

Really Good Stuff 



WATER GEL™ - 1 lb (454 g)

ACTIVITY GUIDE

OVERVIEW:

You're about to discover how superabsorbent polymers are the thirstiest thing you can bring to a party! Solidify a cup of water in an instant, experiment with its water-absorbing properties, then play some really cool tricks on your friends. Let them guess why Water Gel™ powder was invented in the first place. They'll never believe it!



a Really Good Stuff brand

AGES 4+

SKU: WSPA-650

RGS: 800244



WARNING: CHOKING HAZARD - Small parts.
Not for children under 3 years. Adult supervision required. Do not ingest.

VOCABULARY

Young scientists love to learn and use scientific words and you will too! So here's the chance to impress your friends and family as the demonstrations are completed. Just use these bolded words to help everyone understand the fun, scientific "magic" of the demonstrations.

absorb – to take in

atoms – the smallest particle of an element that can exist alone or in combination

dehydrated – to remove water from something

distilled water – purified water

gel – a solid, jelly-like substance

liquid – a substance that is able to flow freely

membrane – a thin, soft, flexible sheet or layer

migrates – moves from one place to another

molecule – the smallest particle of a substance having all the characteristics of the substance

monomers – identical molecules that are joined together in a chain

osmosis – the passage of material through a membrane

polymer – a long chain of repeating, identical molecules

properties – special qualities of something

semipermeable – having some pores or openings that permit liquids or gases to pass through

sodium polyacrylate – a fine, white powder that absorbs 800 to 1000 times its weight in water

solidify – to make or become solid, compact, or hard

superabsorbent – capable of taking in a lot of water

synthetic – produced artificially

MATERIALS | What's included

- 1 lb (454 g) of Water Gel powder
- 1 Measuring scoop
- 1 Water Gel activity guide

MATERIALS | What you'll need to get

- 1 Zipper-lock bag
- 3 Clear plastic cups
- 3 Styrofoam™ cups
- 1 Measuring cup with ounces
- Salt
- 1 Plastic spoon
- Wax paper
- Diapers
- 1 Newspaper
- 1 Clean dinner plate
- Pencils
- Friends



ACTIVITY #1: Water Gel

TIME: 5-10 minutes

MATERIALS

- 1 Measuring scoop
- Water
- 2 Plastic cups
- Friends
- Water gel

STEP-BY-STEP INSTRUCTIONS

1. Using the blue scoop, measure $\frac{1}{2}$ scoop (about 1.5 grams) of Water Gel powder into a clean plastic cup.
2. Fill another plastic cup with approximately 4 ounces of room-temperature water or **distilled water**. Hold the two cups up for your audience to see. Quickly pour all of the water into the cup containing the Water Gel and watch what happens. After just a few seconds, you can turn the cup upside down and remove the **gel**! Read the "How Does It Work?" section so you can explain why.



ACTIVITY #2: Dehydrate Your Gel

TIME: Several Days

MATERIALS

- Water gel slush
- 1 Plastic spoon
- Wax paper

STEP-BY-STEP INSTRUCTIONS

1. Use a plastic spoon to place some of the **gel** on a piece of wax paper or a plate and set it out of the way in a warm place to dry. You'll need to leave it alone for several days or weeks even. What happens to the **gel**?
2. Add a little water to the **dehydrated gel** and watch what happens. Hey! Water Gel is reusable!



ACTIVITY #3: Salt, Anyone?

TIME: 5 minutes

MATERIALS

- 1 Water gel slush
- Zipper-lock bag
- Salt

STEP-BY-STEP INSTRUCTIONS

1. Place some gooey Water Gel in the zipper-lock bag and add a pinch of salt. Squish the bag once or twice and, in a few seconds, the **gel** is a **liquid**. Salt permanently destroys its **water-absorbing properties**.
2. Dispose of the salt water goo in the trash and rinse out the bag so you can use it again.

HOW DOES IT WORK?

Superabsorbent Water Gel is the same **polymer** used to **absorb "liquid"** in baby diapers. It **absorbs** water by means of **osmosis**, the movement of water **molecules** through a **semipermeable membrane**. In other words, the **polymer** lets only **molecules** of water pass through its **membrane**-like structure. **Molecules** larger than water **molecules** are stopped from getting through, but as soon as the **superabsorbent polymer** comes in contact with water, the water **migrates** from outside the **polymer** to the inside, causing the **polymer** to expand to take on more water.



HOW DOES IT WORK? Continued

Everything in the world is made up of groups of **atoms** called **molecules**. Some **molecules** are very large and others are small. A **polymer** is a large **molecule** made up of many smaller, identical **molecules** (called **monomers**) that are joined together in a chain. Some **polymers** are made up of millions and millions of repeating **monomers**.

Polymers play an important role in our everyday lives. **Synthetic polymers** have a multitude of uses from something as simple as a Styrofoam coffee cup to plastics, adhesives, fabrics, paints, rubber, polyester, gelatin, or even a life-saving artificial heart valve. The world as we know it today could not exist without these long chains of **molecules**.

TAKE IT FURTHER

Place a new disposable diaper on a piece of newspaper. Carefully cut through the cotton lining and remove all of the stuffing material. Put this cotton-like material into a clean, zipper-lock bag. You should be able to see and feel traces of the **polymer** in the bag. Scoop up any of the **polymer** that may have spilled onto the newspaper and place it into the bag. Seal the bag with a little air trapped inside. Shake the bag for a few minutes to separate the powder from the stuffing. Notice that the powder has dropped to the bottom of the bag. Remove the stuffing and measure the amount of **polymer** you extracted. If you like, add a little water (about 4 ounces) to the bag and time how long it takes for the water to **gel**. The chemical name for the diaper **polymer** is **sodium polyacrylate**. It's a fine, white powder that **absorbs** 800 to 1000 times its weight in water!



ACTIVITY #4: Don't Get Wet!

TIME: 5 – 10 minutes

MATERIALS

- 1 Styrofoam™ cup
- Water gel
- Friend
- Water
- Pencils
- Measuring scoop

STEP-BY-STEP INSTRUCTIONS

1. Secretly place $\frac{1}{2}$ teaspoon of Water Gel in a Styrofoam™ cup.
2. Invite a friend to hold the cup as you fill it with 4 ounces of water, being careful not to let her see the inside of the cup!
3. Hold the cup above her head and slowly poke pencils through the cup. Say this: "I have to make sure I don't remove any of these pencils, or you'll get wet!"
4. Then remove the pencils. Hey, what happened? Where did the water go?



ACTIVITY #5: Three Cup Monte

TIME: 10–15 minutes

MATERIALS

- 3 Styrofoam™ cup
- Water gel
- Friend
- Water
- 1 Glass
- 1 Measuring scoop

STEP-BY-STEP INSTRUCTIONS

1. Get three Styrofoam™ cups and a glass of water. Before you invite your friends to join in, secretly place $\frac{1}{2}$ teaspoon of Water Gel in one of the cups, leaving the other two cups empty.
2. Place the three cups on the table, being careful to remember which one contains the Water Gel. Make small talk about the history of the game, as you pour water into the cup containing the **gel**.
3. Say "I'll mix up the cups to confuse you. Remember which one has the water!" Mix the cups around so they are in new positions. Look like you are being careful not to spill any of the water.
4. Have your friends guess which cup has the water, then tip that cup over and say "Sorry!" When they choose the cup with the solidified Water Gel, tip it over briefly (so the **gel** doesn't slide out). After choosing all the cups, your audience will be convinced that the water has disappeared!



STEM CONNECTIONS

FOR TEACHERS, PARENTS, GRANDPARENTS, & ALL-AROUND SCIENCE ADULTS

We haven't forgotten about the new STEM and STEAM initiatives you've been hearing about in our schools, bringing Science, Technology, Engineering, (Art), and Math together to make young scientists real thinkers! Look what your young scientist(s) integrated into the Water Gel demonstrations.

- **Science** – states of matter, chemical reactions, molecules, polymers, absorbency, hydration and dehydration
- **Technology** – you can expand the activities by having young scientists research products that contain polymers
- **Engineering** – ask your young scientist(s) how the Water Gel polymer could be used to solve a real-life problem
- **Math** – measuring, volume



NGSS CONNECTIONS

And just for teachers – as you know, the Next Generation Science Standards (NGSS) set expectations for what science concepts that students should understand. These Water Gel Activities start young scientist(s) on the way to meeting those standards. Take a look and see what can be accomplished!

Young scientists (**grades K-2**) who demonstrate understanding can:

- Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. (NGSS **2-PS1-1**.)

Young scientists (**grades 3-5**) who demonstrate understanding can:

- Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. (NGSS **5-PS1-2**.)
- Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (NGSS **5-PS1-4**.)

Young scientists (**grades 6-8**) who demonstrate understanding can:

- Analyze and interpret data on the **properties** of substances before and after the substances interact to determine if a chemical reaction has occurred. (NGSS **MS-PS1-2**.)

PROPER DISPOSAL INSTRUCTIONS

Dispose of the experiment materials properly. When disposing of Water Gel, throw it into a trash receptacle and **NOT** down a drain. Of course, you can let it dry out and reuse the powder again and again.