

ZINC-PLATING COPPER AND THE FORMATION OF BRASS – 'TURNING COPPER INTO SILVER AND GOLD'

Topic: Electrochemistry, electroplating, alloys

Timing: 10 minutes

Apparatus: 1) Two 250 mL beakers
2) Bunsen burner, tripod and gauze
3) Pair of tongs or tweezers
4) Access to top pan balance
5) Tissue papers

Materials: 1) 5 g zinc powder
2) 24 g of sodium hydroxide pellets
3) Concentrated nitric acid (to clean the coins)
4) 100 mL distilled / de-ionized water
5) Copper coins (1 cent / 1p)

Methods: Before the demonstration

- Clean a copper coin with concentrated nitric acid.
- Dissolve 24 g of sodium hydroxide pellets in 100 mL of de-ionized water. Then, add 5 g of zinc powder to this solution. The solution will fizz as some of the zinc dissolves forming sodium zincate and giving off hydrogen.

The demonstration

- Drop the cleaned copper coin into the solution containing sodium zincate and the remaining zinc powder. The coin must be contact with the zinc. Leave the coin until it is plated with a shiny coat of zinc. This will take at least 30 minutes and above (overnight is better).
- Remove the plated coin with tongs or tweezers and rinse it under a running tap water or plentiful de-ionized water to remove any sodium zincate. Then, wipe dry with tissue papers. Now, we could see the clean silver coin.
- Using tongs or tweezers, hold the silver coin in the upper part of a roaring Bunsen flame for a few seconds until the surface turns gold. Turn the coin so that both sides are heated equally. (Overheating will cause the coin to tarnish). The gold colour is brass formed by the zinc migrating into the surface layer of the copper. Finally, allow the coin to cool at room temperature.