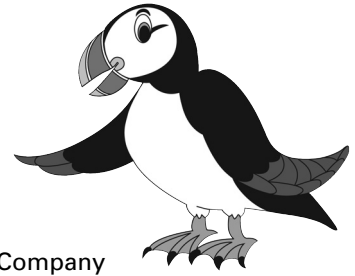


PuffNs®

Environmentally friendly packing material



To protect products during shipment, Carolina Biological Supply Company uses special packing pellets made from puffed natural starch and vegetable proteins. These PuffNs are completely biodegradable. They dissolve readily in water. PuffNs break down into naturally occurring components when composted. PuffNs are clean and nontoxic. They can be reused as packing material, molded into sculptures, or studied in the series of interesting classroom activities below.

NOTE: Although PuffNs are made from grain, they are not intended to be food. **Do not taste or eat PuffNs.**

PuffN Sculptures (all ages)

Put some PuffNs into a container and mist them lightly with water, stirring them around so that they all become sticky. The more water you add, the more the individual PuffNs will lose their shape, and the smaller and denser the mass of material will become. Mold the sticky mass of PuffNs into a sculpture. Abstract shapes work best. If your hands become sticky as you work, rinse them with water. Allow the PuffNs sculpture to dry thoroughly.

Classroom Activities

Exercise A. Appearance (Grades K–5)

- 👁️ What does a PuffN look like?
- 👁️ What does a PuffN feel like?
- 👁️ Split open a PuffN and look inside. What does it look and feel like inside?
- 👁️ Do PuffNs look and feel different on the inside than the outside?
- 👁️ Do PuffNs have a smell? What do they smell like?

Exercise B. Volume (Grades K–5)

- 👁️ Fill a large container with PuffNs, counting them as you fill it. How many PuffNs does it take to fill the container?
- 👁️ Empty the container and flatten some PuffNs. Fill the container with flattened PuffNs, counting them as you fill the container. Now, how many flattened PuffNs does it take to fill the container?

Exercise C. Mass (Grades K–5)

- 👁️ Flatten a PuffN and compare it with a regular PuffN. Which PuffN weighs more?
- 👁️ Do all PuffNs weigh the same? Weigh several and find an average.

Exercise D. PuffN Glue (Grades K–5)

- 👁️ Dissolve four PuffNs in 15–20 mL of water. Spread some of the mixture on a piece of paper and place another piece of paper on top. Allow to dry. The pieces will stick together!

Exercise E. Volume (Grades 6–8)

- 👁️ Repeat Exercise B.
- 👁️ Pour some water into a graduated container and record the volume.
- 👁️ Add the flattened PuffNs to the water and stir until they no longer dissolve. Record the new volume. What happened?

Exercise F. Density (Grades 6–8)

- 👁️ Using a balance, mass a PuffN and record.
- 👁️ Place the same PuffN in a graduated container and add sand until the PuffN is covered. Record the volume.
- 👁️ Remove the PuffN from the sand and record the volume of the sand alone. Subtract this volume from the volume of the sand and the PuffN. This number is the volume of the PuffN.
- 👁️ Divide the mass of the PuffN by its volume. This number is the density of the PuffN.
- 👁️ The density of water is 1.0 g/mL. Is the PuffN more or less dense than water?

Make the following two mixtures and use them in the next four exercises.

- ☞ Dissolve one PuffN® in 10 mL of water.
- ☞ Place one PuffN in a small container and add sufficient saliva to dissolve it. Let the PuffN and saliva sit for 10 minutes.

Exercise G. Test for Glucose Using Glucose Test Strips (Grades 6–8)

The enzyme amylase, present in human saliva, breaks down starch into glucose.

- ☞ Dip one glucose test strip (89-3840) into the PuffN and water mixture. Determine the glucose concentration and record.
- ☞ Dip one glucose test strip into the PuffN and saliva mixture. Determine the glucose concentration and record.
- ☞ Which mixture contains a greater concentration of glucose? Why?

Exercise H. Test for Starch Using Iodine (Grades 6–8)

A yellow solution of iodine (86-9051) reacts with starch to form a deep purple color.

- ☞ Place several drops of the PuffN and water mixture on a piece of wax paper.
- ☞ Place several drops of the PuffN and saliva mixture on another piece of wax paper.
- ☞ Add several drops of iodine to each PuffN mixture.
- ☞ Which mixture contains starch? How do you know?

Exercise I. Benedict's Test for Starch (Grades 6–8)

Benedict's solution reacts with reducing sugars, such as glucose, to form a red precipitate when heated. If there is no reducing sugar present, the solution remains blue.

- ☞ Place 1 mL of the PuffN and water mixture in a test tube.
- ☞ Place 1 mL of the PuffN and saliva mixture in another test tube.
- ☞ Add 2 mL of qualitative Benedict's solution (84-7111) to each test tube and heat the test tubes in a boiling water bath for five minutes.
- ☞ Which mixture contains glucose? How do you know?

Exercise J. Test for Starch Using a Dialysis Membrane (Grades 6–8)

Although starch cannot permeate a dialysis membrane, iodine can. If a solution of starch is placed in a dialysis membrane and the membrane is submerged in a solution of iodine, the iodine will enter the dialysis membrane and react with the starch to form a deep purple color.

- ☞ Cut two pieces of dialysis membrane (68-4212), each 5 inches long, and place them in water for several minutes.
- ☞ Tie a knot in one end of each membrane.
- ☞ Place 1 mL of the PuffN and water mixture in a membrane and tie a knot in the end.
- ☞ Place 1 mL of the PuffN and saliva mixture in another membrane and tie a knot in the end.
- ☞ Place each membrane in a separate beaker and fill the beakers with water so that each membrane is submerged.
- ☞ Add 1 mL of iodine solution to each beaker so that the water is yellow.
- ☞ Wait 30 minutes.
- ☞ Which mixture contains starch? How do you know?



Questions?

Call Product Information at 1-800-334-5551
or email green@carolina.com.