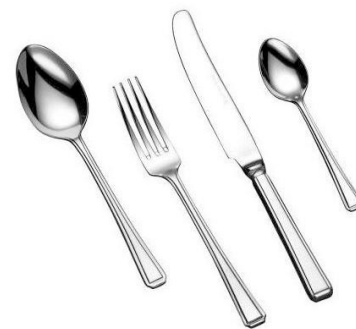


# Removing Tarnish From Silver



## Introduction

Everyone who uses silverware has noticed that it often tarnishes, or turns dark. This occurs when silver reacts with sulfur dioxide in the air, forming silver sulfide ( $\text{Ag}_2\text{S}$ ). Contact with certain foods that contain sulfur can also cause silverware to tarnish. Egg yolks, which contain hydrogen sulfide ( $\text{H}_2\text{S}$ ), can cause this effect, as well as rubber bands, which contain sulfide from the vulcanization process. Silver tarnish can be removed by a paste that contains a mild abrasive that wipes away the silver sulfide and exposes the silver beneath. It can also be cleaned chemically by reversing the tarnishing reaction, turning the sulfur into hydrogen sulfide gas.

In this lab, you will first use tarnish remover to clean silverware. You will then coat the silverware with egg yolk and allow it to sit until it has tarnished. Finally, you will react the tarnish in an aluminum pan with a hot solution of baking soda. The baking soda speeds up the reaction between the tarnish and the aluminum, which is written as:



## Materials

aluminum pie pan	sodium bicarbonate (baking soda) [ $\text{NaHCO}_3$ ]
cloth or rag	tarnish remover
egg	
silverware, various	

## Equipment

beakers, 100-mL & 1000-mL	stirring rod
hotplate	tablespoon

## Safety Considerations

- Sometimes chemicals from previous labs still remain in glassware and on other lab equipment; wash all lab equipment before and after performing this lab.
- Wash your hands thoroughly after completing this lab.

## Procedure A – tarnishing silver

1. Using silver tarnish remover and a clean cloth or rag, gently wipe a piece of silverware until it is shiny and all the tarnish has been removed.
2. Obtain an egg and separate the yolk into a 100-mL beaker; discard the egg white.
3. Generously spread egg yolk all over the piece of silverware and allow it to sit for 10-15 minutes.
4. After sitting for 10-15 minutes, gently rinse the piece of silverware until all the egg yolk has been removed. Record your observations in the Data Table.

## Procedure B – chemically removing tarnish

1. Add around 500 mL of tap water to a 1000-mL beaker and heat it with a hotplate until it is hot but not boiling.
2. Add 2 tablespoons of baking soda to the hot water and stir until it has all dissolved.
3. Carefully pour the hot solution into an aluminum pie pan until it is  $\frac{3}{4}$  full.
4. Place the rinsed, tarnished piece of silverware in the hot solution.

- After 5-10 minutes, remove the piece of silverware. If it is still tarnished, add another tablespoon of baking soda and put the silverware back in the solution.
- After the tarnish has been fully reacted away, record your observations in the Data Table.

**Clean-up**

- Egg shells must be placed in the trash, NOT THE SINK.
- Dispose of any leftover solutions or baking soda in the sink.
- Clean all used lab equipment with soap, water and a test tube brush.
- Return all equipment to its proper location.
- Wipe down your lab area and wash your hands before leaving the lab.

**Data Table**

Silverware	Observations
after treatment with egg yolk	
after treatment in aluminum pan	

**Questions**

- Which process of cleaner is better for removing tarnish, the commercial paste or the baking soda? Why do you think so?  


---


---
- When silverware tarnishes, do you think it gets lighter, heavier, or stays the same? Why?  


---


---
- Identify two pieces of evidence that showed a chemical reaction occurred.  


---
- Sulfur dioxide gas, which causes the majority of silver tarnish, is produced by burning coal and other fossil fuels. What other major environmental problem is caused by sulfur dioxide?  


---
- List one way you could change this lab and describe how your results might be different.  


---


---