

Conclusion or Discussion Questions.

1. Predict whether a hydrogel will form if sodium alginate is mixed with each of the following salt solutions. Explain why or why not.
 - a. Lithium chloride
 - b. Strontium chloride
 - c. Tin(IV) chloride

Students should be able to respond that a hydrogel would not form with lithium chloride, would form with strontium chloride, and that it may or may not form with tin(IV) chloride. These conclusions are based on the valences of the metal ions (divalent ions form hydrogels through their ability to produce crosslinking). Acceptable responses for tin(IV) chloride are dependent on their observations of any trivalent metal salts; for example, teachers might use this as a discussion question or for extra credit.

2. Hydrogels produced with sodium alginate and metal salt solutions have different properties depending on the cation in the salt.
 - a. List two properties that were observed to vary among the hydrogels produced.

Elasticity (or flexibility) and strength.

- b. Why might these properties vary for the different hydrogels?

The geometry of the hydrogel molecules is different because the metal ion joining them is different. (Charge may also be mentioned.)

3. The hydrogels intended for use on biomedical implants are synthesized from compounds other than those used in this activity, and thus require different properties. Specifically, the hydrogels in the research lab need to attract bone cells and repel bacterial cells.
 - a. What chemical property would most likely control this aspect of these hydrogels? How might this be controlled in a large molecule such as a hydrogel?

Electrical charge.

Acceptable student responses to the second question will be dependent on the relevant content taught in class, but might include a reference to polarity, unequal sharing of electrons, or the addition of functional groups.

- b. Briefly describe one other important property for this hydrogel considering the fact that it will be used on humans.

It must be nontoxic.