



# Make a Comet Model and Eat It!



**Created for the Deep Impact Mission, A NASA Discovery Mission**  
Maura Rountree-Brown and Art Hammon  
Student - Inquiry

Comets have sometimes been described as dirty snowballs, snowy dirtballs or something in between. But what does that really mean? It means that these dirty snowballs are believed to be a cold mixture of frozen water, dry ice, and other sandy/rocky materials left over from the early formation of our solar system. In this activity, we are going to develop a comet model that you can eat. You'll trade "comets" and pretend to be an instrument on the Deep Impact Spacecraft called a spectrometer. It analyzes the structure and composition of comets by using nine different filters. You will use four of your senses individually to decide what is in the ice cream. Most of the ingredients can be found in your home or can be incorporated there after the activity.

Form small research groups of 2 - 4 students. Survey your class ahead for any allergies (milk, peanuts, etc) that you plan to use. You'll need to gather the following materials for each group:

- One sandwich size re-closable plastic bag per team of 2 - 4
- One Gallon size re-closable plastic bag per team of 2 - 4
- Small cups for eating ice cream - one for each person on the team and one extra cup for ice cream to feel
- Plastic spoons
- Pairs of rubber kitchen gloves or have them use cloths or sweaters (comet gets cold!!)
- Ice (enough to fill a gallon size bag ½ full per team) - or bring in fresh snow from outside.
- Chunky cookies in black or brown, crushed candies (like toffee or peppermint), gummy bears, coconut flakes and peanuts
- Whole milk (2% won't work)
- Sugar
- Vanilla extract
- Evaporated milk
- Salt
- Can opener
- Something to use to crush cookies and other additives

\*\*\*\*\*

To begin: Wash hands! You may choose to use food gloves.

HINT: One person should hold the bag while another pours ingredients into the bag. To cut the activity time, you can pre-mix the milk, evaporated milk, sugar and vanilla to the small bags and pre-measure the salt into the large bags. Make enough sandwich bags of ice cream for each team to have one. Squeeze the air out and seal the sandwich bags carefully each time they are opened to add ingredients.

- STEP #1: Mix to the sandwich size bag
- One-third cup evaporated milk (or cream)
  - Two-thirds cup whole milk
  - 5 level spoonfuls of sugar
  - Less than ¼ tsp of vanilla

Comet connection: Discuss with your class the following ingredients to be added to the ice cream to represent dust (Black/brown cookies in fine and large chunks), rocks (peanuts), carbon dioxide (coconut flakes). Then have the students begin to add ingredients. Make sure they are also adding some ingredients to represent what we might find in a comet. Possibilities are: gummy bears (early organics for life?),

peppermint, toffee or other ingredients you might choose. Remember to choose food that will not dissolve while the ice cream is setting. Now close the bags.

**HINT:** Squeeze any extra air out of the sandwich bag and close it. **Be sure it cannot leak.** [Turn it upside down to check]

### **STEP#2**

Place the sandwich bag into the bottom of the gallon bag. Put in approximately 10 heaping spoonfuls of salt if you did not pre-load the salt earlier. You can pre-load salt into the bags at home.

### **STEP #3**

Fill the gallon bag (containing sandwich bag) at least 1/3 full of ice.

### **STEP #4**

1. Close the larger bag tightly to remove as much air as possible. Check for leaks.
2. Gently shake and roll the bag while keeping it in constant motion for approximately 6 - 10 minutes or until half the bag has turned to water.  
[SUGGESTION: Rubber gloves, mitts, cloth towels or other thick fabric may be needed to hold the bag because it will get extremely cold. Start with bare hands so students can feel the temperature change].
3. Gently feel the sandwich bag through the icy mixture. When the milk/sugar mixture in the sandwich bag has hardened into soft ice cream, open the gallon bag and remove the sandwich bag containing the ice cream.

### **STEP #5**

Trade your comet with another team so the ingredients are a mystery. Each team should briefly rinse the outside of the sandwich bag they were given with fresh water before opening so that no salt flavor is transferred to the ice cream.

Split the ice cream comet by spooning some into the cups provided, one for each team member. **Make one extra cup and put it aside. Don't eat this one!**

A spectrometer takes different kinds of data through different filters. Pretend that your eyes, hands and taste buds are scientific instruments taking data from your "comet". Take the following "data" and record it on the data sheet:

- Look at the "comet" and see what you can observe **visually**.
- Take the extra cup you laid aside and have your team **feel** the contents with your fingers. Record your data.
- **Smell** the ice cream and see if you find any additional information.
- **Taste** the ice cream and record any final information about what is in it. Compare your results with the team who made the ice cream you tasted.
- Record what you discovered as you watched the elements in the bag become ice cream.
- Share your conclusions about your comet with your class.

### **SUGGESTIONS FOR LARGER GROUPS: For a class of 20 (10 groups of 2)**

- 3 - 4 cans - 12 fl oz each)
- 1 gallon of milk (you'll have some left over)
- 20 cookies
- 1/4 lb of sugar
- 1 bag of peanuts and 1 bag of coconut flakes
- 1/4 bottle of vanilla or leave this ingredient out
- 10 sandwich size re-closable bags (but best to make a couple extra)
- 10-gallon size re-closable bags
- 2 - 3 containers of table salt (you'll have some left over)

### **SOME TIPS FOR THE TEACHER:**

- If the students toss the bags back and forth or bang them against a surface while freezing the ice cream, they may break.
- Bring dishtowels, cloths or other insulator for hands to guard against discomfort while they are turning their bags over and over.
- Have a mop available for dripping water or do the activity outside.

- Limit the amount of any material students put into their ice cream to one plastic spoonful so supplies last.
- Mark one of your serving cups with sugar and salt measurements to pre-load bags faster. Mix all ingredients in class if you want your students to work on measurements.