

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

Post-Lab Assignment

In the lab, you and your lab partner created a Silly Putty® like polymer and discovered the optimum ratio of reacting components so that your new toy has maximum bounce. Now we want to determine if we can market this toy and make a million, or if we simply made a Silly Putty® rip-off!

- a) Do some research into the ingredients of white glue and determine the reacting chemical responsible for the toy's polymer properties. What is this chemical? Draw a picture of the structural formula of this molecule.

- b) What is the molar mass of the chemical (monomer) you identified in part a?

- c) What is the purpose of adding the Borax solution to the white glue solution? Explain this at the chemical level. Draw a picture of the structural formula of the polymer after the addition of the Borax solution.

- d) In class, we discussed how mass spectrometry is an analytical technique that can help scientists determine what elements and bonds are present in molecules. The mass spectrum of the chemical responsible for Silly Putty's® properties has been provided. On spectrum # 1, look at the peaks at 883.4 Da, 957.4 Da, and 1031.4 Da along with 911.4Da, 985.4Da, and 1060.4 Da. What do these two series have in common? What could this pattern represent in terms of polymer structure?

- e) When looking at the peaks in the previous question, along with the data presented in spectrum #2, why do you think the numbers are offset by 28 Da?
- f) Spectrum #3 is a detailed picture of the peak at 957.4 Da that was shown in spectrum A and B. What could be a reason for the smaller peaks at 957.4 Da, 958.4 Da, and 959.4 Da? (Hint: A part of Dalton's Atomic Theory had to be amended because of this.)