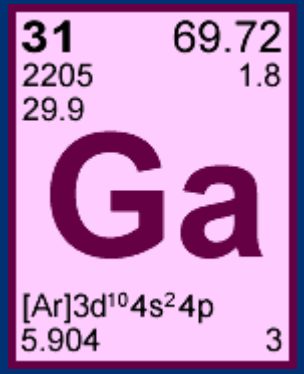

Gallium

Santa Rosa Junior College

Engineering 45

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“There is an incredible metal that shatters like glass, melts in a human hand, attacks other metals but is non-toxic to humans, and acts like an alien life form when exposed to sulfuric acid and dichromate solution”.

--Gajitz.com

Fun Facts

Gallium is a metal that is liquid just above room temperature. As a solid, pure gallium is brittle and a poor electrical con

Fun Facts

- Gallium exists in all human bodies in a small quantity of ½ mm^3.
- Gallium exists in the earth's crust at 16 PPM
- Gallium is 10,000 times more abundant on earth than the rest of the solar system.

Low Melting Point


4GIFs.com

Fun Facts

- Melting point is 29.76 °C
- Boiling point is 2229 °C
- Second largest liquid range of any element
- Crystal Structure: Orthorhombic
- 1 of 5 elements that expand when they freeze
- Does not appear in nature and must be extracted
- Obtained from bauxite, germanite, coal
- Leading producers are China, Germany and Kazakhstan.

What is Gallium used in?

- Semiconductor production (gallium arsenide)
  - Gallium arsenide has a similar structure to silicon
- High temperature thermometer
  - Non-toxic substitute for mercury (boiling point only 357 °C)
  - Gallium more temperature sensitive than mercury
- Aluminum-gallium-arsenide (AlGaAs) used to make LEDs
- Microwave and radar equipment
- Mirrors
- Nuclear weapons
  - Stabilizes allotropes in plutonium

Gallium Experiments

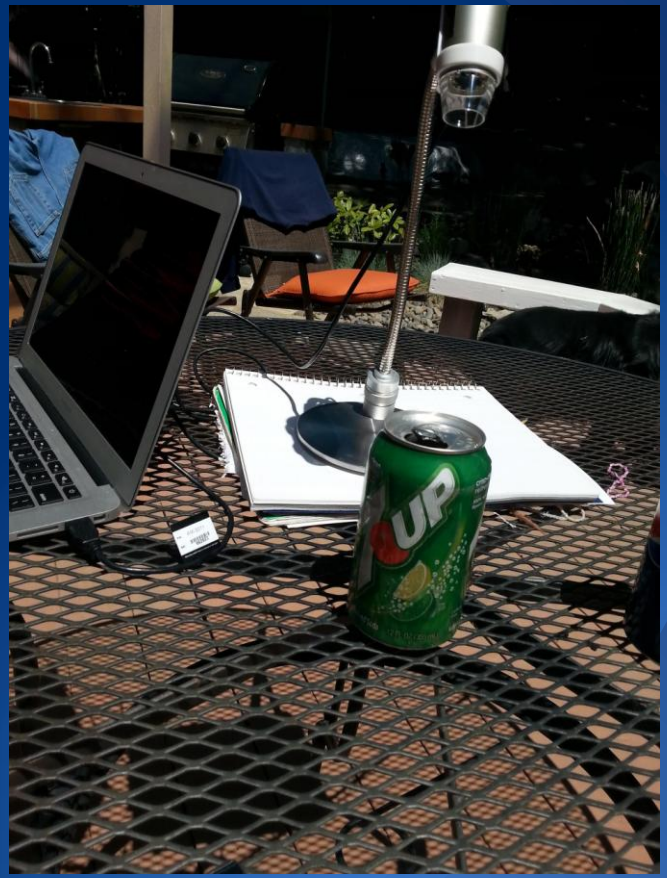
- Aluminum Gallium Reaction- Gallium reacts with Aluminum to create an Aluminum alloy that crumbles at the touch.
- Gallium Aluminum & Water reaction. When the Aluminum alloy is exposed to water it reacts violently to create a new Aluminum alloy and hydrogen gas (H_2).

Why this happens?

Gallium attacks many metals including Aluminum & Steel by diffusing into the grain boundaries making them extremely brittle. Gallium easily alloys with many metals in low quantities.

Experiment

- High performance camera
- Aluminum cans
- Computer
- Gallium
- Scratching tool
- Solar heat source



We experimented with:

- 1/16” thick sheet
- Aluminum foil
- Aluminum can

Experiment with 1/16” sheet

Needed a long time for enough Gallium to react with the Aluminum to cause a noticeable change in the the metal.

Process on Aluminum Sheet

start time: 0 min

after 8 min

after 13 min

after 19 min

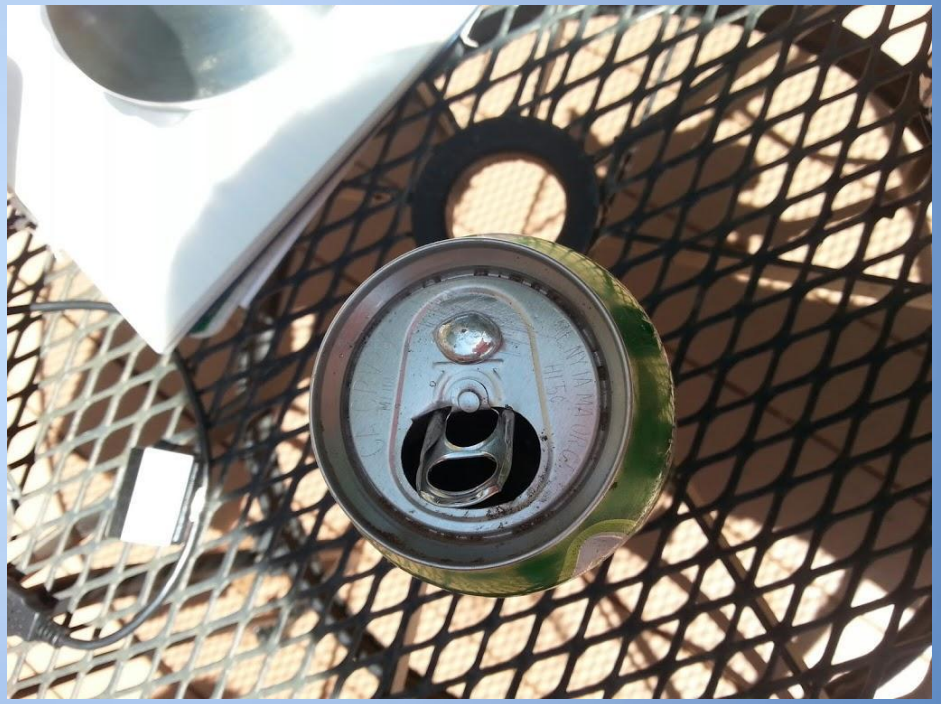
after 50 min

Experiment with Aluminum Foil

The Aluminum reacted with the Gallium very fast. When we attempted to scratch off the oxide layer, we compromised the structural integrity of the Aluminum which made it hard for us to

Experiment with Aluminum Cans

The Aluminum can worked best because it was very strong to start with and also thin enough for the reaction to make rapid changes.



Gallium and Aluminum

https://www.youtube.com/watch?v=rY3rYe0Mn1Y

Gallium, Aluminum and Water

https://www.youtube.com/watch?v=NiybHvz8Tag

Gallium Experiment

In conclusion, Gallium is a very interesting metal that can do many unique things. Gallium can be useful in alloys but is also very corrosive to some metals. Even though some of Gallium's properties have no practical application they are still very interesting to analyze.

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