate and pouring the water.

Material provided: Density rod

Materials to collect: Hot plate, goggles, Partial Immersion Celsius thermometer (Red Alcohol), Metal backed Celsius thermometer, 2 250 ML Polymethylpentene beakers, distilled water, Wire gauze squares (ceramic center), 100 mL Polymethylpentene graduated cylinder, ice cubes, and lab mitt

Procedures:
- Put your goggles on.
- Fill the Pyrex beaker with 50 mL of distilled water.
- Insert the Celsius thermometer into the beaker. Observe the temperature of the water. Record the temperature. Place it in the center of the hot plate. Turn the dial to the high position.
- Observe the thermometer until it reaches 60 degrees Celsius. Turn off the hot plate.
- While waiting for the water to be heated, carefully pour 40 mL of cold distilled water at 10 degrees Celsius into the other beaker. Add ice cubes to the water if it is not at 10 degrees Celsius. Watch the temperature very carefully. Place your metal back thermometer into the beaker to document the temperature.
- Pour 35 mL of the cold water into the graduated cylinder.
- Wearing your lab mitt, carefully pour 35 mL of hot water into the center of the graduated cylinder. Place your beaker in the center of the wire gauze away from graduated cylinder.
- Make a **hypothesis** of what will happen when you insert the density rod into the graduated cylinder.
- Swiftly lower the density rod into the center of the graduated cylinder using the attached string.
- Observe the location of the density rod when it is lowered. Record your observation of the density rod after 3, 6, 9, and 12 minutes.

Analysis:
When the density rod is quickly lowered in the graduated cylinder, the rod is hanging between the line of demarcation between the hot water and the cold water. As the warm water cools, the density rod should begin to rise.

Critical Thinking:
What other properties of matter can cause changes in the density of matter?

COMPARE THE RELATIONSHIP OF THE DENSITY ROD WITH DIFFERENT LIQUIDS

Safety first: Always wear your goggles so that no liquid will splash in your eyes.

Material provided: Density rod

Materials to collect: Goggles, 1 250 ML Polymethylpentene beaker, distilled water, table salt, 2 250 mL Polymethylpentene graduated cylinders, paper towels, tablespoon, masking tape, and string

Procedures:
- Put the masking tape on each of the graduated cylinders. Mark one with distilled water and the second graduated cylinder with salt water.