Sodium-γ-hydroxybutyrate.

Materials needed:

- NaOH 99,7% pure (Pro-Analyse quality).
- γ-butyrolactone 99,7% pure (Pro-Analyse quality).
- Round bottom flask (or another chemical resistant container).
- Glass rod.
- dH_2O

First you need to know a little bit of chemistry before doing this reaction.
When NaOH is dissolved in water there is quite some heat produced, so watch out for that, NaOH-solution is basic, and if it gets onto your hands it will eat away your hands like sulfuric acid (battery acid). Especially when it is hot it will even react better with your skin, for that case wear safety glasses, and gloves (which are resistant against NaOH-solution).

When the NaOH-solution and γ-butyrolactone are mixed together there will also be quite some heat produced, the temperature will be around 200°C.
The solution can get to a boil, just so you know and won't get scared of the vigorous reaction.

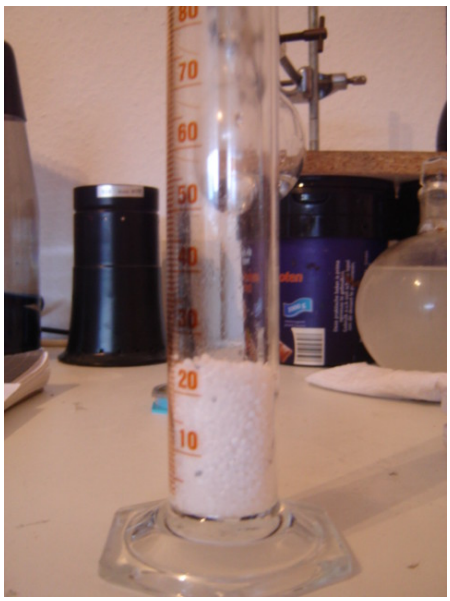
γ-butyrolactone and NaOH react in a molar ratio of 1:1 so that means 1 mol of NaOH will react with 1 mol of γ-butyrolactone.
γ-butyrolactone: 86,1 g/mol
NaOH : 39,99 g/mol

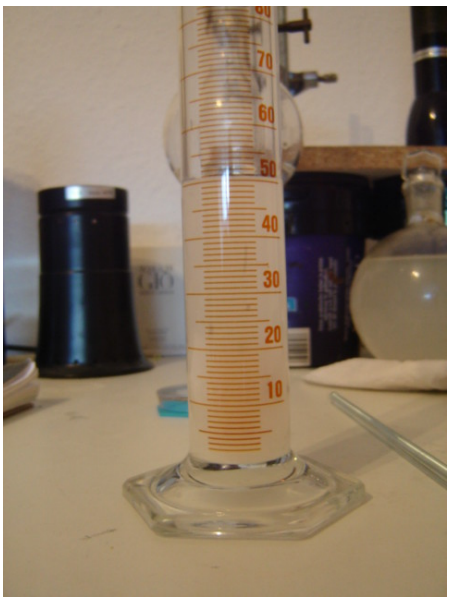
So 39,99g NaOH will react with 86,1g γ-butyrolactone.
The density of γ-butyrolactone is 1,2 g/ml so that means 86,1g is 71,75ml. (86,1g / 1,2g/ml = 71,75ml)
That means for a first time if you want to use 50ml γ-butyrolactone, (which is 50ml*1,2g/ml=60g) you need to add.
(60*39,99)/86,1 = 27,86g NaOH.
So you will need:

- 50ml γ-butyrolactone.
- 27,86g NaOH.

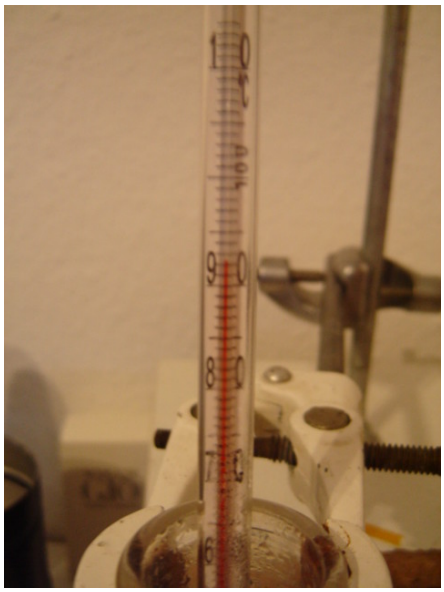
Put the 50ml γ-butyrolactone in a roundbottom flask (picture 1).

On the second picture you can see the NaOH waiting in the measuring cilinder to be dissolved in water, we use for 50ml γ-butyrolactone 40ml water to dissolve the NaOH in (so that is 90% of the volume of γ-butyrolactone). So we dissolve 27,86g in 40ml water. On the third picture the NaOH is dissolved in ~40ml water.



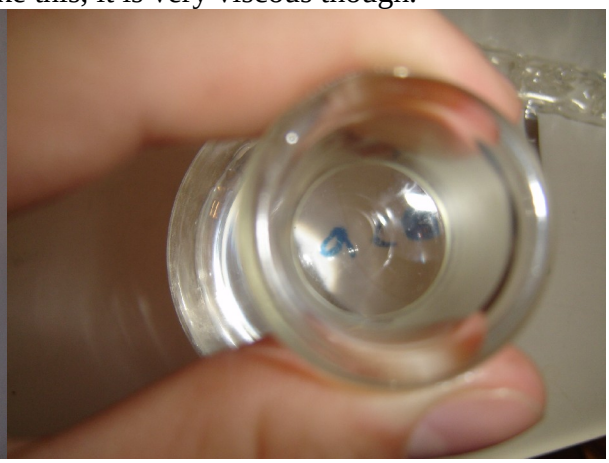


Here is a picture made during the rise of temperature when the NaOH is dissolved in water.



The solution turns white(milk color) and gets **very hot**.

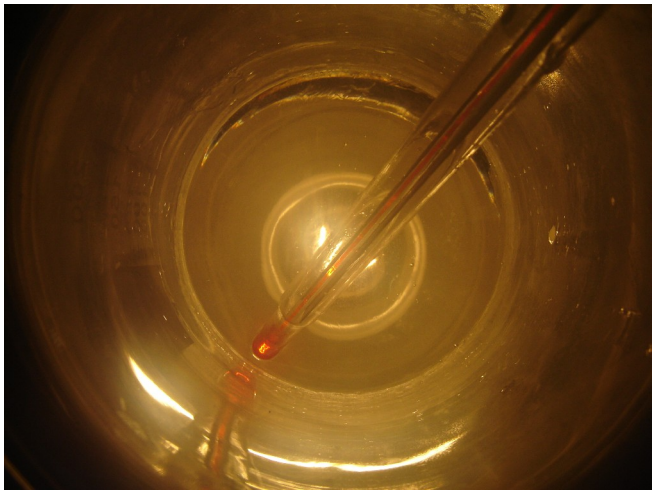
When adding the NaOH solution to the γ-butyrolactone 2 layers will form, one layer which is the NaOH on the bottom, and one layer the upper layer of γ-butyrolactone. You need to shake it very very hard to get everything mixed good enough and get the reaction going, you need to add hot NaOH to roomtemperature γ-butyrolactone, all at once. The reaction is heavy so watch out! It will start boiling out of itself.
After the reaction is complete (30seconds) the white layer is gone (the layer on the bottom of NaOH-solution). And it will look like this, it is very viscous though.

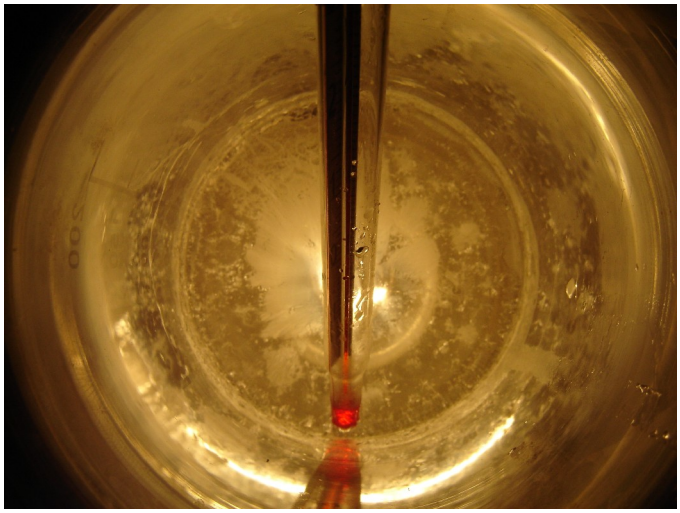
Side view ; Top view

After the temperature has dropped to 20*C you can measure the pH and if you did it right you get pH 7, which will most likely be yellow in color on your pH strip.

Now I wanted to get crystals so I poured the whole liquid in a beaker, and started to boil of the water.



This is the beaker on top of a hot lamp.



Here quite some water evaporated and crystals started to form in solution.

Even more crystals formed.

Here you can see crystals precipitating out of the solution, actually the liquid is molten Na-GHB. And where some of the liquid came to the walls of the beaker while stirring the crystals started to form.


After standing for a while in a cold enviroment, the temperature dropped quickly and the liquid solidified to a big solid mass, which could be scraped out of the beaker and which can quickly be put in a zip-lock bag.

Reaction mechanism:

γ-butyrolactone + sodiumhydroxide → sodium salt of γ-hydroxybutyrate.

Because of the heat the circle is opened, and at the ketone bound it breaks, and the hydroxy group will be added to the free electron pare at the end of the tail.