CHEMISTRY IN ART

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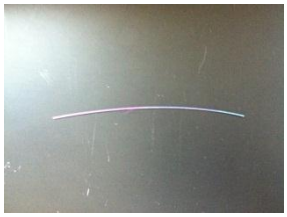
Metals contain several characteristics that can be taken advantage of to produce art and materials the average consumer may want. In fact, metals have always played an important role in civilizations throughout the course of history. The ancient Egyptian's used to mine copper, silver, and gold for various uses. The latter of the two metals are considered to be precious metals and will always be highly sought after. Today in lab, we explored three distinct characteristics of metals that make them so useful in arts and crafts. The first trait explored was malleability. Malleability is the ability of a metal to be extended or shaped without breaking. Some metals such as aluminum, silver, and copper are more malleable than others; however, it all depends on the properties of that unique metal. For the first experiment conducted, we were to make a wire metal sculpture. I decided to create a caged marble as imaged above. The metal we used was aluminum, and I was very surprised to how malleable it actually was. There were several different pliers available to bend the short strand of aluminum, but many times all it took was my hands to create the cage for the marble. I also attempted to make the letter "C", but it did not quite turn out how I wanted it to. The second experiment involved the oxidation of the surface of the metal niobium. Metals have the ability to undergo oxidation/reduction reactions. Oxidation involves the loss of electrons, while reduction is the gain of electrons. The thin strand of niobium was placed in a beaker filled with an electrolyte solution and was oxidized while a piece of stainless steel (also in the solution) was reduced. The source of power driving the reaction was 9V batteries. The thickness of the oxidation layer is controlled by the voltage (the amount of batteries used) and different thicknesses result in different colors. While it may be hard to see, my niobium metal wire is the color of blue and two different shades of purple. This was my favorite experiment of the day because I find electrochemistry to be pretty interesting. It was also fun to experiment with different voltages to get the different colors. The last experiment of the day was copper patinas. Patinas are an example of tarnishes that discolor the surface of a metal overtime. The reason for the discoloring is because of a reaction with the atmosphere. Patinas form due to oxides. The heat patina we created in lab is a metal oxide, while the green and blue patinas are due to different salts of copper I and copper II. These salts are typically sulfides, sulfates, or chlorides. Four different colors were supposed to be produced: light green, blue, light blue-green, and the heat oxidized color. The picture above shows this effect from the three different colored solutions. I also created a leaf patina, but the result was not as prominent as above. This was most likely because I did not sand paper the copper rectangle well enough. Overall this lab was packed with several topics that related with important qualities metals possess, and the learning objective to understand the development of chemical theory and apply current chemical content to solving problems was achieved. By applying the traits we learned in lecture today, we were able to create three different pieces of artwork that all complement each other in their own unique way. Metals have always been and will continue to be an important aspect of the art community. Today's lab shows only a small portion of how they are used in real world applications ranging anywhere from the natural patina of the Statue of Liberty to malleable sculptures across the globe.

Malleability of Aluminum (Caged Marble)



Niobium Oxidation

Copper Patina Effect