

Name:

Date:

Class:

Post-Activity Assessment **Answer Key**

Instructions: Answer the following questions.

1. What is a hydrogel?

A hydrogel is substance with a three-dimensional network structure capable of absorbing large amounts of water. Hydrogels exist naturally in the form of polymer networks such as collagen or gelatin or they can be made synthetically. Hydrogels form chains or link entanglements that do not normally dissolve.

2. Describe what happens during the ionic crosslinking process.

During the ionic crosslinking process, the sodium ion is replaced with a divalent metal (e.g., calcium, magnesium) which joins two strands of polymers, making a dense network capable of holding large amounts of water.

3. Would the crosslinking process work if you use potassium chloride (KCl)? Justify your answer.

No, because replacing the sodium ion with a potassium ion (same group as sodium) does not tie or join two different strands of polymers.

4. Would the crosslinking process work if you use magnesium chloride ($MgCl_2$)? Justify your answer.

Yes, because magnesium is a divalent metal, in the same group as calcium.

5. Can you think of other possible uses of a hydrogel?

There are multiples uses in medicine applications such as contact lenses, drug delivery, implants, tissue repair to name a few. Hydrogels are also use in culinary confections, hand sanitizers, diapers, and other applications that require water absorption. They can also be used as a filter for unwanted dissolved substances.

6. If you want to design a hard hydrogel, what would you do to the concentration of the ionic crosslinking solution?

I would make a high concentration solution, for example 1M.

7. What do you think happens in the ionic crosslinking process if you wait a longer time? Justify your answer.

Waiting a longer time allows for more exchange of divalent cations, which makes a denser network of polymers and eventually firmer gels.