CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J1518

Project Title
Melting with Metals

Abstract

Objectives/Goals
I wanted to know which type of metal conducts heat the fastest. I think aluminum will melt butter the fastest. My research found that Aluminum has the lowest specific heat capacity (24.2) out of the 5 metals. The lower the specific heat capacity the faster the metal will heat up and melt the butter.

Methods/Materials
Base clamp, Bunsen Burner, stop watch, camera, mini cup, wooden rod, metal wand with Nickel, Aluminum, Brass, Copper, and Steel spokes, foil, butter cut into equal chunks (2 TBSP)

Cut butter into equal chunks. Place on foil and refrigerate until use. Secure metal wand onto base clamp. Place Bunsen Burner under 1 metal spoke tip. Place butter chunk on metal spoke pushing it to the center axle. Turn burner on to heat tip of metal spoke. Using a stop watch time how long it takes for butter to begin melting. Record time on data chart. Let wand completely cool. Repeat two more times with same spoke. Then repeat all steps for remaining 4 metals.

Results
Copper melted butter with an average time of 56 sec., Brass 1 min. 9 sec., Aluminum 1 min. 15 sec., Steel 2 min. 52 sec., and Nickel 9 min. 36 sec. Copper, Brass, and Aluminum melted the butter relatively close in time. But Nickel wasn't close to any of metals.

Conclusions/Discussion
My data showed that Copper melted butter the fastest. I was surprised my results did not support my hypothesis. I based my hypothesis on specific heat capacity which tells you how much energy it takes for the metal to heat up. With further research, I found a property called Thermal Conductivity which describes the flow of heat through the metal rod. The higher the number of Thermal Conductivity the more heat flows through the metal. Copper's conductivity is 401 which is the highest of all 5 metals. Copper should melt butter the fastest and that is what I observed. I tried my experiment 3 times but trial #2 didn't turn out like the others. There were errors that may have caused the 2nd trial to be off. It was a breezy day. The wind could have made the flame flicker causing uneven heating. The tool used to cut the butter made it difficult to cut equal slices which may have made it take longer to melt on some trials. I was amazed at the range of time between the metals from 56 sec. for Copper to 9 min. 39 sec. for Nickel. I can say "Yes" the type of metal does affect how fast it can conduct heat.

Summary Statement
I wanted to find out which type of metal can conduct heat the fastest.

Help Received
My science teacher Mrs. Patterson helped me find an investigative question. My dad helped me gather my supplies, turn on and off the Bunsen burner, and conduct the experiment. My mom proof read my written paragraphs.