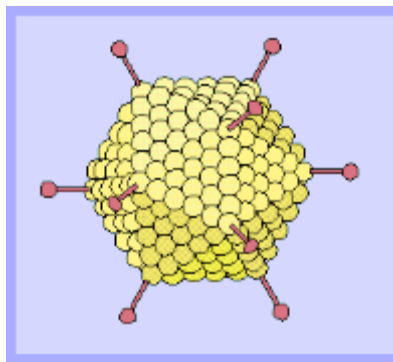


Test for Self-Assembly activity

Name _____ Teacher _____
 Date _____ Class _____

1. The shell of a flu virus is a soccer-ball shape made of hundreds of identical proteins (See picture). Scientists can use a chemical to disassemble (separate the proteins) the flu shell in their laboratory. When they remove the chemical, however, the shell, while still in a water, can reassemble in exactly the same shape it started. What properties of the protein and characteristics of the molecular world make it possible for it to reassemble into exactly the same shape?



<http://biology.about.com/library/weekly/aa110200a.htm>

Response includes...	
1. Proteins have charges and specific shape that allow them to stick together; 2. Proteins are in constant thermal motion.	2
Only mention one of the above.	1
Other	0

2. Why might the proteins in the flu virus fail to come back together if the sample is too cold?

Response includes...	
Thermal motion of the proteins is much slower and the molecules will not be moving around fast enough to find appropriate positions.	2
Thermal motion slows molecules (doesn't mention why this affects outcome of self-assembly).	1
other	0

3. A technician is assigned the task of making a monolayer, which is a sheet of molecules, one molecule thick. She has two options for how to create it:

a) Use a special device to push the individual molecules into position one by one into place.

b) Create complementary charges on a surface and on the molecules, and allow the monolayer to self assemble.

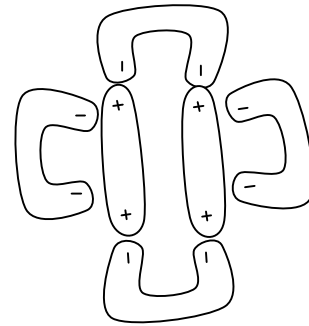
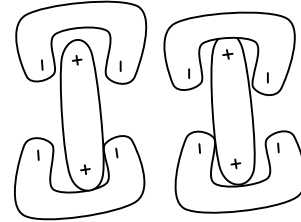
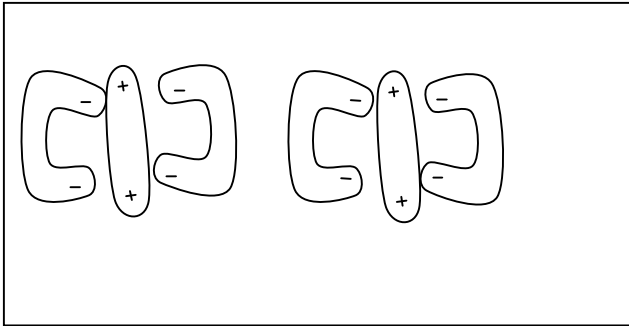
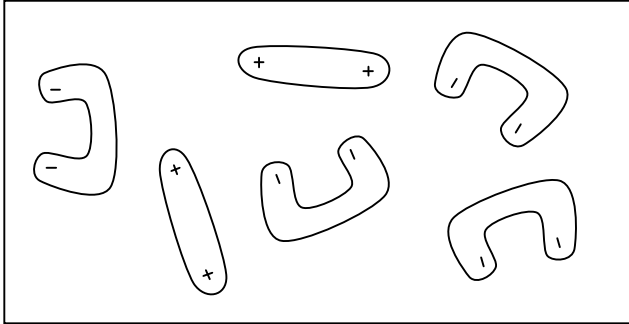
Which method should she use? Explain, giving at least one advantage and one disadvantage of each method.

Explanation Score

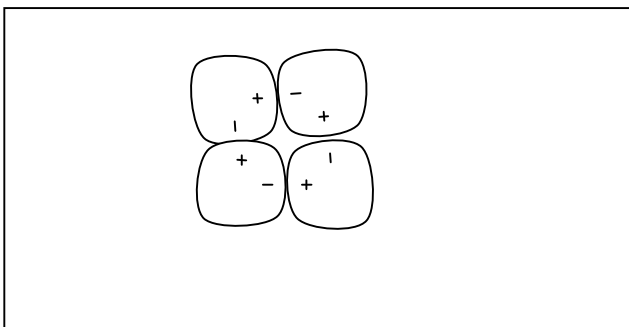
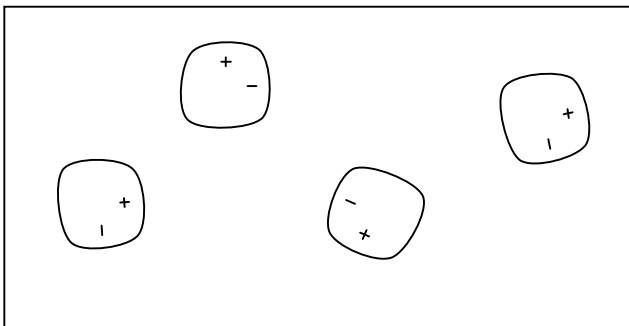
	Response includes...
Complete (3)	Chose a method and explains choice. Advantage for B –This is more efficient since any opposite charge molecule can join AND Disadvantage for B – This has potential for error because it is not selective; any complementary charge can join the layer....AND Advantage for A – It is more precise. Disadvantage for A - It is inefficient as it only moves one molecule at a time.
Mostly complete (2)	Chose a method (doesn't explain choice) AND List most advantages and disadvantages from above.
Partial (1)	List advantages and disadvantages but didn't relate to above reasons (misconceptions, inaccuracies)
Incorrect (0)	Other

4. The shapes in boxes A and B represent molecules, with charges shown as + and -. Suppose the molecules in box A have some time to bounce around and stick together. Redraw them in the empty box below, in a configuration you think they will self-assemble. Then do the same for box B. Make sure your picture includes all the shapes included in the drawings.

A



B



Explanation Score

	Response includes...
Complete (2)	Both A and B have all the pieces AND Molecules joined with appropriate opposite charges AND No pieces unassembled.
Mostly complete (1)	Only A or B have all the pieces AND Molecules joined with appropriate charges (If configuration doesn't account for all charges, not given credit)
Incorrect (0)	Other