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| **Standard(s) addressed:** | | |
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| **Targets:** (What will students know and be able to do as a result of this lesson?) | | |
| -**Experiment using the scientific method**  **-Discuss and use polymer terminology**  **-Participate in the engineering design cycle** | | |

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| **Assessment:** (How will you and your students know if they have successfully met the target?) |
| **Students will be assessed throughout the seven days. The teacher will use observation and direct conversation to individually assess the abilities and understanding levels of each student. Students will complete a worksheet. An exit note may be provided by the teacher.** |

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| **Instructional Activities:** (In what learning experiences will students engage? Consider higher order thinking, multiple intelligences, multimodal, and/or multimedia input.) |
| Day 1-Unit Introduction  Discuss #1-6 on note worksheet  Optional: Oobleck - Make a batch and discuss the questions on the unit presentation  Day 2-Gloop  Make a batch and allow time to complete the slime tests  Day 3-Boogers  Make a batch and allow time to complete the slime tests  Day 4-Goobers  Make a batch and allow time to complete the slime tests  Day 5-Super Slime  Make a batch and allow time to complete the slime tests  Day 6  Complete puzzles and unfinished slime tests  Day 7  Mystery Slime Challenge -Provide students with samples of a mystery slime and challenge them  to use the observations from their slime tests to identify what type of slime it is  Preparation  Corn Starch (Optional)  -Place 1/2 cup of corn starch into ziploc bags and prepare enough bags for each pair of students in your class. Students will need to add water to create the right consistency. Have additional starch on hand in case they added too much water.  Borax Solution for Gloop, Goobers, & Super Slime  Mix 1 teaspoon (heaping) of borax powder for every cup of water. I mix the borax solution in a 1 gallon container (such as a bucket or milk jug) and usually need to make 2 batches to have enough for all the slimes. Pour the solutions into the small beakers for the students to use.  Liquid Starch  Fill small plastic containers (such as old yogurt cups with lids) with liquid starch. You will need 1 container per group of 4 students. Have extra on hand to refill the containers as needed. NOTE: If you purchase a different brand than Stay Flo, be sure to make a test batch first! I've had some problems when using an off brand of liquid starch.  Guar Gum  The guar gum is a powder that comes  in a plastic container and will keep very well from year to year. I fill film canisters with powder and label them. Save the extra powder to refill the containers as needed. You will also need to label 6 small plastic cups for use only with the guar gum. I place one film canister of powder into each labeled cup to give to the groups.  PVA Powder/Solution  PVA is available as 4% solutions in 500 ml and 1000 ml bottles, but the powder is much cheaper and is fairly easy to make yourself. I prepare five batches of the solution and store it in 2liter bottles. For the lab, I fill several 1 liter bottles with clear solution and then add several drops of food coloring to create a variety of colors for the students to use. I usually provide five colors: red, blue, yellow, green, and purple. Students may also use the clear solution to create a neat looking slime! Save the extra solution to refill the smaller bottles as needed.  Follow these directions to make your own PVA 4% solution:  1. Pour 1 liter of water into a microwave safe plastic bowl.  2. Use a triple beam balance to measure our 40 grams of PVA powder.  3. Sprinkle the powder over the water and stir until well mixed.  4. Cover the bowl with plastic wrap and place in the microwave. Heat on high for 2 minutes.  5. Remove from microwave and stir well.  6. Return the bowl to the microwave and heat for an additional 2 minutes. Remove from microwave and stir well.  7. Continue to heat the solution (2 minutes and then stir) until the solution is clear. It usually takes about 4 to 5 times before the solution turns clear.  8. Pour the solution into 2 liter plastic bottles to store.  TIP: Make a test batch of Super Slime to see if the amounts work well with your homemade PVA solution. You may need to adjust the amount of borax solution. |

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| **Resources/Materials Required:** |
| Playing with Polymers PowerPoint Presentation-Includes an answer key for the student note worksheet, introduction to using graduated cylinders, and the safety rules. Step by step directions for the slimes are also provided and go along with the directions on the recipe card.  Playing with Polymers Student Packet-Includes the note worksheets, puzzle pages, data chart, and slime test descriptions. Students fill in the note worksheet using the information on the first few slides of the presentation  and complete the data chart as they finish the slime experiments. I require students to complete the puzzle pages  on their own time.  Playing with Polymers Recipe Card-print out enough recipe cards to provide 2 copies for each  group of 4 students. If possible, laminate the cards to help them last from year to year.  Playing with Polymers Online  -Students use various websites to learn about the history of polymers and plastics; I use this at the start of the unit to build background knowledge and refer to the information throughout the unit.  Materials -NOTE: Suggested amounts are based on 100 students working in pairs.  -Cornstarch 3 boxes (If you choose to do the optional Oobleck activity)  -Mule Team Borax 1 small box  Stay Flo Starch 1 large bottle  Plastic containers with lids (yogurt size) One container per group; use for storing starch  White Glue 4 oz size Need enough bottles for each pair of students.  White Glue 1 gallon -Use to refill the small bottles; much cheaper to purchase per gallon  Guar Gum 60 grams Available from Flinn Scientific; need 0.6 g per pair/group so one larger container will provide enough powder for several years)  Film Canisters Need 1 per group; used for storing guar gum powder  PVA powder Available from Flinn Scientific; need 200 grams of powder to make enough solution for 100 students; a large container will provide enough powder for several years)  Food Coloring Green, yellow, blue, and red -One set for each group of 4 students  Plastic cups 4 oz size -200  Styrofoam or plastic plates 100  Small plastic Ziploc style bags -2” x 3” size; need 5 per student; available at many craft stores or purchase from Uline (http://www.uline.com/) for a $11 per 1000; may also use snack size ziploc bags.  Stirring Sticks -1 large box of wooden craft sticks (at least 400 sticks)  Graduated cylinders-25 ml -Need 2 per group of 4 students-50 ml sizes -Need 2 per group of 4 students  Small beakers (or extra plastic cups) to hold water or borax solution -2 per group  Eyedroppers -4 per group  Triple beam balance or other scales -1 per group  Safety goggles -1 pair for each student  Paper towels  Permanent marker -1 per group  Timer/stopwatch -1 per group  Metric ruler -1 per group  Playing with Polymers recipes -1 set per group  Playing with Polymers Data Chart/Slime Tests-1 per student  Optional Materials  Film canisters -Use to store the Gloop, Boogers, or Super Slime make "farting noises!  Gel style Glue -Try substituting gel glue for white glue in some of the recipes.  Glitter powder -Use to make sparkling Gloop or Boogers; don’t add too much! |

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| **Student Engagement:** How will you get and hold student attention? |
| **Lesson Hook: Teacher will show a quick video on natural and synthetic polymers. The video will spark discussion among the class.**  **Students will be engaged through the variety of activities completed at each station. Different learning styles will be addressed at the stations. Students will also be engaged through the use of the 1:1 computers in the classroom and will work collaboratively with their peers.** |

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| **Differentiation:**  (How will you adjust the lesson to appropriately challenge ALL students?) |
| **Students will be grouped prior to the lesson by the teacher based on ability level and behavior issues.**  **Differentiation will occur through the multiple days about polymers that incorporate a variety of learning styles. Two versions (levels) of the worksheet will be provided.** |

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| **IEP/504 Modifications/Accommodations:** (What curriculum modifications and/or classroom accommodations will you make for Students with Disabilities in your class? Be as specific as possible.) |
| **-Hear instructions orally and be given a written list of instructions**  **-Give responses in an oral/written form**  **-Work in a different setting (fewer distractions)**  **-Take more time to complete the task/frequent breaks**  **-Use an alarm to help with time management**  **-Answer fewer/different questions**  **-Individual redirection** |

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| **Suggestions for Consideration and Reflection:** |
| What went well?  What did you learn?  What adjustments will you make moving forward?  What did your assessment results indicate?  Was this lesson rigorous enough to engage all students? Explain.  Were the modifications/accommodations sufficient to facilitate meaningful participation for challenged students?  Would you be willing to share this lesson with colleagues? If no, why not? |
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