CANDLE MAKING

Unite/Theme: Distinctive Properties of Matter

Pursope: To conduct an experiment demonstrating the melting, freezing, and boiling points of substances.

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Learning Outcomes and Process Components

When does a substance change its state?

What changes occur in substances that gain or lose heat?

What are the distinctive properties of substances?

What Do You Know?

- When does a substance change its state? ☐
- What changes occur in substances that gain or lose heat? ☐
- What are the distinctive properties of substances? ☐

Explain what you know!

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Let's Spark Curiosity!

Come on, let's start exploring!

"In our daily lives, many substances change their state when heated. For example, a candle melts when it burns and solidifies again when it cools. But does this change happen at the same temperature for every substance? The melting, freezing, and boiling points of substances are important properties that distinguish them from one another. Today, through the candle-making activity, we will observe a substance melting by absorbing heat and solidifying by releasing heat, and we will explore how state changes are related to the distinctive properties of substances."

The activity video is watched by pausing at certain points. Before starting the activity, the contents of the kit are checked. All lid-opening and package-opening steps are carried out simultaneously with the students.

Kit Contents

- [ ] Candle-Making Template
- [ ] Paraffin
- [ ] Glitter
- [ ] Candle Jar
- [ ] Crayon
- [ ] Candle Wick
- [ ] Stirring Stick
- [ ] Candle
- [ ] Candle-Making Activity Sheet

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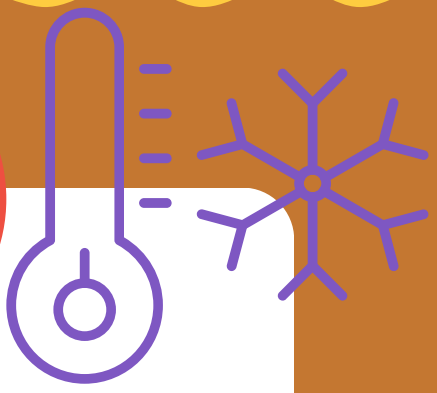
How Do We Do It?

- Place the candle-making template in front of you and take out the pieces one by one.
- Insert the raising piece into the hole on the base piece, then attach the top ring piece.
- Place the candle you will use for heating into its designated spot on the template.
- Position the candle jar on top so that it stays in place.
- Put the paraffin into the jar.
- At this stage, get help from your teacher or an adult. Light the candle carefully.
- Wait for the paraffin to melt slowly.
- Once the paraffin starts melting, add the crayon to color the candle.
- Stir with the stick, making sure not to leave the stick inside the jar or touch the jar.
- When the paraffin and crayon are completely melted, add glitter and stir.
- You can also save some glitter to decorate the top of the candle later.
- Extinguish the candle and let the jar cool without touching it.
- Check your candle with the stirring stick.
- When you notice it starting to solidify, dip the candle wick inside.
- Hold the wick in place briefly to attach it to the base.
- Once the candle has completely solidified, your candle is ready!

What Should the Scientists of the Future Discover?



Students are asked the following questions:

- Why does a candle melt when heated and solidify again when cooled?
- Do you think every substance melts at the same temperature?
- Do pure substances have the same melting and freezing points?
- What does water need to turn into ice?

Around us, there are many different substances. Properties like mass and volume are common to all substances, so they do not help us distinguish between them. Properties such as color, smell, and taste are also not always reliable. For this reason, we use more reliable properties to identify substances.

The properties specific to pure substances that allow us to differentiate them are called distinctive properties. The melting point, freezing point, and boiling point of a substance are among these distinctive properties.

Melting Point

When a substance absorbs heat and changes from a solid to a liquid, this process is called melting. Examples include ice cream melting, butter melting, or iron being melted.

A solid does not start melting immediately when heat is applied. The temperature must reach a certain value for melting to begin. The temperature at which a solid starts to melt is called the melting temperature (melting point). Every substance has a different melting point. For example, ice begins to melt at 0 °C, while lead melts at 327.4 °C.

Freezing Point

When a substance releases heat and changes from a liquid to a solid, this process is called freezing. Examples include freezing water in a freezer or ice forming on roads in winter.

A liquid begins to freeze when the temperature drops to a certain value. This temperature at which a liquid starts to solidify is called the freezing point.

- The temperature at which a solid starts to melt is the same temperature at which it freezes. Therefore, the melting point and freezing point of pure substances are equal.

Did You Know?

Water is one of the rare substances that expands when it freezes.

That is, while most substances shrink as they cool, water's volume increases upon freezing. For this reason:

- A bottle filled to the top with water may crack when the water freezes.
- The surfaces of lakes and seas freeze first, but the water underneath remains liquid.

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A SCIENTIFIC Explanation for the Curious

Students are asked the following question:

- Where are the distinctive properties of substances used in daily life?

The distinctive properties of substances help us determine which substance to use, where, and how in daily life. For example:

- A substance with a low melting point will melt if exposed to high temperatures and fail to perform its function. Therefore, materials intended for hot environments are chosen from substances with high melting points.
- Similarly, liquids with high boiling points are preferred for heating processes in kettles, engines, or cooking, while liquids with low boiling points evaporate quickly and cannot be used where evaporation is undesirable.
- The freezing point also affects how a substance is used. For example, in buildings constructed in cold regions, water pipes and construction materials are selected based on the freezing point of water. Appropriate materials are chosen to prevent cracking in freezing temperatures.

We also use these properties in everyday life. The pots and pans we use for cooking, parts of electrical devices, kitchen utensils, and even the storage conditions for medicines are all determined by considering the melting, boiling, and freezing points of materials. This ensures substances are used safely and efficiently, reducing the risk of malfunction or spoilage.

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What Did We Discover?

"Today, we learned about the distinctive properties of substances—their melting and freezing points—while observing these state changes. So, how did you feel about it?"
An Activity Sheet is then completed.

What Else Can We Do?

Come on, you try it too!

Dear Teacher,
While teaching the distinctive properties of matter, you observed the melting and freezing state changes of substances through the candle-making activity.
You can also carry out the "Let's Observe the Melting of Ice" activity.

Question of the Day

What physical state change does dry ice undergo when heated?

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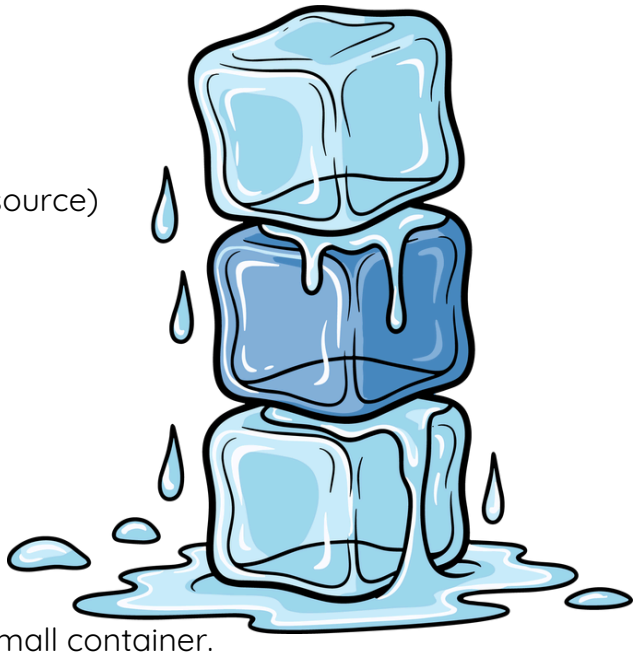
Let's Observe the Melting of Ice

Materials:

- Ice cubes
- Small heat-resistant container
- Tripod stand
- Alcohol burner (or a safe heat source)
- Thermometer
- Spoon
- Timer (clock or stopwatch)
- Observation notebook



Procedure:

- Place a few ice cubes into the small container.
- Set up the tripod stand and place the container with ice on top of it.
- Carefully position the alcohol burner under the tripod stand.
- Measure and record the initial temperature of the ice using the thermometer.
- While heating the ice, measure and record the temperature every minute.
- Continue your observations until the ice has completely melted, and compare the temperature changes with the changes in state.

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