Introduction

My aunt's job is a jewelry maker, she does her job at her own house. When I was I child I always love the crystal things and espicially the silver, so my aunt amd for me a silver ring. I loved it so much I always wore to school , play with my friend, take the shower, and also go to sleep. Once day my rings turn it color to the brown, I felt so sad, but my aunt did her job as the magic in front of me to make my ring beautiful again. Then , when I went to high school I knew that was chemical reaction, my curious lead me to the experiment remoing tarnish from silver obects

Silver or silver platted objects have a bright, shiny surface. As time passes these surfaces gradually become less shiny and darken. The reason behind this is the chemical reaction between silver and sulfur substances in the air. As simple chemistry procedure may be used to reverse this effect and

Tarnish of silver is caused when sulfur reacts with it to form silver sulfide which is black in color. This is the reason as to the darkening of the silver object. The method used in the experiment above for the tarnish removal reverses the chemical reaction hence turning the silver sulfide back into silver. Many metals among them being silver react with sulfur to form its compound and some of them have a higher affinity to this reaction compared to silver. Baking soda used in this experiment contains aluminum which has a higher affinity to sulfur compared to silver. The reaction is as follows

$$3\,Ag_3S + 2\,Al \longrightarrow 6\,Ag + Al_2S_3$$

Silver sulfide + Aluminum ⟶ Silver + Aluminum sulfide

Temperature of the mixture affects the rate of reaction between the aluminum and silver sulfide. In the hot water mixture the reaction is faster as the kinetic energy of the molecules is increased making them speed up the reaction. The product of this reaction which is aluminum sulfide may adhere to the aluminum foil which may be seen as pale yellow flakes at the pans bottom.

Hypothesis

I expect The tarnish begins to disappear almost immediately from the silver spoon in the hot water mixture. For the light tarnished object the tarnish will disappear after a few minutes. When the mixture is not heated it takes a long period of time for the tarnish to be removed and the silver spoon does not shine as much as compared to the one that was immersed in the hot water mixture. For the cold water the reaction is slow and the tarnish takes a considerable longer time to begin peeling off and it is not completely removed.

The research question

How does the temperature of water affect the rate of removing tarnish from silver objects?

Materials

- 6 identical tarnished silver spoons
- Aluminum foil
- A pan large enough to immerse the silver
- 1 liter of water
- 100g of baking soda
- Thermometer
- Timer

Method

- Cover the bottom of the pan with the aluminum foil.
- Place the silver spoon on top of the aluminum foil making sure they touch
- Heat the water until it boils then place it in a sink
- Add 100g baking soda to the hot water
- There will be frothing of the mixture hence the reason of placing it in the sink.
- Record the temperature of the mixture
- Take the mixture of the hot water and the baking soda and pour it in the pan making sure the silver is completely immersed and covered.
- Start the timer and stop if after the tarnish has been completely removed from the spoon.
- Repeat the process three times to have precise results
- Using cold water at room temperature to make the mixture repeat the procedure from the start and record the time taken for the tarnish to be removed.
- Repeat three times to get precise results.

Variables

Dependent

Time taken for the tarnish to be completely removed from the silver spoons

Independent variable

The temperature of the mixture of water and baking soda

Controlled variable

The surface area of the silver spoons as they are identical