

Overview

The STARDUST spacecraft will use a material called **aerogel**, a silica dioxide gel with the lowest density solid known, to collect the comet and interstellar dust particles. It is similar to gelatin we use in foods before it undergoes a drying process which removes almost all of the liquid.

Developed by the Kirkpatrick Science and Air Space Museum at Omniplex.

Objective

Students will simulate and observe the collection of particle by aerogel. Students will classify the particles, record and interpret data gathered during the experiment.

Preparation

Materials Needed

- Millimeter ruler (one per team)
- Clear gelatin (Prepare ahead of time. Use two cups of water instead of one as the package indicates.) Pour about two inches deep into clear plastic cups (one per team).
- Steel balls (Get 3 different sizes selecting the largest sizes you can find which will fit easily in a straw. Using 2 or 3 different colors of fingernail polish or spray paint, paint the balls. Don't worry about painting all one size the same color. It will make no difference in the experiment. You can reuse these by taking them up after class and rinsing them off). Six steel balls per team (give each team a variety of size, colors, etc.).
- Transparent plastic cups for gelatin (one per team)
- Push pins (one per student)
- Worksheet (one per team)
- Pencil (one per student)

Introduction

Tell students about aerogel and its purpose of this mission.

Note to Teachers

You know your students' personalities/abilities. If you do not feel comfortable with them preparing the samples themselves, you may, of course, prepare them in advance. We do not recommend students preparing their own samples below grade 6.

However, this activity is designed for grades 3-12 with early experiment getting progressively more challenging as the age level increases. If you feel that 4th or even 3rd graders can handle BB's and straws, then certainly allow them the opportunity to do that portion of the experiment as well.

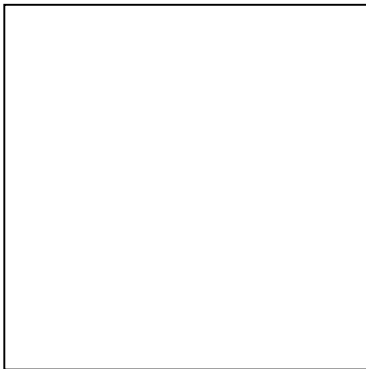
Procedure

1. Explain to the students that they will work in team of two or more. They must cooperate with their teammate, sharing the work and collaborating on gathering/recording data.
2. Hand out worksheets, pencils, straws, tweezers, set of 6 steel balls (3 per team member) of varying sizes and colors.
3. Pass our aerogel-lo samples.
4. Each student will insert the pushpin about an inch from the end of the straw they will blow into. This will hold it in place and prevent it from rolling back into their mouth until they blow through the straw. NOTE: Placing a pencil eraser in the sharp end of the push pin will make it safer to work with.
5. Next, the students will simulate the capture of comet particles in aerogel by blowing each ball into the aerogel-lo. Hold the cup of gelatin up and tilted towards you so you can blow the BB's straight at it. Hint: Try blowing them down into it while it is on a flat surface will cause the BB to fall out of the straw.
6. Once all the students have completed step #5, instruct them to trade samples with someone close by. This is the sample they will use for the rest of the experiment.
7. On the worksheet, there is a square representing the aerogel-lo sample. In the square, students will draw each particle in its position in the aerogel-lo sample and sketch the path it made while making sure to get the length and width of the path as close to what they actually observe as possible. Number the particles on their sketch.
8. Next, instruct students to remove particles from aerogel-lo using the tweezers. Using the numbers you assigned on the aerogel-lo square, place them in numerical order.
9. Instruct the students to count their particles and record the collected data on the worksheet.

Aerogel-lo Student Worksheet

Name: _____ Date: _____

Draw each particle and sketch the path it made. Try to get the length and width of the path as close to what you observe in the Aerogel-lo sample as you can. Number the particles on the sketch.



Particle Number	Diameter

Aerogel-lo Square Number of Particles Collected: _____

Write your categories in the boxes at the top of the chart. You may not need to use all boxes. That is fine. Next, record the number of particles you have in each category.

Classification system you used: _____

Categories					
# of Particles					

Classification by Size

Write your classification categories in the boxes at the top of the chart. You may not need to use all boxes. That is fine. Next, record the number of particles you have in each category.

Categories					
# of Particles					

Study the data. Then answer the following questions:

1. Which category of particle in your classification system made the largest marks in the Aerogel-lo? Why?
2. Which type of particles would be easiest for the Aerogel to collect? Why?