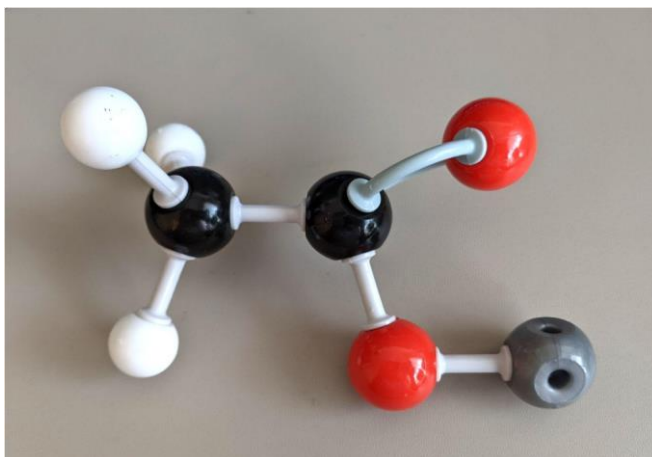


## Chemistry in Minecraft #3

Let's look at different molecules that include carbon and make things using the Lab Table and Crafting Table.

### Sodium Acetate:

When you mix baking soda and vinegar you get water ( $H_2O$ ), carbon dioxide ( $CO_2$ ) and a molecule called Sodium Acetate ( $CH_3COONa$ ). We can make Sodium Acetate in Minecraft and use it to make Ice Bombs.



To make Sodium Acetate we need:

2 atoms of Carbon (black balls)

4 atoms of Hydrogen (white balls)

2 atoms of Oxygen (red balls)

1 atom of Sodium (grey ball)

When we place them in the Compound Creator we get one bottle of Sodium Acetate!



### Lab Table: Ice Bombs

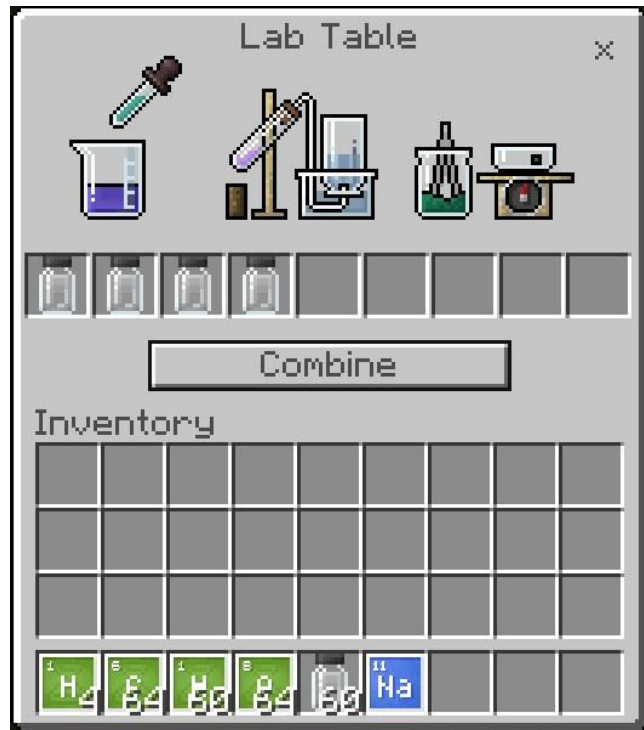
To turn the Sodium Acetate into an Ice Bomb we will need a **Lab Table**. Currently in Minecraft we can only make only four things using the Lab Table. If you combine other objects, the Lab Table turns them into garbage.



When you open the Lab Table you will get a long row of squares. Place 4 bottles of Sodium Acetate in the squares. Click on Combine when the animation starts.

We see an explosion and an ice bomb is floating in our world. Grab the ice bomb and go to the nearest body of water. When you click on the water the surface freezes instantly!

Sodium Acetate in real life doesn't work like this, but a special solution of sodium acetate can form "Hot Ice."



When you heat a mixture of Sodium Acetate and water, and allow it to cool down to room temperature, you create what is called a super cooled liquid. A super cooled liquid is a liquid that's been cooled below its freezing point (the temperature at which a liquid turns into a solid). The freezing point of a solution of Sodium Acetate is 54 C or 136.4 F. When this solution is cooled to room temperature it creates a super cooled liquid. To start the freezing process, solid crystals of Sodium Acetate need to be introduced into the solution. When that happens the molecules of Sodium Acetate attach to the crystal and start freezing. This process releases heat. This process is the chemical reaction used to make reusable heating packs!

### Lab Table: Heating Blocks

Let's make Heat Blocks. For the heat block, we use a molecule of carbon called Charcoal, some Water, Salt and Iron! We use Heat Blocks to melt the ice made from the ice bombs. Heating Blocks also exist in real life! We call them heating packs or hand warmers.



### a. Charcoal:

To make Charcoal in the Compound Creator we need:

7 atoms of Carbon

4 atoms of Hydrogen

1 atom of Oxygen

You can also grab Charcoal from your inventory instead of making it in the Compound Creator.



### b. Water:

Water is also called H<sub>2</sub>O. To make this molecule we need:

2 atoms of Hydrogen

1 atom of Oxygen

In water, the atoms of Hydrogen and Oxygen share electrons with each other to help each other complete their outer electron shell level. This is called a

**Covalent Bond.**



### c. Salt

Last week we made salt by placing 1 atom of Sodium and 1 atom of Chlorine in the Compound Creator. In order for Sodium and Chlorine to have completely filled outer electron shell levels, Sodium gives away 1 electron to Chlorine to form Sodium Chloride or salt! This is called an **Ionic Bond.**

The last thing we need to make the heating block is Iron. In real life, it is the rusting of the iron that provides the heat in the heating pack. The salt and water



help speed up the rusting process and the charcoal helps spread the heat more evenly.

In the lab table, place the charcoal, iron, water and salt in the four squares. Once the animation starts click on combine.

We see another explosion and a small heat block is floating in our world. Grab the heat block and go back to where we made the ice. When you place the heat block on the ice the squares around the ice start to melt!

Experiment to see what happens when you stack the heat blocks or spread them over a large area!

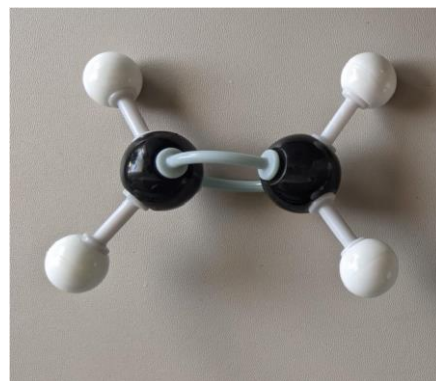
### **Crafting Table: Glow Sticks**

We also used the crafting table to make glow sticks! To make the glow sticks we need some Polyethylene, Hydrogen Peroxide, Luminol and dye.

#### **a. Polyethylene:**

When making glow sticks we use a molecule of carbon called Polyethylene. This molecule of carbon is what we call a Hydrocarbon. Hydrocarbons are molecules made of carbon and hydrogen atoms.

Polyethylene is a long chain of carbon atoms formed from a process called Polymerization. To make Polyethylene we start with a lot of Ethene molecules. When these molecules are exposed to high temperatures and pressure they link together to form long chains. **Plastic** is made of these chains of Ethene molecules.



For the glow stick in Minecraft we need a polyethylene chain of 10 carbon atoms. To make Polyethene in the Compound Creator you need:

10 atoms of Carbon

20 atoms of Hydrogen

### b. Hydrogen Peroxide:

In order for the glow stick to glow the chemical reaction needs Hydrogen Peroxide. By looking at the name of the molecule we know that it's got Hydrogen and Oxygen. The symbol of Hydrogen Peroxide is  $H_2O_2$ . So we need:

2 atoms of Hydrogen

2 atoms of Oxygen

### c. Luminol

We made Luminol in class last week by combining atoms of Carbon, Hydrogen, Nitrogen and Oxygen. The symbol for Luminol is  $C_8H_7N_3O_2$ . This means that we need:

8 atoms of Carbon

7 atoms of Hydrogen

3 atoms of Nitrogen

2 atoms of Oxygen



Once we have everything, we need to arrange the materials to craft a glow stick!

Assembly:

1. First we need the plastic casing around the glow stick. Place 3 Polyethylene in the first and third column, this creates the plastic stick.
2. In the middle place the dye. You can choose any color you like.
3. On top of the dye place the Hydrogen Peroxide and at the bottom place the Luminol.



This gives us a glow stick! Shake the glow stick to see it light up in Minecraft!

Glow sticks work when the Hydrogen Peroxide mixes with the Luminol. This happens when we snap or shake the glow stick. When Hydrogen peroxide mixes with Luminol it causes a chemical reaction. The molecule formed as a result has a lot of excess energy, and as this molecule settles down it loses the excess energy in the form of **light** causing the glow stick to glow.

You can also make some Elephants Toothpaste at the lab table!

To make Elephant's Toothpaste:

You will need the following molecules from the Compound Creator:

1. Potassium Iodide (KI)
2. Soap ( $C_{18}H_{35}NaO_2$ )
3. Hydrogen peroxide ( $H_2O_2$ )

When you combine these at the Lab Table you get an explosion that looks like the science experiment called Elephant's Toothpaste.