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Burning Magnesium Ribbon: Are students allowed to burn magnesium ribbon in a Bunsen burner flame using tongs as a class activity or should it just be a teacher demo? I know that people should not look directly at the burning ribbon. Also, is it okay to burn it in a crucible?

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Asked By: Anonymous
Tags

Tags

- burning
- magnesium
- combustion

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Answer by labsupport on question Answer by labsupport on question Answer by kris.szalai on question Burning Magnesium Ribbon

Submitted by Science ASSIST ... on Wed, 2014-12-03 15:37

Expert Answer

Answer reviewed 17 Feb 2023.

Burning magnesium ribbon poses a significant risk to students as it produces a high intensity white flame and high heat. The white light emitted by the magnesium burning is mostly in the visible light wavelength but is also in the UV-A range of the spectrum.[1] It can damage the eyes if students look directly at the flame.

The light cannot be observed safely without the protection of welding-standard safety glasses or through a shade 9 welding filter lens in addition to safety glasses.[1] Viewing through fingers, sunglasses, smoked glass, blue glass or polaroid filters are not recommended methods.[2] Students should be instructed not to look directly at burning magnesium. For more information about magnesium ribbon, consult the Safety Data Sheet[3] and the Chemical Management Handbook for Australian Schools - Edition 3 [4]

Burning Magnesium ribbon in a Bunsen flame

Due to the significant risks of burning small pieces of magnesium ribbon held with tongs over a Bunsen flame, it is recommended to only be done as a teacher DEMONSTRATION. Prior to the demonstration, a site-specific risk assessment should be carried out and safety guidelines followed as detailed below:

- Be aware that burning magnesium produces a lot of heat and a white flame that emits ultraviolet light that can cause significant damage to eyes.
- The piece of magnesium ribbon should be no more than 2 cm in length.
- Use crucible tongs to hold the piece of magnesium ribbon over the Bunsen burner flame to light it, or suspend the strip of magnesium over the Bunsen burner flame using a laboratory stand and clamp.
- Students should wear safety glasses and sit no closer than 2–3 m from the flame.
- Students are instructed **NOT to look or stare directly at the burning metal,**
- **Observation should be from the side (i.e., using peripheral vision) due to the risk of eye damage**.
- Avoid breathing in the smoke from the burning magnesium ribbon.

The burning of magnesium is a reaction between the metal magnesium and oxygen in the air. A chemical change occurs forming a new compound: magnesium oxide.

See the following *Youtube* link demonstrating magnesium reacting with oxygen.
https://youtu.be/m2i9jLPXprQ

Burning of magnesium ribbon in a crucible

This is an activity that can be performed as a class activity provided a site-specific risk assessment is carried out and the following safety procedures and guidelines are followed:

- Wear safety glasses.
- The magnesium ribbon can be cut into about 15 cm lengths before the lesson.
- The reaction is highly exothermic. Particular care should be taken to avoid burns.
- Students must only move the crucible and lid using tongs.
- Students should be discouraged from looking at the magnesium when it is burning and the bright light produced as this can cause eye damage.
- The number of magnesium strips used by students should be limited to one per group by the teacher.

This activity is an excellent demonstration of a combination/oxidation reaction and the conservation of mass in a chemical reaction.

Method

1. Take a piece of magnesium ribbon about 15 cm long and roll it into a tight coil.
2. Weigh an empty crucible with a lid and record its mass.

3. Place the coil of magnesium ribbon into the crucible, weigh the crucible, lid and magnesium and record this mass.
4. Place the crucible on a pipe clay triangle on a tripod stand and heat over a Bunsen burner.
5. Heat for 1 minute, then carefully lift the lid slightly with tongs. The magnesium will burst into flames as the air reaches it. Do not let any white smoke escape and replace the lid. This will prevent any loss of product (magnesium oxide).
6. Lift the lid periodically over 5 minutes to ensure an adequate supply of oxygen.
7. Let the crucible cool. When it is cool, weigh it. Record the mass of the crucible, lid and magnesium oxide. (Take care that a hot crucible is not placed on a plastic pan top of the balance or the plastic may melt.)

See *Youtube* video demonstrating magnesium reacting with oxygen in a crucible.
https://www.youtube.com/watch?v=OuFqtxZJRvM

Cleaning crucibles

The oxidation reaction of magnesium (Mg) with oxygen (O) in a ceramic crucible is commonly performed in high school senior science chemistry to produce magnesium oxide (MgO). This leaves behind a black carbon-like residue, which becomes strongly bonded to the crucible surface.[5]

Attempting to clean ceramic crucibles that have chemical/metal oxide residue stains will not remove all of the residue. Burning magnesium damages the ceramic surface of the crucible, making the strongly bonded residue very difficult to remove.

Science ASSIST recommends reusing the crucibles for this activity, as it will not interfere with repeated experiments in the future. Crucibles, like glassware, are consumable items and are cheap enough to replace by purchasing new ones from science suppliers. Any chipped, cracked or broken crucibles should be disposed of safely.

If thorough cleaning is to be attempted, scrape out the contents of the crucibles using a wire brush to remove the more stubborn bits. Gumption, fine sand or moist powdered pumice can be used to scour the crucibles to remove any residual magnesium oxide. Wash in hot soapy water and make sure that they are dry before soaking in 2M hydrochloric acid.

Soaking times vary from 5 to 10 minutes for general glassware or up to 12 hours for problem stains. After soaking, rinse 3 times in tap water and then once in distilled water and air dry.[6] After that anything that is ingrained into the ceramic glaze is not going to come off.

References

[1] CLEAPPS, (2022, January), *'PX059 Magnesium and magnesium compounds',* Retrieved from the CLEAPSS website *https://science.cleapss.org.uk/Resource-Info/PX059-Magnesium-and-magnesium-compounds.aspx* Login required

[2] CLEAPPS (2021, November), *'GL127: Ultraviolet (UV) light sources',* Retrieved from the CLEAPSS website https://science.cleapss.org.uk/Resource-Info/GL127-Ultraviolet-UV-light-sources.aspx Login required

[3] Chem-supply. (2021), '*Safety Data Sheet: Magnesium Ribbon'*. Search https://www.chemsupply.com.au/ to source the latest Safety Data Sheets for chemicals, via the product information page.

[4] Science ASSIST. (2018). *Chemical Management Handbook for Australian Schools – Edition 3*, Retrieved from the Science ASSIST website: https://assist.asta.edu.au/resource/4193/chemical-management-handbook-australian-schools-edition-3

5 Armstrong, Jacob A. 2005, ‘Combustion induced reaction of magnesium with a silicate coated crucible surface’, Journal of Young Investigators https://www.jyi.org/2005-february/2005/2/9/combustion-induced-reaction-o...

6 Dungey, Barbara,(2006), The Laboratory: a science reference and preparation manual for schools. Revised edition. Contemporary Press Pty. Ltd., Victoria

Burning Magnesium Ribbon

Submitted by Clonard College... on Wed, 2023-05-24 15:10

☆☆☆☆☆
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What is the lowest secondary year level you would recommend

by Clonard College (VIC151) on 24 May 2023

What is the lowest secondary year level you would recommend for students to be proficient in and safe to carry out the burning of Mg in a crucible and determine the conservation of mass. thanks

Thank you for submitting an answer to this question. Your response has been sent to our administration team for moderation.
