The property displayed in this demonstration uses magnesium metal to display what happens to metal when it reacts with oxygen gas, that is found in the air around us. Magnesium metal and its alloys are explosive hazards; they are highly flammable in their pure form when molten or in powder or in ribbon form. Burning or molten magnesium metal reacts violently with water. When working with powdered magnesium, safety glasses with welding eye protection are employed, because the bright white light produced by burning magnesium contains ultraviolet light that can permanently damage eyes.

\[2 \text{Mg(s)} + \text{O}_2(g) \rightarrow 2 \text{MgO(s)} + \text{energy} \tag{1}\]
Magnesium is also capable of reducing water to the highly-flammable hydrogen gas, which will be ignited by the excess heat given by the reduction reaction.

\[ \text{Mg}_{(s)} + 2\text{H}_2\text{O} \rightarrow \text{Mg(OH)}_{2\; (s)} + \text{H}_2 \; (g) \tag{2} \]

Magnesium also reacts with carbon dioxide to form magnesium oxide and carbon:

\[ \text{Mg}_{(s)} + \text{CO}_2 \rightarrow 2 \text{MgO}_{(s)} + \text{C}_{(s)} \tag{3} \]

Hence, carbon dioxide fire extinguishers cannot be used for extinguishing magnesium fires either. Burning magnesium is usually quenched by using a Class D dry chemical fire extinguisher, or by covering the fire with sand to remove its air source.

**Materials**

1. strip of magnesium metal ribbon - 4 inches long
2. lighter

**Directions**

1. Hold the piece of magnesium metal ribbon in a pair of tongs.
2. Take the lighter and hold the magnesium metal ribbon in the hottest part of the flame.
3. It will soon catch fire and emit a very bright light.
4. CAUTION DO NOT LOOK DIRECTLY AT THE BRIGHT LIGHT. Briefly gaze at the light out of the corner of your eye.
Safety

- Wear goggles.
- Do not let children do this.
- Do not look directly at the light emitted from the metal.
- Make sure you hold the metal securely with the tongs.
- Keep away from combustible materials.

Remember that water cannot extinguish magnesium fires and will produce hydrogen gas (\(H_2\)) that will only intensify the fire. Wear goggles that filter out UV light. Throw the powder in the garbage.

References

- http://www.angelo.edu/faculty/kboudr..._magnesium.htm
- http://www.newton.dep.anl.gov/askasc.../chem03362.htm

Contributors

- Charles Ophardt, Professor Emeritus, Elmhurst College; Virtual Chembook