Modeling Fusion using Cookies

Fusion occurs when two **ions** in a **plasma** collide with enough energy to merge together. This releases *a lot* of energy. Scientists would like to find a way to control fusion so we can use the energy that is released. We can use this energy for electrical power, which will make us less dependent on fossil fuels.

Cookies as a Model for Fusion

In this activity, cookies will act like atoms in a fusion reaction. Fusion occurs when heat is added to atoms, giving them enough

energy to collide and stick together. In this case, the microwave will add the energy to heat the "atoms" (cookies).

- 1. Put two equally sized pieces of cookie dough on the wax paper, about 1 inch apart.
- 2. Mass the cookies and write your measurement in the table.
- 3. Put the cookies in the microwave for 1 minute.
- 4. Let the cookies (your new element) cool for 1 minute.
- 5. Mass them again and record on your table. What's the difference in mass before and after fusion (cooking)? The missing mass is like the energy released by fusion!
- 6. Einstein's famous equation, $E = mc^2$ tells us that mass can be converted into energy. If all of the mass lost in your cookie was converted into useable energy, how much would there be? (Remember c = 3.0×10^8 m/s.)
- 7. Questions
 - a. What accounts for the missing mass in the cookies?
 - b. Name two ways this experiment is like fusion.
 - c. Name two ways in which this experiment is different from fusion.

How does this compare to real fusion?

In real fusion	In the cookie experiment	
Atoms	Raw Cookies	
New element (2 atoms fused together)	Baked cookie	
Heat energy from electromagnetic	Heat energy from microwaves (which	
waves	is an electromagnetic wave)	
Mass lost is energy we can use.	Mass lost is due to water loss.	

Data Table

	Mass before cooking	Mass after cooking
Atom 1		
Atom 2		
Total Mass		
Difference between	n before and after cooking	

