Below is an example script that could be used while engaging in the Comet Building activity. Created by Elisabeth Mills, Astronomy graduate student, UCLA, 2010. Edited by Kristin Kulas, Astronomy graduate student, UCLA, 2010

Start off with a question or two to get an idea of student's background if not known already, or to just start a general conversation about comets.

Where in the solar system are comets found?
Look for Oort cloud, Kuiper belt, maybe asteroid belt, but could also be answers like 'near the sun' or 'really far away'. Maybe mention also here that comets have very different orbits than most planets: they can be both farther away from the sun and closer to the sun than any planet, making their orbits highly elliptical, while most planets go in circles.

Or ask: Where do comets come from? How were they formed?
Not sure what answer we might get, but an opportunity to start talking about comets as leftover material from solar system formation.

After these questions, start talking about how we would actually make a comet. As students mention ingredients, add them to the bowl, and remark on the quantity. *Make it clear that water is the dominant ingredient*.

What are some things you think might be in comets?
Water, dust, rocks- these are the easy ones. When students get stuck, start to use the idea of comets as being made out of materials found elsewhere in the solar system to help prompt them for ideas.

What are planets like Jupiter or Neptune made out of?
They may not know, in which case you can tell them, but you can also use this as a teaching opportunity.
What is the sun mostly made of?
Hydrogen. Hydrogen is the #1 most common thing in the solar system. It's all about the hydrogen. To help with the sugars part, say comets may have brought not only our oceans, but also ingredients necessary for life.

What kinds of things might that include?

At this point, everything is in our mixing bowl but the dry ice

What is wrong with our comet? We have everything we need- we have checked off all of the ingredients that might go into a comet. What's wrong?
It's not cold. Prompt students to describe a little more a comet's lifecycle: Frozen with no tail, comes in toward sun and melts a bit, forms a progressively larger tail as surface material boils away.

So we need to make it cold. Why not just put it in the freezer? Well, that would get it down to 32 F. But how cold is space?
They may not know exactly, but should know it is much colder.

How do the temperatures of planets in the solar system vary with distance from the sun? And where are comets found?
The further you are from the sun, the colder the temperature of the planet.

We need to make our comet much colder than the coldest you can get on earth. How do we do this?
Dry ice, Students will want to know how cold it is, and it is -70 degrees. Inform students: DO NOT TOUCH. It will burn you.

What is dry ice?
Frozen CO2. On earth, it is a gas. But go far away from the sun, and it freezes.

**What is something that can exist as a solid on earth but might be a gas on a planet closer to the sun?**
Maybe water! Mercury has no water, because it has already boiled away.

**Is there liquid water on any planets farther away from the sun than earth?**
Nope. Mars has ice caps, but even those are mostly dry ice!!

**Are there any things that exist as liquids on earth that are solid on other planets?**
Ammonia! There are ammonia ices in the gas giants. In fact, Neptune and Uranus are so far out that a lot of stuff, even methane (on Earth, natural gas), exists as an ice. We often call these 2 planets ice giants.

**Add the dry ice, lots of stirring, then shaping it with your hands. Gloves are a must!!! Students probably won't pay attention to anything you tell them from this point on**

Observe the comet, final remarks that this is a "dirty snowball", remind them that these things probably brought our oceans through lots of impacts, bigger and more frequent and earlier than the one that likely cause the extinction of the dinosaurs. Comets still hit things: Mention Shoemaker-Levy hitting Jupiter. Finally, space permitting, smash the comet, let students examine fragments. Remind them not to touch the dry ice, assume they will anyway.