

Electrolyte Content of Sports Drinks

FYI...

Granular water-storing polymer products (such as Soil Moist™, Water-Gel Crystals, Sta-Moist™, Aquadiamonds®, or Watersorb®) are usually available where potting soil is sold.

Sports drinks contain large amounts of electrolytes (ions), such as sodium (Na^+) and potassium (K^+), in order to replenish the electrolytes that the body loses through sweat during exercise. This activity provides you with an indirect way to measure the amounts of electrolytes in a water beverage.

Stuff You'll Use: ▶water-storing polymer product with crystals measuring about 2–4 mm in diameter ▶Gatorade®, Propel®, or similar sports drink ▶bottled mineral water ▶distilled water ▶tap water ▶9-ounce (270-mL) or larger clear plastic cups (one for each sample) ▶1-cup (250-mL) liquid measuring cup with metric markings ▶strainer ▶permanent marker

Sample data table

Liquid	Ingredients	H ₂ O Volume Absorbed
tap water		
distilled water		
sports drink		
mineral water		



Important...

When you are done with the crystals, throw them in the trash. Do not dump the crystals down the drain because they can clog plumbing.

What to Do:

- 1 Label a cup for each sample to be tested. Record the names of the liquids you will test in a data table. Record the ingredient list for each sample, if applicable.
- 2 Place 10 polymer crystals that are about 2–4 mm wide into each of the labeled cups. Make sure the sizes of the crystals are evenly distributed in the cups. (In other words, don't have one cup with only the largest crystals and another with only the smallest.)
- 3 Add 150 mL of the appropriate liquid to each of the labeled cups. Allow the cups to sit several hours or overnight.
- 4 Hold the strainer over the measuring cup and pour the contents from one sample cup into the strainer. Once the liquid has drained into the measuring cup, return the crystals to their original (now empty) cup. Record in milliliters the volume of liquid you collected in the measuring cup. Rinse the liquid down the drain.
- 5 Calculate the volume of liquid that the crystals absorbed by subtracting the volume of liquid you collected from 150 mL (the volume of the liquid added).
- 6 Repeat steps 4 and 5 for each sample.
- 7 Look at the data that you collected. *What (if any) trends do you observe with regard to the amount of liquid absorbed by the crystals and the ingredients/water sources listed for the samples?*

How It Works:

The water-absorbent crystals in this activity are made from sodium polyacrylamide, a polymer that absorbs many times its own weight in water. The polymer has this property because it contains ions that attract the polar water molecules. When a sports drink comes into contact with the sodium polyacrylamide, the ions in the drink and the ions in the polymer are in competition for the water molecules. The more ions in the liquid, the less water molecules that can be absorbed by the polymer. Thus, the polymer swells less in liquids with high concentrations of ions. You should find that distilled water is absorbed the most and sports drinks and mineral water the least. How much tap water the crystals absorb depends on the concentration of ions in your local tap water.



More Fun?

Learn more about the properties of water-absorbing polymers. Terrific Science Press (www.terrificscience.org/sciencestore) offers the following books that include activities involving the science of water-absorbing polymers:

- ▶▶ [*Camp and Club Science Sourcebook: Activities and Planning Guide for Science Outside School*](#)
- ▶▶ [*Polymers All Around You, 2nd Edition*](#)
- ▶▶ [*Wet Your Whistle: Drinking Water Activity Handbook*](#)

