

Producing a foam

Introduction

Two solutions are mixed, and a chemical foam is produced

Equipment

Apparatus

- Eye protection
- Beaker, 250 cm³, x2
- Pestle
- Mortar

Chemicals

- Laundry detergent – eg Persil non-biological
- Hydrated aluminium sulfate
- Sodium hydrogen carbonate

Health, safety and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3VhgS5Q>
- Always wear eye protection.
- Aluminium sulfate can cause eye damage, see CLEAPSS Hazcard [HC002b](#).
- Laundry detergent may irritate the skin.

Notes

- It is sometimes difficult to dissolve these reagents, but the reaction still works.
- The foam is produced by the action of carbon dioxide gas on a detergent solution.
- Hydrogen carbonate ions from the detergent react with hydroxonium ions from the aluminium sulfate and water to produce carbon dioxide.
- $\text{HCO}_3^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
- Teachers need to tell students that aluminium sulfate in water produces H_3O^+ ions.
- This is similar to the baking process; baking powder contains sodium hydrogen carbonate and tartaric acid.
- This chemical foam contains carbon dioxide (CO_2), while mechanical foams often contain air.
- This foam is a colloidal system with a gas dispersed in a liquid.
- This is a suspension of gas in the liquid.
- Other common foams include whipped cream and shaving cream.

Answers

1. $\text{HCO}_3^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
2. Baking powder contains sodium hydrogen carbonate and tartaric acid.
3. Whipped cream and shaving cream.