

The *Bain-Marie* and the Double Boiler

Grades: 2nd grade - 4th grade

efficient innovations in life

Materials: *Women in Engineering / Las mujeres en la ingenieria*, a double boiler (pot with water inside and heat safe bowl), a small pot, a hot plate or stovetop, chocolate, thermometer

NGSS: K-2-ETS1-1 Engineering Design, K-2-ETS1-3 Engineering Design, 3-5-ETS1-3 Engineering Design

Subject: Inventions as versatile and useful,

Skills: observation, critical thinking, experimentation

BACKGROUND

Women in Engineering / Las mujeres en la ingenieria highlights the ingenuity of engineering, and the timeless, universal nature of human invention. The inventions themselves, too, can be enduring, such as Mary the Prophetess's version of a double boiler, the bain-marie. Years after Mary's invention, engineers have expanded upon the bain-marie and have created the much more reliable double boiler. This activity will show your students the power of engineering, even in everyday tasks such as melting chocolates. By fashioning your own double boiler, your students will observe the practical and diverse types of inventions engineers make.



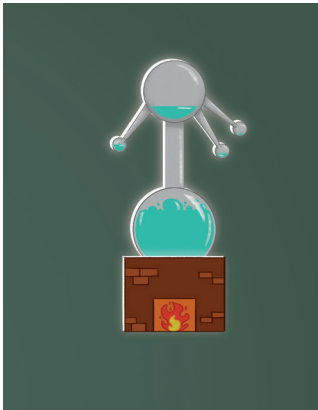
ACTIVITY

1. Read *Women in Engineering / Las mujeres en la ingenieria* aloud to your class.
2. Discuss the different inventions that you read about, and how inventions can be replicated and upgraded to improve the efficiency of a process.
3. Explain that while Mary invented the bain-marie, her work inspired the creation of the double boiler. Compare and contrast the similarities and differences the bain-marie has with the double boiler, and discuss how Mary's influence on the double boiler is still significant.
4. Melting chocolate is a simple process and can be done in several ways, but chefs complete this task using a double boiler because its design results in the best chocolate!
5. You can show your students how inventions can make a difference and improve our methods for doing something by creating your own double boiler!
 - A. For set up you will need: a hot plate (or a stovetop, if you are in a kitchen), a pot of water, a heat-proof bowl that can be placed on top of the pot (e.g. glass), another small pot, and four bars of chocolate.
 - B. Gather your students around your double boiler. Make sure they are cautioned against touching the set up, as the hot plate is a safety hazard.

The *Bain-Marie* and the Double Boiler continued

ACTIVITY CONTINUED

6. Inform your students that you'll be melting chocolate in two ways: by direct heat and by double boiler.
7. Keep certain parameters the same between these two methods (i.e. the equipment you use, the same amount of chocolate, same degree of heat). Discuss with your students why it's important in scientific experimentation to keep your controls consistent, so that you can directly compare the melting methods.
8. Turn the heat on to medium. In the small pot, melt two of the chocolate bars directly in the pot and keep stirring for a minute. For this method, you will not need water or the bowl.
9. The chocolate will melt, but explain how the chances of the chocolate burning is very high, given that it's so close to the heat source, and you have less control over how quickly the chocolate is melting. This is important for professionals who cook with chocolate, because it has to reach a very specific temperature in order to stay shiny and not break apart when it cools.



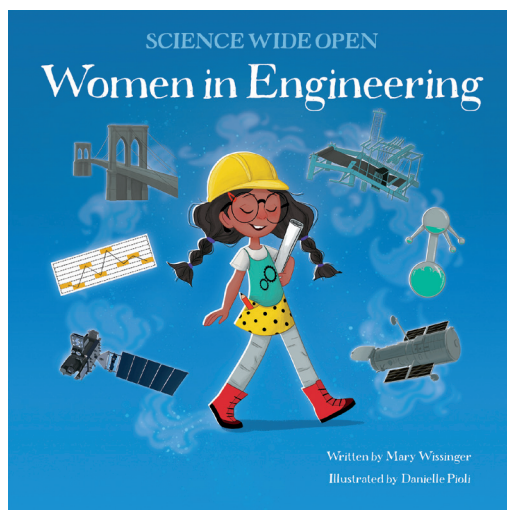
10. Melt the other two bars of chocolate in heat-proof bowl, which should be on top of other pot (this pot should have two inches of water in it, set to simmer in medium heat), this is your double boiler set up. Have your students observe the differences in process, and explain how using Mary's invention allows for the chocolate to melt evenly, and how you can even lift the bowl off the heat and cool it for a bit. Use your thermometer to ensure that you temper the chocolate to the correct temperature (110-115 degrees Fahrenheit).

11. Have your students taste test the chocolate!

DISCUSSION

Ask your students the following questions to start a discussion about inventions, and how they can help improve the methods we use:

1. What method worked better? Was there a difference?
2. How do you think the double boiler method works? How does it melt chocolate differently than when melting the chocolate directly in the pan?
3. Have you seen anyone use the bain-marie or a double boiler method outside of this experiment? Discuss the many different uses for this invention.



This activity was excerpted from the Teacher's Guide to
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