

# Turbulent Orb



## What's Going On?

As you rotate or shake the container, the mixture of liquid soap and water drags against the inside wall and starts to move. If you rotate the container slowly, you may see smooth orderly currents that flow parallel to each other, called *laminar* flow. If you spin the container rapidly, the currents become more complex, with disorderly swirls and eddies, called *turbulent* flow. These flow patterns in the container are reminiscent of the flow patterns that occur in planetary atmospheres.

## What Do I Need?

- small clear container with a tight-fitting cap (round or spherical containers are best)
- liquid soap containing *glycol stearate*
- food coloring
- tape

## What Do I Do?

1. First, fill the container about 1/4 full with liquid soap.
2. Next, add a few drops of food coloring.
3. Slowly fill the rest of the container with water. If you run the water too fast, you will get foam. Allow any foam to run over the edge and make sure to fill the bottle all the way to the very top.
4. Screw the cap on the container and dry it before wrapping tape around the top to prevent leaks.
5. Turn the container upside-down a few times to mix the soap and water.
6. Twirl and shake the container to see smooth streaks and turbulent swirls.

In planetary bodies friction between gaseous layers at different altitudes drags the atmosphere along in the direction of the planet's rotation. Friction also occurs between the solid surface of the planet and the atmosphere. Atmospheric winds interact with the spinning planets as they create complex circulation patterns. The laminar regions form bands, which follow the rotational direction of the planet. As the fluid mixes, the bands break up into turbulent swirls, ripples, and waves. Turbulent flow is complex and chaotic.

Source: Exploratorium

