

# Tornado in a Bottle!

## THE CLARKSVILLE TORNADO, JANUARY 22, 1999

At 4:18 a.m. on the morning of January 22, 1999, an F3 tornado ripped through downtown Clarksville, destroying a 5-block area. An F3 tornado has a rating classification of Strong, with wind speeds between 158 to 206 mph. It cut a path 6 miles long and 880 yards wide, causing bricks and glass to be strewn everywhere. There was a total of 124 buildings destroyed and 562 buildings damaged. The FEMA Director who toured the area said "Wow! It's like someone dropped a bomb on it. That's just what it looks like".



### What is a tornado?

A tornado is a type of storm in which powerful rotating winds form a column, which reaches from a cloud down toward the ground.

- ☼ Tornadoes usually develop during large thunderstorms (only a small portion of thunderstorms produce tornadoes, though).
- ☼ Sometimes in thunderclouds, warm, humid air inside the thundercloud rises, while cool air falls. This can cause spinning wind currents, which start out horizontal; but if they turn vertical and drop down from the cloud, it becomes a tornado.

- ☼ A tornado may appear nearly transparent until dust and debris are picked up.
- ☼ The winds of a tornado are the strongest on Earth. They may reach speeds of up to 300 miles per hour.
- ☼ Such violent winds can flatten buildings and whip heavy objects, such as cars, into the air.

<https://kids.britannica.com/kids/article/tornado/399626> [for kids up to 5th grade, includes a couple short videos of tornadoes]

# Tornado in a Bottle!

**What causes the tornado to form inside the bottle?** There are two science principles going on here.

One has to do with how you spin the bottle.

- ✿ Spinning the bottle in a circle creates force that moves the water. Where can it go? So long as you screwed the lid on tight, it can't leave the bottle.
- ✿ So, the water moves around the edge of the bottle. It is going along a circular path. When something moves along a circular path, it also moves toward the center of the circle.
- ✿ This is called centripetal force.

The second part to understanding how you created a tornado in a bottle is what is in the bottle: water – a fluid.

- ✿ When you spin a fluid around a central point, it creates a spiral called a vortex. You couldn't do this experiment if you filled the bottle with gummy bears, for example; it has to be a fluid.
- ✿ If you look around, you can see examples of vortices in lots of places, even in your home. If you fill a bathtub and open the drain, then a whirlpool (which is an example of a vortex) is created as the water rushes out. You can see a vortex when you drop a bit of cream into a cup of coffee that's just been stirred; the swirls of cream are vortices.