Physical and Chemical Changes

Approximate time: 1 h, 15 min

Materials:

- 2 clear plastic cups
- snow or ice
- vinegar
- baking soda
- Measuring cup
- Dixie cups (2 per student)
- White Elmer's Glue
- Borax
- Water
- Plastic spoons for stirring
- Food Colouring (optional)
- Lysol Wipes for clean up
-

Process (Follow Slideshow):

- Agenda

-Introduction

- Physical Changes
  - What is it?(a change in the state of matter of an object)
  - Can it be reversed? (yes)
  - Examples (popsicle melting, clouds forming, etc…)
  - Use pictures on slideshow as prompting for students to answer these questions
  - Elaborate on student answers, repeat changes in states of matter for each example given
  - Popsicle example: When you pull a popsicle out of the freezer, what state of matter is it? (solid) If it's a really warm day and you're out in the sun and can't eat the popsicle fast enough so it starts to drip down your arm, what state of matter is it changing into? (liquid) If you collect the dripping popsicle in a container, can you make the liquid back into a solid? (yes) How? (put it back in the freezer)
  - Explain that physical changes are reversible
  - Explain that when the popsicle starts melting and changes from a solid to a liquid, it is still a popsicle- it doesn't magically turn into something different (like popcorn). This is another characteristic of a physical change.
- Chemical Changes
  - What is it?(a change in the chemical make-up of substances)
  - Can it be reversed? (no)

- Examples (fires, frying an egg, fireworks etc…)
- Use pictures on slideshow as prompting for students to answer these questions
- Elaborate on student answers, get students to explain why their examples are chemical changes
- Fire example: If I had a log in front of me and used a match to make a campfire and then waited until my fire died down, I would have a pile of ashes. Is it easy for me to collect the ashes and make them back into the log that I started out with? (no) Explain that chemical changes are not reversible
- Explain that chemical changes occur when you have 2 or more substances and a chemical reaction occurs so that the end product is not the same as what you started off with

- Experiment Time!
  - Show the students a clear plastic cup filled with snow or ice
  - Ask what is in the cup (snow or ice) and what would happen to it if you left it out for a long time (it would melt)
  - Ask students if that is an example of a physical or chemical change (physical) and how they know (snow is still water-just frozen; a change in the state of matter occurs; it is reversible)
  - Explain to students that you have some baking soda in a clear plastic cup and get predictions about what you're going to add to it (vinegar) and what will happen (it will form a chemical reaction)
  - Place the cup with baking soda inside the clear measuring cup (in case there is overflow) and add some vinegar
  - Gas bubbles will occur
  - Ask students what kind of change that is (chemical) and how they know (it is irreversible; you created carbon dioxide from two different solutions)
- Get Moving!
  - Review the three states of matter (solid, liquid, gas)
  - Ask students to identify which picture on the slideshow represents each state of matter and how they know (at least one student will generally know this)
  - Get 5 volunteers to come up to the front of the class and demonstrate the atoms of each state of matter
    - Direct students to act like a solid (stand close together)
    - Direct students to act like a liquid (spread apart a little bit)
    - Direct students to act like a gas (spread out even further)
    - Direct students to return to their desks
- Real World Examples

- Ask students how they think screws are made (metal is melted and put into a mould where it cools and takes the shape of a screw); ask students what kind of change this is (physical) and why (reversible, still metal)
- Ask students how they think rubber tires are made- students will say rubber is melted and put into a mould like the screw (rubber is heated (but does not melt), sulfur is added and cross-linking process occurs that causes the sulfur and rubber molecules to bond together)
- Ask students what type of change this is (chemical) and why (you cannot separate the rubber and sulfur after the cross-linking process occurs therefore it is irreversible)

- Creating Slime
  - Inform students that they will have the opportunity to make slime and ensure there are no food dye allergies if you choose to use it to colour the slime
  - Inform students that they will be required to dispose of their slime after the demonstration and that nobody will get to bring it home (they will be upset about this; explain that it doesn't stay good for very long and that it is a messy distraction)
  - Give each student two Dixie cups
  - Put a little bit of water in each cup
  - Put about a teaspoon of white glue into one of each student's cups and leave the spoon in the cup, instruct students to gently stir the glue and water together
  - Put some borax into the second cup for each student, have students take the spoon from the glue-water mixture and use it to mix the borax-water mixture until the borax is dissolved (the spoon will have some glue on it and that's ok)
  - Optional: add a few drops of food colouring of student's choice to the glue-water mixture
  - Instruct students to pour the water-borax mixture into the glue-water cup and mix that all together
  - A slimy substance will form- some students may need glue or borax added to their cup
  - Instruct students to remove the slime from the cup with their hands and try to roll it into a ball
  - Students can try to bounce the ball on their desks
  - The more students play with their mixture, it should take on more properties of a solid
  - Have students discard their slime and materials and wash their hands
  - Clean up student's desks with Lysol wipes

- Ask students what their slime felt like, what state of matter they created, what type of change they created (chemical) and how they know (irreversible, chemical change occurred)

- Conclusion
  - Review main ideas
  - Ask is students have any questions
  - With permission of the classroom teacher, write the ingredients for the slime on the board so that students can try it at home if they wish (they will ask for instructions as to how to make it)