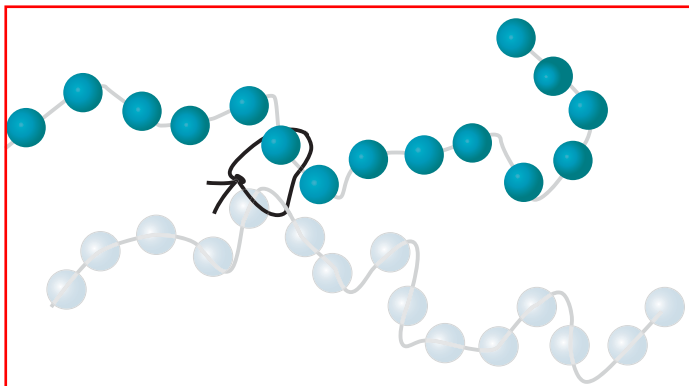


- a) Then hold the stretched rubber band against your forehead to familiarize yourself with its temperature.
 - b) After that, move the stretched rubber band away from your forehead and quickly allow it to contract. Immediately hold it against your forehead again. Is it warmer, cooler, or the same temperature as your skin? Try this several times to be sure of your results.
 - c) Record your observations in the data table.
4. There is a relationship between the results from *Part A: Steps 4 and 5* and the results from *Part B: Steps 2 and 3*. Discuss this in your group and describe this relationship in your *Active Chemistry* log.
 5. Return to the model you drew of rubber molecules in the *What Do You Think?* section.
 - a) Describe how your model would explain what happened when you heated the rubber band and when you cooled the rubber band. If your model does not explain the evidence you collected about heating and cooling the rubber band, revise your model and use the revised model in your explanation.

Part C: Modeling the Behavior of Rubber Molecules

1. Obtain four chains of round beads and three pieces of string. The chains of beads represent polymers. Each bead represents a single part of a polymer, called a monomer.
2. Use three pieces of string to create a tangled mess of the chains of beads by tying each string around any two chains of beads, as shown. The drawing shows only two chains of beads as an example. You will link together four chains into one large group. Each string represents a cross-link that binds the polymer chains together to create a



network of long-chain molecules. When you have all the strings tied, you should be able to lift the entire tangled mess by grasping any single location in the mess. In other words, no chains should remain unattached.

3. Set the tangled beads down randomly on a rectangular piece of flat rubber. Using duct tape, attach the beads to the rubber in about five different locations, so that the beads will move along with the rubber as you stretch it.
 - a) Make a drawing of what the chains of beads look like, making sure to indicate the cross-links. Identify one of the chains of beads by shading the beads that you draw, as one of the chains is identified in the drawing above.
4. Now stretch the rubber gently, the long way, but try not to break any strings of beads.
 - a) While one person holds the rubber stretched, everyone else should sketch what the polymer chains look like now. Try to identify the very same chain of beads as before, by shading the beads.
 - b) Compare and contrast the two configurations of bead chains (not stretched and stretched). It might be helpful to look at the difference between the shaded chain in your first drawing and the shaded chain in your second drawing. How are the chains arranged differently in each configuration? Which configuration is more ordered (organized) and which is more disordered (disorganized)?