

# Solar System Soup: The Formation of the Solar System

## Background

Over the last four centuries, many theories have been formulated to explain the origin and evolution of the Solar System. Today, the theory most commonly held by scientists is known as the **accretion theory**. The theory was originally formulated in the 1940s but it has been refined over the last few decades.

The theory explains that the Solar System began to form at a time when the Sun had acquired enough mass to begin to attract material from what is known as the **interstellar medium**. The interstellar medium is simply the gas and dust that are spread throughout our galaxy. Since the Sun was spinning when it began to attract the gas and dust, what originally formed was a huge rotating disc of material with the Sun at its center. Astronomers believe that this disc looked very much like the satellite pictures of hurricanes which you have probably seen on television weather reports. Over billions of years, the material in the disc accreted, or clumped together, to form the planets presently in the Solar System. Prior to the accretion theory, no one could explain why the planets farther away from the Sun revolved more slowly than the ones closer to the center of the Solar System.

This activity will model what the very early Solar System would have looked like, as predicted by the accretion theory, and demonstrate that the material on the edge of the disc revolves more slowly than the material at the center.

## Procedure

1. Fill a bucket (or comparable container) three-fourths full with water.
2. Using the graduated cylinder, measure about 15 mL of vermiculite and pour it on top of the water.
3. Stir the mixture vigorously with a stirring rod in a circular motion. When you have a funnel-shaped pattern in the water, stop, remove the stirring rod, and observe.
4. In the space provided on the following page, sketch the

## Objective

The object of this activity is to observe a model of how the Solar System would have originated according to the accretion theory.

## Materials

For each group of students:

- ◇ 1 stirring rod
- ◇ 1 bucket (11 L) for student exercise
- ◇ basin for collecting used water
- ◇ 15 mL of vermiculite