EXPERIENCE N°1

# Lava lamp

**The purpose of this experiment is to use the acid-base properties of sodium bicarbonate to achieve a lava lamp type system.**

| | |
|---|---|
| **Materials required:** | 1 transparent container 500 mL of oil,<br>1 container 200 mL of vinegar, dye or ink,<br>50g of sodium bicarbonate, |
| Safety : | An adult should monitor the experience. Sodium bicarbonate is not a dangerous product. However, you should take care not to directly mix the vinegar<br>and bicarbonate to avoid splashes.<br>Acetic acid is a corrosive and irritating product, especially for the eyes and other sensitive mucosa that should not come into contact with this compound.<br>In this experiment, since the acid concentration of vinegar is low, wearing protective glasses is enough. |

At the bottom of the larger container, arrange the baking soda in an even layer. Slowly pour the oil against the 500 mL container wall so as not to disperse the bicarbonate in the oil.
In the other container, mix the vinegar and the ink or dye to obtain a colored solution: "lava".
Gently inject the colored solution onto the surface of the container with the oil. Heavier than oil, colorful bubbles fall to the bottom of the container and in contact with sodium bicarbonate, they go back because the carbon dioxide formed lightens the bubbles. Carbon dioxide escapes when the bubble reaches the surface and falls again.

The reaction observed in the system is a reaction involving sodium bicarbonate $NaHCO_3$, the base, with acetic acid $CH_3COOH$ vinegar, acid.

The balanced equation of the reaction is:

$NaHCO_3 (s) + CH_3COOH (1) \rightarrow NaCH_3COO (s) + H_2O (1) + CO_2 (g)$

The products formed are sodium acetate (a salt), water and gaseous carbon dioxide.

This reactivity of sodium bicarbonate with acidic species is at the origin of many applications of this product.
It is used to neutralize the acidity of certain fruits or vegetables (tomatoes, etc.) and soften the meat.
In bakery, bicarbonate can be used to prepare yeast (emission of $CO_2$ bubbles) when mixed with acid products such as milk and its derivatives.
In addition, sodium bicarbonate has an anti-odor power because many odors are generated by acid substances that it reacts with and thus neutralize them. Due to this reactivity baking soda is a treating agent for flue gas acidity; but also in animal feed to increase the welfare and milk production of cows that often suffer from acidosis.

**France**
**SOLVAY-CARBONATE-FRANCE**

25, rue de Clichy
75442 Paris Cedex 09
Tél. : +33-1 40 75 82 96

**Bénélux**
**SOLVAY CHEMICALS INTERNATIONAL**

Rue de Ransbeek, 310
1120 Bruxelles
Tél : +32-2-264 27 23