

The Journey of a Soda Can: From Creation to Use in the United Kingdom



Every time you open a can of soda, you're holding a marvel of engineering, chemistry, and sustainability.

In the United Kingdom, where soda cans are a **ubiquitous** part of daily life, millions of these aluminium containers are produced each day. But have you ever stopped to think about how a soda can is made, the materials used, and its impact on the environment? Let's explore the journey of a soda can, from its creation to its recycling, with a focus on sustainability.



The Raw Material: Bauxite to Aluminium

The primary material for soda cans is aluminium, a lightweight yet strong metal. Aluminium is derived from a mineral called **bauxite**, found primarily in countries like Australia, Guinea, and Brazil. While the UK does not mine bauxite, it imports the raw material to produce aluminium.

The process begins with bauxite mining, where large deposits of the mineral are extracted from the Earth. The bauxite is then transported to processing plants, where it undergoes a refining process to extract **alumina** (aluminium oxide). This is achieved through the Bayer process, which uses **caustic soda** and heat to separate alumina from the other elements in bauxite.

Next comes the **Hall-Hérout process**, where alumina is dissolved in molten **cryolite** and subjected to **electrolysis**. This process separates pure aluminium metal from the alumina using high electrical currents. The aluminium is then cast into large blocks or **ingots**, ready for manufacturing.



Manufacturing the Can

In the UK, soda can production is a highly efficient process. Aluminium ingots are transported to factories, where they are rolled into thin sheets. These sheets are cut into discs and shaped into cylindrical cans through a process called deep drawing and ironing.



Shaping the Can:

The aluminium discs are pressed into a cup shape, which is then stretched and thinned to form the body of the can. This process ensures that the can is lightweight yet strong enough to hold pressurised soda.

Adding the Base and Rim:

The bottom of the can is curved to withstand pressure, while the top is rimmed to secure the lid.

Coating and Printing:

Before the can is filled, it is coated inside with a thin layer of epoxy resin. This lining prevents the soda, which is acidic, from reacting with the aluminium. The outside is printed with colourful designs and branding using specialised inks and dyes.

The Lid and Opening Mechanism:

The can's lid is made separately and includes a pull-tab mechanism, a clever design that allows easy opening while keeping the can airtight.



Filling and Distribution

Once the cans are manufactured, they are transported to bottling plants, where they are filled with soda. The filling process happens in a highly controlled environment to maintain hygiene and ensure the soda's fizz is preserved.

Carbonation:

Soda is carbonated by adding **carbon dioxide (CO₂)** under high pressure. This creates the bubbles that make soda fizzy.

Sealing:

After filling, the cans are immediately sealed with lids to prevent the CO₂ from escaping.

Distribution:

The finished cans are packed and distributed to shops and supermarkets across the UK. The lightweight nature of aluminium makes transportation efficient and reduces fuel consumption.



The Role of Recycling

One of the most remarkable aspects of aluminium is its recyclability. In the UK, around 75% of soda cans are recycled, making it one of the most recycled packaging materials.

Collection and Sorting:

Used soda cans are collected through household recycling schemes and public recycling bins. They are then sorted at recycling centres.

Melting and Recasting:

The cans are shredded, cleaned, and melted in a furnace. The molten aluminium is then recast into new ingots, ready to start the process again.

Energy Efficiency:

Recycling aluminium requires **95% less energy** than producing new aluminium from bauxite. This significantly reduces greenhouse gas emissions.



Environmental Impact and Sustainability

While soda cans are more sustainable than many other packaging materials, they are not without environmental impact.

Mining Concerns:

Bauxite mining can lead to deforestation and loss of biodiversity in the countries where it is extracted.

Energy Usage:

The Hall-Héroult process is energy-intensive, contributing to carbon emissions. However, in the UK, advancements in renewable energy are helping to reduce the carbon footprint of aluminium production.

Recycling Challenges:

Although recycling rates are high, millions of cans still end up in landfills each year. These cans take centuries to degrade, underscoring the need for better recycling habits.



The Future of Soda Cans

To make soda cans even more sustainable, companies and researchers in the UK are working on innovations such as:

Lightweighting:

Reducing the amount of aluminium used in each can while maintaining its strength.

Improved Recycling Systems:

Increasing public awareness and access to recycling facilities.

Alternative Coatings:

Developing eco-friendly linings to replace epoxy resin, which contains bisphenol A (BPA), a chemical with potential health risks.

The journey of a soda can is a testament to human ingenuity and the importance of sustainability. By recycling and choosing eco-friendly options, we can all play a role in reducing waste and conserving resources.



Comprehension Questions



1. What is the primary raw material used to make aluminium for soda cans, and where is it mainly sourced?
2. Describe the two processes involved in transforming bauxite into aluminium.
3. Why is the inside of a soda can coated with epoxy resin?
4. Explain the process of recycling aluminium cans and its benefits.
5. What environmental concerns are associated with bauxite mining?
6. How does recycling aluminium reduce energy usage compared to producing new aluminium?
7. What are some innovations being developed to make soda cans more sustainable?
8. Why is aluminium considered a good material for making soda cans?