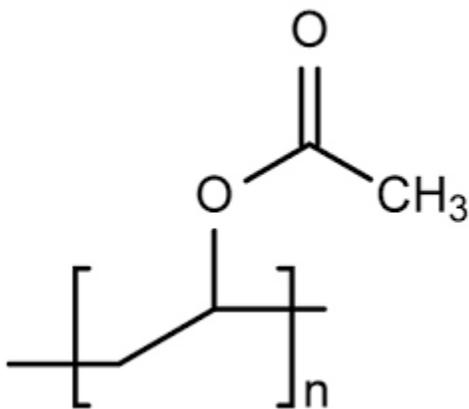


## “Ooey Goey Fun! But Can We Sell This Stuff?”

### Instructor Page

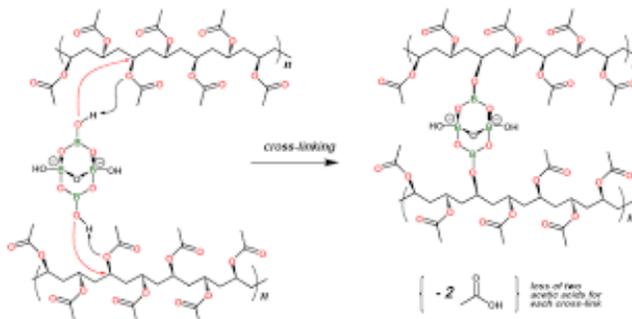
1. In order to make the 50% glue/water solution, empty a 4oz (118mL) bottle of glue into a large beaker or bowl. Fill the glue bottle with water and add to the beaker or bowl. This makes 236 mL of the glue solution. If each student group conducts 4-5 tests, this amount will be enough for two lab groups. Approximately 6 bottles of glue will be needed for a class of 24 students working in pairs.
2. In order to make the 4% Borax solution, add 2 teaspoon (10mL) of Borax powder to 1 cup (236 mL) of water. If each student group conducts 4-5 tests, this amount will be enough for two lab groups. Approximately 12 teaspoons (4 tablespoons) of Borax added to 6 cups of water will be needed for 24 students working in pairs.
3. Answers to the post lab questions:

a) Polyvinyl acetate



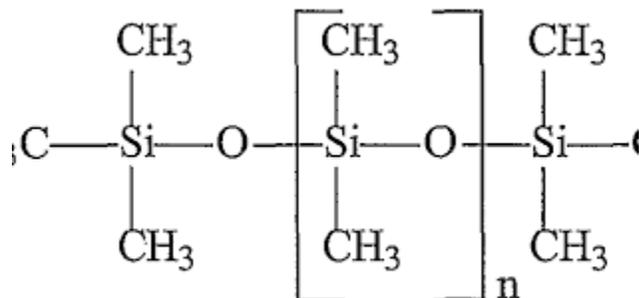
b) 86 Da or 86 g/mol

c) The Borax crosslinks the polymer chains. This prevents the polymer chains from slipping past one another and helps to solidify the mixture. The addition of crosslinker enables the polymer to bounce.



d) Both of the series of have peaks separated by 74 Da. This would represent the molar mass of the repeating unit used in the Silly Putty® polymer. Because the student polymers are made of PVA (MM 86 Da), this proves that the student

polymers are chemically different than Silly Putty®. Silly Putty® is based on the repeating monomer, PDMS (polydimethylsiloxane) shown below.



- e) The two series of peaks being offset by 28 Da in spectrum #2 is due to the different termination units of the polymer chains. Students will need help with this concept. The difference is due to some polymers having an ethoxy termination group (O-CH<sub>2</sub>CH<sub>3</sub>, MM=29Da) and others having a hydroxyl termination group (O-H, MM= 1 Da).
  - f) The 1 Da separation of peaks in spectrum C is due to the existence of isotopes in the PDMS polymer chain. The common isotopes responsible for this would be C-12, C-13 and Si-28 and Si-29.
4. When reviewing answers to the post-lab questions with the class, the history of the development of Silly Putty® (WWII synthetic rubber research) should be discussed. Students may also research this independently as this information is easily found online. This allows for a cross curricular discussion with material learned in their American History classes.