



## **A Hot Property: Water Stores a Lot of Heat!**

**It has a very high heat capacity!**

Heat capacity is a measure of a substance's ability to hold and release heat, or thermal energy. (Water's heat capacity is "1"; it is the standard by which all other substances are measured.) About 70 percent of the world's surface is water.

If 70 percent of the earth's surface had a lower heat capacity, the temperature extremes between day and night would be much greater: we'd roast during the day and freeze during the night. For example, planets like Venus and Jupiter do not have bodies of water or even water vapor in the atmosphere, and far greater extremes of heat and cold. If 70 percent of the earth had a higher heat capacity than it currently has, warm spots on the earth would be much hotter; cold spots would be colder; and there would probably be fewer areas with a temperate climate.

### **Demonstrating the effect water has on the temperature of a landscape!**

#### **You will need:**

- Two small terrariums
- A chunk of mini-moss or soil
- Enough sand to create a layer in one terrarium
- A small cactus plant
- Two thermometers
- One large heat lamp (optional)
- Small amount of water to soak mini-moss/soil

#### **Get started:**

- Set up two terrariums, one with moist, humus mini-moss garden/soil and one with sand and cactus
- Place a thermometer inside each one and cover
- Measure the temperature in the morning before the terraria is exposed to sun.
- Place each terrarium in bright sunlight or under a heat lamp for an hour or so.
- Record the temperature of each. Are there distinctions? Why?
- (Optional) If available, put a temperature probe connected to your computer in each container and program it to record the temperature every hour, day and night. Plot and compare the temperature swings.

### **What Did You Learn?:**

- Because of the presence of water, the earth, as a whole maintains a fairly moderate climate. Its highs and lows stay within a fairly narrow range.
- The life forms or species that have adapted to earth's various climates require temperatures with the range of our climate. No species have adapted to survive temperature swings of hundreds or thousands of degrees.

## **Surface Tension: Manifesting Itself Through Capillary Action! A Gravity-defying Fete!**

### **You will need:**

- Two plastic cups
- About two cups of water
- Stack of books about 3" high
- One or two paper towels

### **Get started!**

- Fill a plastic cup with water and place it on the table.
- Place an empty plastic cup next to it on an elevated surface, such as a book or stack of books about 3" high.
- Roll up a paper towel.
- Place one end in the cup of water and drape the other end into the higher empty cup.
- Leave it overnight and observe the changes the next morning.

### **Results**

- The water will migrate up the towel by capillary action and drip into the elevated glass.

### **What did you learn?**

- Water's intermolecular forces make life on earth possible! These forces give water molecules a strong attraction to each other. Capillary action is one result of this attraction—water is drawn up from the roots into the plant. Also, this water is a nutrient since water is the universal solvent.
- Without this ability, earth could not support the variety of plants it has on land and water, which gives us the diversity of life.