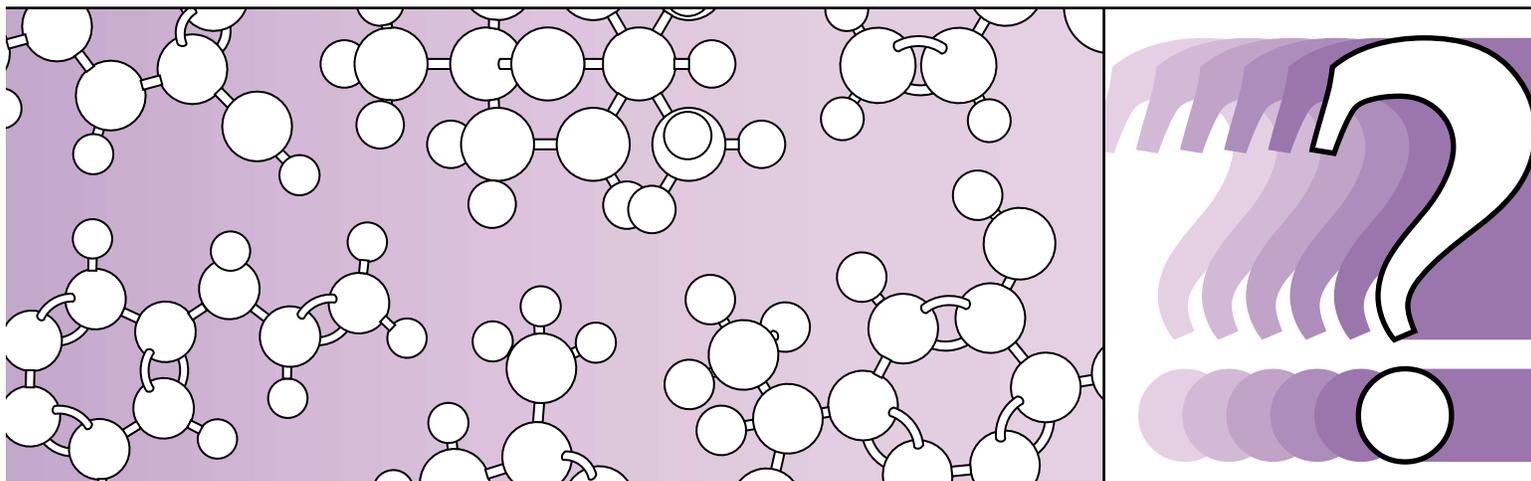


*The Pfizer Foundation Biochemistry*

# Discovery Lab

**What molecules  
are in ocean foam?**



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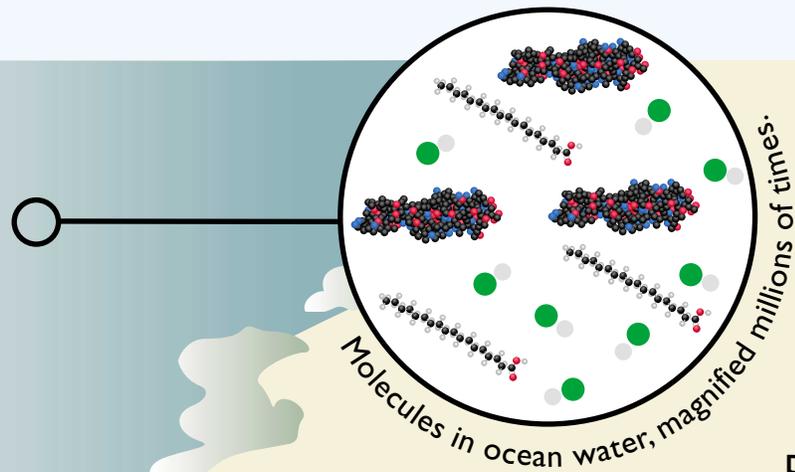
**Have you ever watched waves breaking on a beach?**

**Did you notice the white foam that the waves make?**

**Do an experiment  
to find out where ocean  
foam comes from.**

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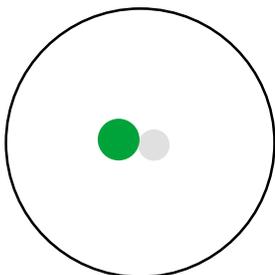
Ocean foam comes from the molecules in ocean water.



Molecules are tiny particles that make up everything around us.

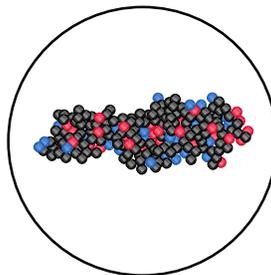
Choose one of these ocean molecules to test and see if it makes foam.  
Each person in your group could try a different molecule.

salt molecule



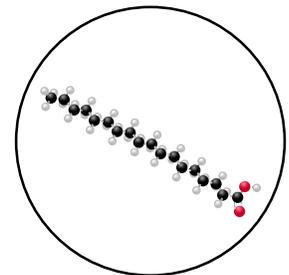
salt molecules  
come from rocks

protein molecule



protein molecules are  
from animals and plants  
living in the ocean

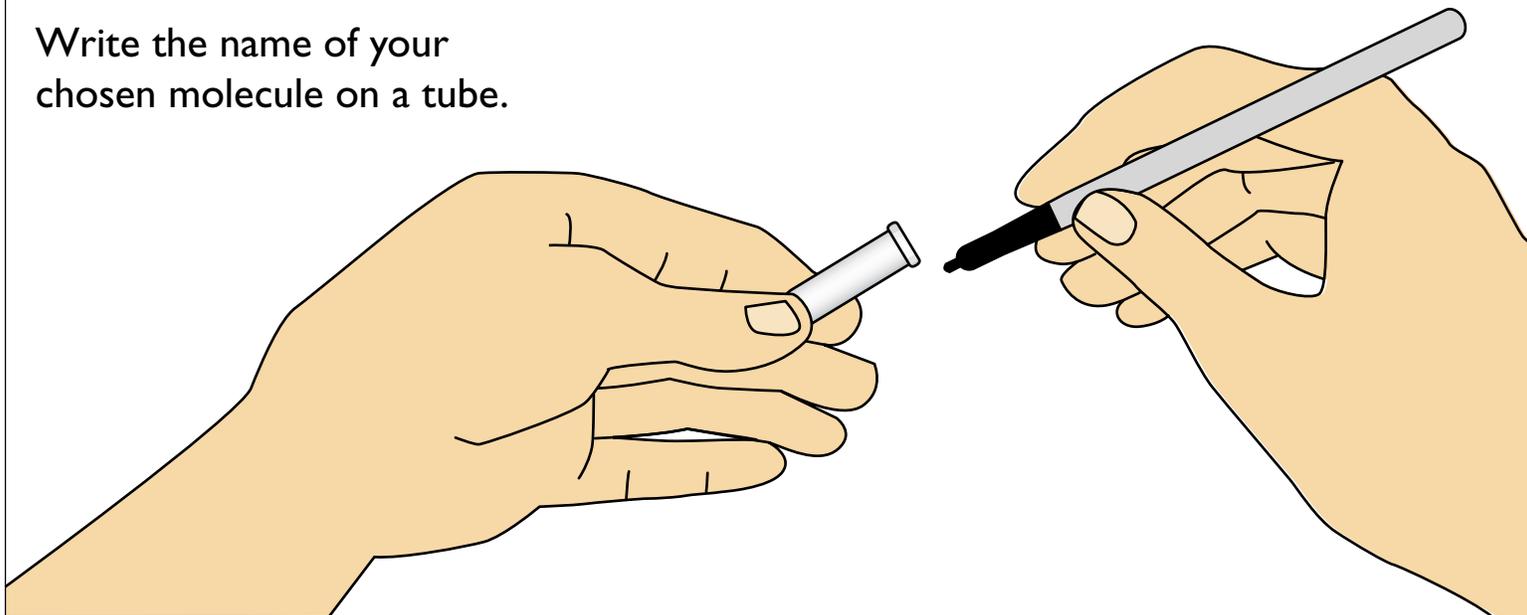
fat molecule



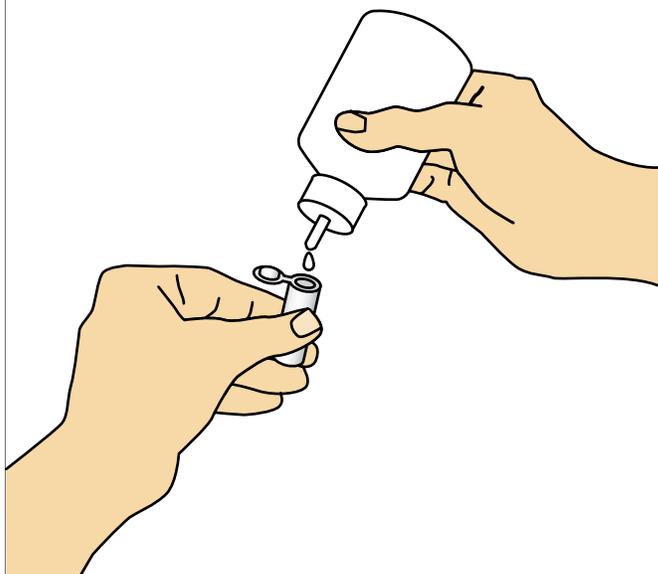
fat molecules are  
from animals and plants  
living in the ocean

## Do the foam test on your molecule

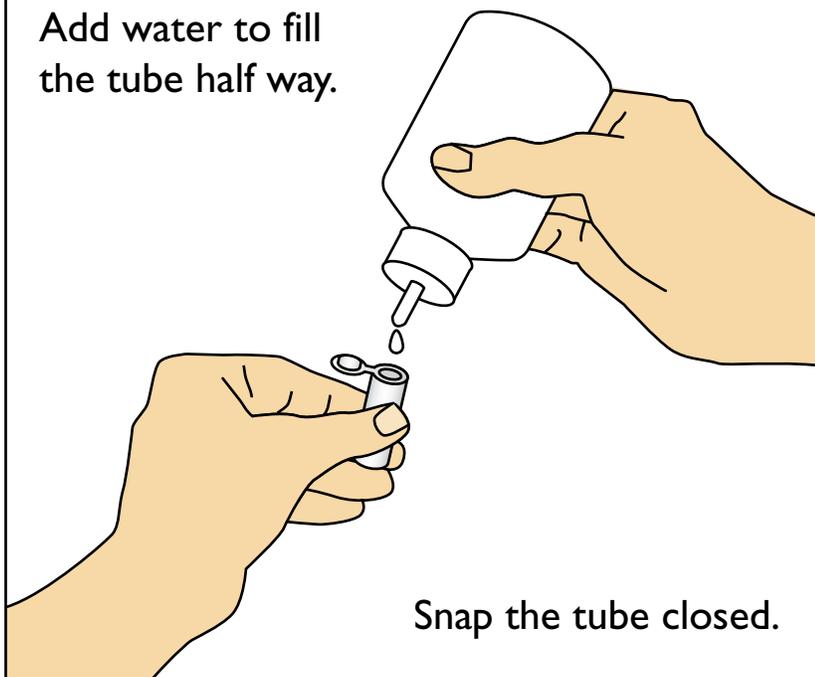
Write the name of your chosen molecule on a tube.



Add 10 drops of your chosen molecule to the tube.

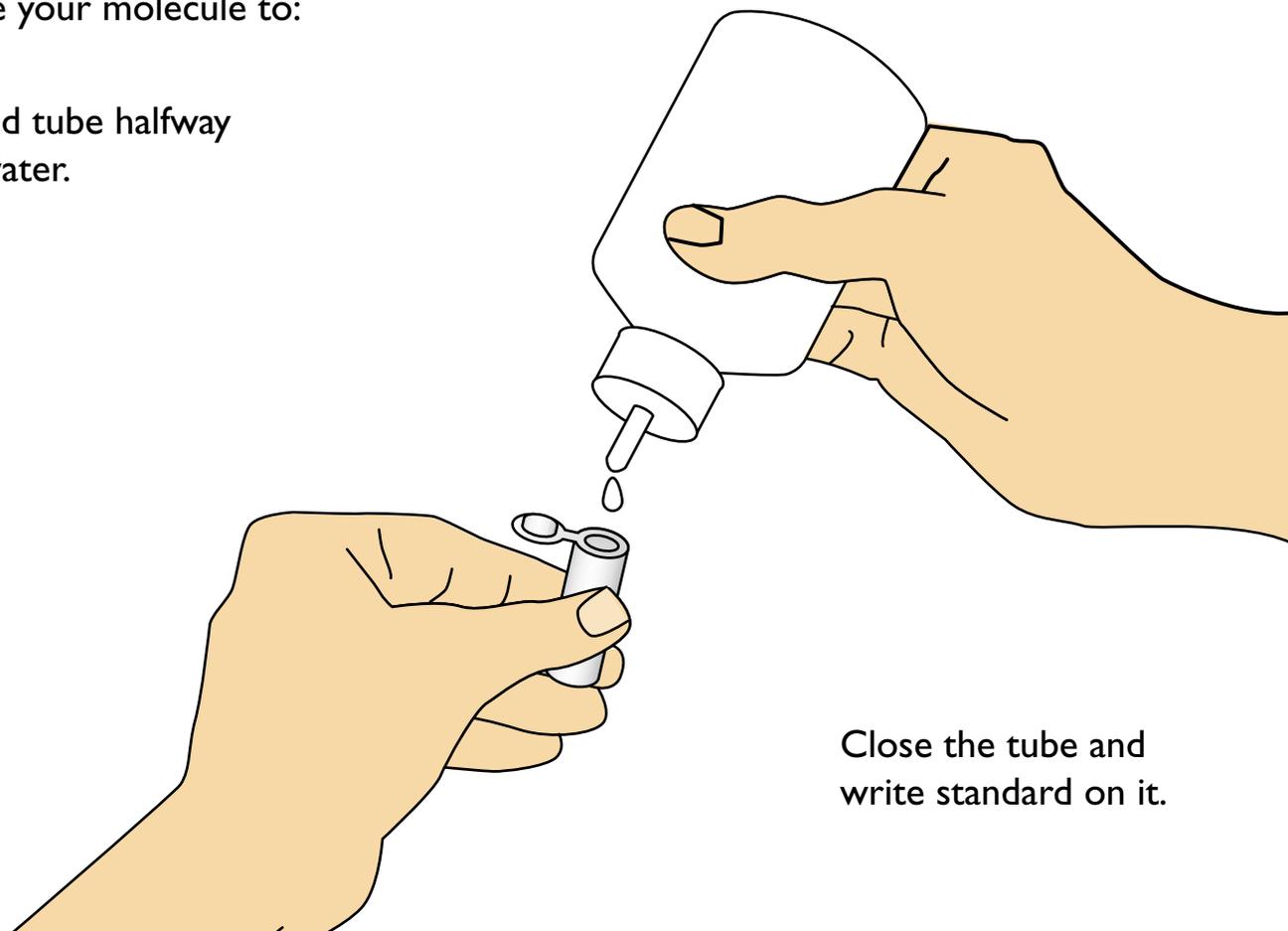


Add water to fill the tube half way.



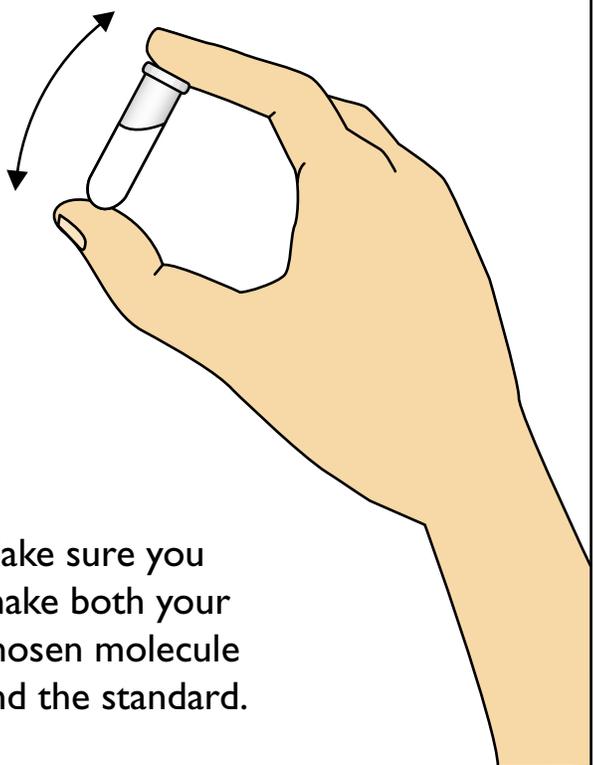
You need a "standard" that does not foam  
to compare your molecule to:

Fill a second tube halfway  
with just water.



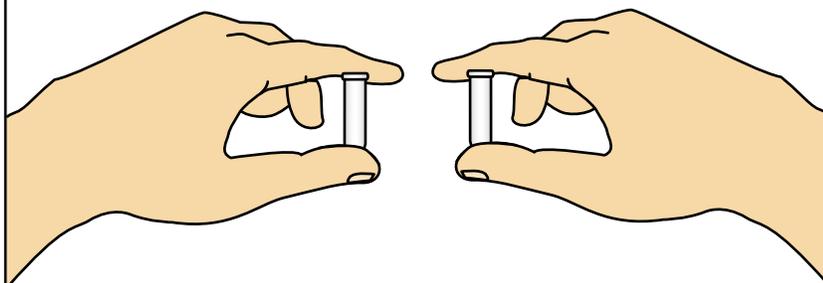
Close the tube and  
write standard on it.

Mimic the crashing of the ocean waves by shaking the tubes hard.



Make sure you shake both your chosen molecule and the standard.

Compare your chosen molecule with the standard.



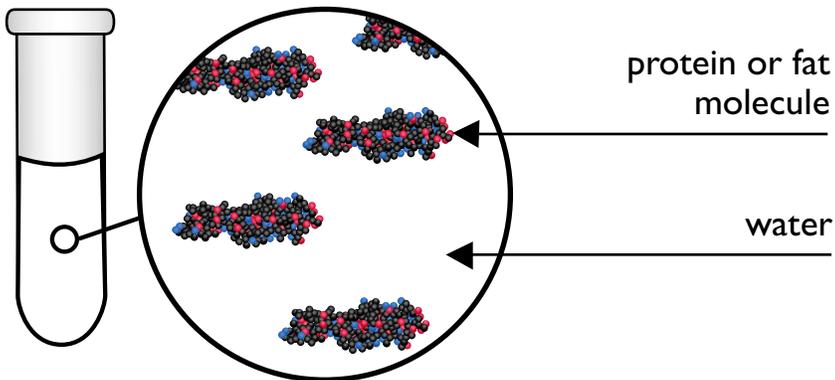
Did your molecule make foam?



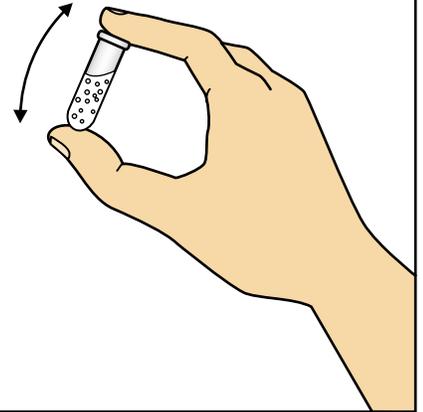
Which ocean molecules make foam and which ones don't?

## Where does the foam come from?

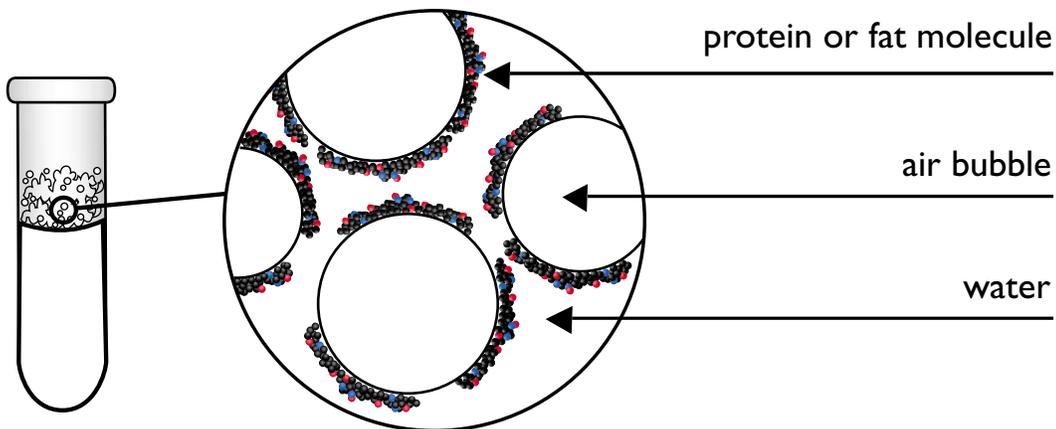
Before you shook the tube, the protein or fat molecules were spread out:



When you shook the tube, you mixed in air bubbles.



The protein or fat molecules cluster around these air bubbles, holding them in place:



The foam you see is hundreds of tiny air bubbles held in place.

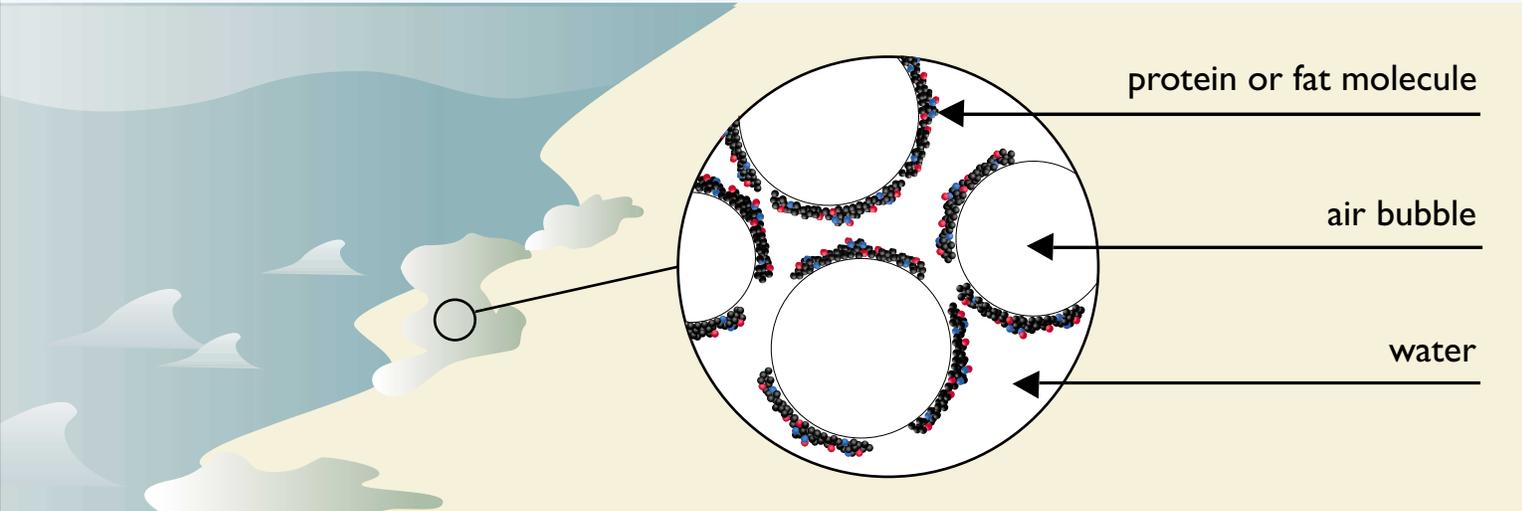
Salt molecules don't cluster around air bubbles, so they don't make foam.

# What about the foam on the ocean?

The crashing waves in the ocean mix air bubbles into the water.



Just like in your experiment, the protein and fat molecules in the ocean cluster around the air bubbles, and hold them in place to make a foam.



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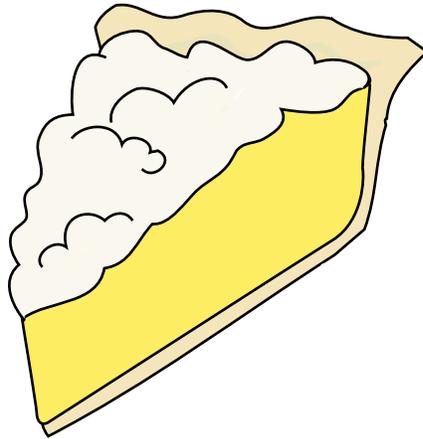
## Have you seen these other foams?

A milkshake is made by beating air into milk.



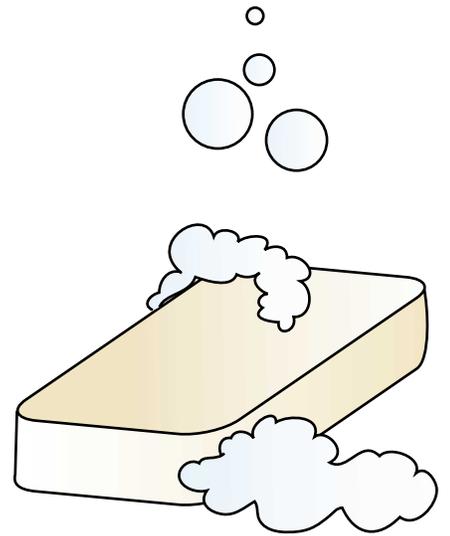
The foam comes from protein and fat molecules in the milk holding the air bubbles.

A meringue is made by beating air into egg whites.



The foam comes from protein molecules in the egg white holding the air bubbles.

Soap makes a foam when you rub it against something.



The foam comes from soap molecules holding the air bubbles.

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Do you have questions about this activity,  
or about foam and molecules?

Maybe you can find the answer by  
experimenting some more.

Ask a staff person if you need help.

When you are done, stick the tubes in your  
Lab Notebook, or throw them in the trash.

