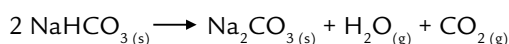


The thermal decomposition of sodium hydrogen carbonate (or: Making honeycomb)

Honeycomb (cinder toffee) is made using a thermal decomposition reaction to produce the gas bubbles.

Sodium hydrogen carbonate (also known as sodium bicarbonate or bicarbonate of soda) has the chemical formula NaHCO_3 . When it is heated above about 80°C it begins to break down, forming sodium carbonate, water and carbon dioxide. This type of reaction is called a thermal decomposition.



This reaction is used in cooking where the carbon dioxide gas causes a number of products to rise. The higher the temperature of the mixture, the faster the reaction is. A toffee mixture of golden syrup and sugar will get very hot, well over 100°C , when heated to boiling point and sodium hydrogen carbonate added to it will decompose very quickly. This causes the toffee to puff up from the gas bubbles formed. If it is cooled quickly by being poured into a cold tin then the toffee will have all these bubbles in it, giving a solid foam. It is known by various names including honeycomb, cinder toffee and hokey-pokey.



Heating the toffee mixture

You will need:

- 100g caster sugar
- 2 tablespoons golden syrup
- $\frac{1}{2}$ tablespoon sodium hydrogen carbonate (bicarbonate of soda) – not baking powder
- Heavy-bottomed saucepan
- Wooden spoon
- Stove
- Baking tin, greased thoroughly or lined with a tefal sheet
- Apron

What you do

Wear an apron and take care as the mixture will get very hot.

Measure the sugar and golden syrup into the saucepan. Mix them together then put on a low heat, stirring until they boil and then simmer gently for about 3 minutes. The mixture can burn if heated too hard so keep the heat quite low and stir occasionally. It will be ready when it has darkened a bit.

Take the saucepan off the heat and quickly stir in the sodium hydrogen carbonate. Watch as it thermally decomposes, forming gas bubbles in the mixture and causing it to foam up. Don't over stir or you will lose your bubbles.

Tip into the waiting tin and leave to cool while you admire the results of your chemical reaction.

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