Diving Submarine

Visitors use a commercially available toy to experiment with density. They fill a chamber in the toy submarine with baking powder and release it into a tank of water. They observe the behavior of the submarine and infer the nature of the process.

OBJECTIVES:

Visitors learn about a chemical reaction and its products. They also learn how density affects the behavior of an object in water.

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MATERIALS
(with amounts to have on hand)
- One 5-gallon plastic terrarium (store it with side displays)
- Yellow Undersea Explorer toy (Manufactured by DaMert Company, San Leandro, CA) (keep three on hand)
- One 100-ml plastic beaker
- One metal scoop
- Miscellaneous small sea toys for “atmosphere”
- One small (6- to 12-oz) wide-mouth jar with lid
- Baking powder (keep two 7-oz cans on hand)
- One small plastic tray (about 5 in. by 7 in.)
- One 125-ml dropper bottle

Setup/Takedown Procedures

ORIGINAL SETUP
- Label 100-ml beaker “Baking Powder”
- Label metal scoop “Scoop”
- Label jar “Baking Powder”
- Label dropper bottle “Water”

DAILY SETUP
- Set out the visitor instructions in a Plexiglas holder.
- Set out the terrarium and fill ½ full with clean water.
- Add water toys.
- On a tray, set out the following:
  - Labeled baking-powder jar
  - Labeled metal scoop
  - Labeled water bottle
  - Small tray with the submarine toy on it
  - Labeled plastic beaker for used swabs
  - Test tube brush
- Fill the water bottle.
- Fill the baking-powder jar halfway.

DAILY TAKEDOWN
- Empty the tank.
- Wash out the submarine, small tray, and fish tank.
Experiment: Diving Submarine

☐ Return all equipment to the tub.

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**WEEKLY TAKEDOWN**

☐ Clean the tray and leave it at the station.

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**RUNNING SUGGESTIONS**

◊ Fill the baking-powder jar only half full to avoid waste (if it gets wet).
◊ If the sub is not working, try again. Make sure the chamber is DRY and full and that visitors initially hold it upside down under water.
◊ Certain periscope lids fit certain submarines better, if a lid is loose, try trading with another submarine.

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**EXTENSIONS**

Warm water causes the reaction to proceed more rapidly.

Relate this experiment to OMSI’s Blueback submarine. Tell the visitors to take the sub tour and find out how the sub uses air and water to descend and rise (no, the real sub does not use baking powder).

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**SAFETY & DISPOSAL**

No special precautions are needed; follow standard lab safety procedures.