Chemistry and Welding article

### The Chemistry of a Welding Rod

**Introduction**

Until this year, I had no idea what a welding electrode was, but I am currently taking a welding class out at the Billings Career Center. We are learning a variety of things, such as how to use the machine correctly, how to weld specific joints, and how to weld in a variety of different positions. A welding electrode is the rod that makes the bead of metal by using electrical currents from a welding machine. I hope by taking this class it will give me enough experience to continue this hobby throughout my life.

**Composition of ...**

A welding electrode is made up of two parts: the actual metal, and the flux coating. The metal can vary from mild-steel, cast iron, stainless steel, high-tensile steel, copper, bronze, brass, or aluminum. The metal is then wrapped in a flux coating that is blends of cellulose, which is used by plants to give them flexibility, iron powder, and hydrogen. It is also blended with some Sodium, Titania and Potassium. The flux coating makes the electrical currents flow more evenly during the weld.

**Main Chemicals, Compounds, Components**

The two main ingredients of a welding rod would be iron (Fe) and cellulose (C6H10O5), which is a carbohydrate. Iron is strong, hard, magnetic, silvery-grey metal, the chemical element of atomic number 26, a transition element widely distributed as ores. Cellulose is an insoluble substance that is the main constituent of plant cell walls and of vegetable fibers such as cotton. It is a polysaccharides.

**Chemistry's Role**

When welding with a welding electrode on a specific joint or piece of metal, the electric current coming from the welding machine to the rod holder, to the grounded out area in which you are welding, to the rod, heats up and melts the rod and the flux creating a bead. The bead then solidifies on the base metal holding the joints together.

**Background Research**

Welding rod  comes in all different sizes. The most common welding rod that we use in class at the Career Center are E6010 and E7018. The numbers, 60 and 70, are to tell you the tensile strength of the rod. The third number, which is 1, in both of these codes tells you that the rods can be used to weld in all positions (overhead, vertical, horizontal, and flat). Before you start to weld, you need to know what type of rod to use depending on the thickness of your metal, and the amount of amps needed to burn the electrode. Here is a chart to kind of give you an example of what I mean.

|  |  |  |  |
| --- | --- | --- | --- |
| Electrode Table |  |  |  |
| ELECTRODE DIAMETER (THICKNESS) | AMP RANGE | PLATE |  |
| 1/16" | 20 - 40 | UP TO 3/16" |  |
| 3/32" | 40 - 125 | UP TO 1/4" |  |
| 1/8” | 75 - 185 | OVER 1/8" |  |
| 5/32" | 105 - 250 | OVER 1/4" |  |
| 3/16" | 140 - 305 | OVER 3/8" |  |
| 1/4" | 210 - 430 | OVER 3/8" |  |
| 5/16" | 275 - 450 | OVER 1/2" |  |

he chart above explains the  bigger the electrodes diameter, the more amps needed, and the thicker the metal plate used.  
  
Also at the Career Center, we are learning how to weld in a variety of different positions. The four main welding positions are: flat, horizontal, vertical, and overhead. We are also learning how to weld the five basic joints, Those are: T-fillet, corner joints, butt joints, edge joints, and lap joints.

*Care of the Welding Electrode*

Need to be kept in warm dry places, such as a rod oven. Chipping the flux cause insufficient weld penetration. Caring for the electrodes is certainly a must because you will not be able to get the best possible weld from a rod that has been cared for incorrectly.

**Resources**

<http://www.metalwebnews.com/howto/weldrod.html>

[**http://www.red-d-arc.com/pdf/Welding%20Electrode%20Classifications.pdf**](http://www.red-d-arc.com/pdf/Welding%20Electrode%20Classifications.pdf)

<http://www.weldingelectrodes.org/welding-electrodes/>

Audet, Allen. Welding Course. Manufacturing Design. Billings Career Center, Billings, MT.

2011-2012 School Year.

**About the Author**

Josie Pinch is a Junior that goes to Billings Senior High School. She has played volleyball for her high school for three years. She also attends the Billings Career Center and loves it. She never thought that welding would be one of her hobbies, but she loves it and hopes to continue the hobby throughout her life. She’ a very outgoing girl so don’t be afraid to say hey! She loves to hang out with her friends, and she is always up for a good time outside of school. She has been on the honor roll all throughout high school, and has been trying hard to get straight A’s for her Junior year. She is super excited for the summer, and she can’ wait for her senior year of high school!