**Chemical Engineering Activity Sheet**

Engineering Challenge 1:

1. Take the two cups and label one “A” and the next one “B.” **Cup A** will contain 1.25 mL of water and 1.25 mL of polymer. **Cup B** will contain 250 mL of water and 1.25 mL of polymer. Calculate the ratio of water to polymer in these two cups.

*How to calculate a ratio*

*Water Ratio = # of mL of water Use decimals, not fractions!*

*# of mL of polymer*

**Cup A** water to polymer ratio = \_\_\_\_\_\_

**Cup B** water to polymer ratio = \_\_\_\_\_\_

Hypothesis: How do you think the different ratios of water to polymer will affect your resulting material? How stiff will they be? How liquidy?

**Cup A** Hypothesis:

**Cup B** Hypothesis:

1. Make **Cup A** by adding water to the polymer
2. 1.25 mL of water
3. 1.25 mL of polymer

Make **Cup B** by adding water to the polymer

1. 250 mL of water
2. 1.25 mL of polymer
3. Now, to see how stiff, or solid-like, these materials are, see how much weight each material will hold.

**Cup A** stiffness rating = \_\_\_\_\_\_ g

**Cup B** stiffness rating = \_\_\_\_\_\_ g

Engineering Challenge 2: It’s your job to create a patch for burn victims to be used by a patient recovering from a fire. How stiff do you think the material should be? How could you change your solutions to make a stiffer polymer while keeping it very hydrated?

1. Design your material. How much water do you want in your patch? How stiff should your material be? How can you change your ratio to make a stiffer polymer while keeping it very hydrated?

Design considerations:

How many mL of water and mL of polymer will you use to produce your burn patch material?

\_\_\_\_\_\_mL of water \_\_\_\_\_\_ mL of polymer

What is your ratio? \_\_\_\_\_\_\_

Why this ratio?

1. Test your hypothesis. Make your material design and measure its stiffness.

Stiffness rating = \_\_\_\_\_\_ g

Why do you think this happened? How does your chosen ratio impact how the material will perform as a burn patch? What would you do to improve your material for this application?

Engineering Challenge 3: You need to design your burn patch to prevent pain and dryness upon application. That means your material has to incorporate the salt solution to simulate a buffered system and still maintain its shape.

1. Design your material.

Design considerations:

How many mL of water and mL of polymer will you use to produce your burn patch material?

\_\_\_\_\_\_mL of water \_\_\_\_\_\_ mL of polymer

What is your ratio? \_\_\_\_\_\_\_

Why this ratio?

1. Test your hypothesis. Make your material design and measure its stiffness.

Stiffness rating = \_\_\_\_\_\_ g

Is it self-contained?

Why do you think this happened? How does your chosen ratio impact how the material will perform as a burn patch? What would you do to improve your material for this application?