Curiosity Guide #501
Polymers

Accompanies Curious Crew, Season 5, Episode 1 (#501)

Diaper Dissection

Investigation #5

Description

Find out how diapers keep a baby dry.

Materials

- Diaper (size 3)
- Scissors
- Black construction paper
- Ziploc bag
- Cup
- Water

Procedure

1) Open the diaper by stretching it open and leaving it face up.
2) Use scissors to cut along the top of the liner.
3) Turn the diaper over and let the powder and small bits of cotton fall out of the diaper onto the black paper.
4) Collect the powder and small bits of cotton in a Ziploc bag.
5) Add a small amount of air into the bag. Move the cotton pieces around inside the bag so powder collects in the bottom corner of the bag when held up.
6) On the bag, cut off the bottom corner that contains just the powder. Pour the powder into a clear cup.

7) Add water to the cup. Swirl the water around until it begins to gel. (A thin layer of powder on the bottom of the cup will be able to gel a half-cup of water.)

My Results

Explanation

Sodium polyacrylate is a polymer that can hold a lot of water. If we could magnify this polymer, it would look like long chains of molecules. Water is drawn into the center of each of the polymer molecules. The water will continue to absorb into the powder until there is an equal concentration of liquid both inside and outside the polymer. This is a physical reaction. We could spread out and leave the gel, and the water would evaporate out. The polymer powder could be used again. however, if we add salt to the gel, a chemical reaction causes the gel to liquefy and destroy the powder.

Think about this:
This particular polymer cannot be used for agriculture because the polymer is too sensitive to natural salts in the environment.

Diaper designers and engineers need to understand how sodium polyacrylate works because using too much of this polymer in a diaper will not only take care of business but will draw out the moisture in the baby's skin, and she will get a rash. Diapers are engineered to hold a lot of fluid without irritating the baby's skin.

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