HOW CAN WE CONTROL VISCOSITY?

HOW DO SURFACTANTS WORK?

Sketch a diagram to show how surfactant molecules help remove oil and grime when we wash our hands. Show how the molecules work with molecules of oil and water.

WHAT IS A MICELLE?

Surfactant molecules can form micelles when water molecules surround them.
Sketch a diagram to show the structure of a micelle.

HOW CAN WE CONTROL VISCOSITY?

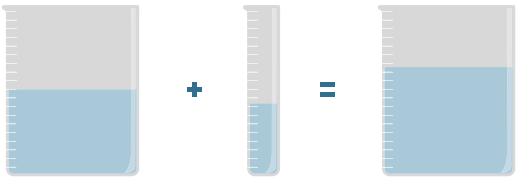
Surfactant micelles repel each other because they have the same electrical charge on their outer 'surface'. Adding salt to a surfactant product lets Na+ and Cl- ions get between the micelles. These ions 'hide' the outer charge, letting the micelles get closer together. The closer the micelles get to one another, the thicker (more viscous) the surfactant product becomes.

1. PREPARE YOUR SAMPLE

Your teacher will tell you which sample(s) to make up. Circle the forumla(s) you are making.

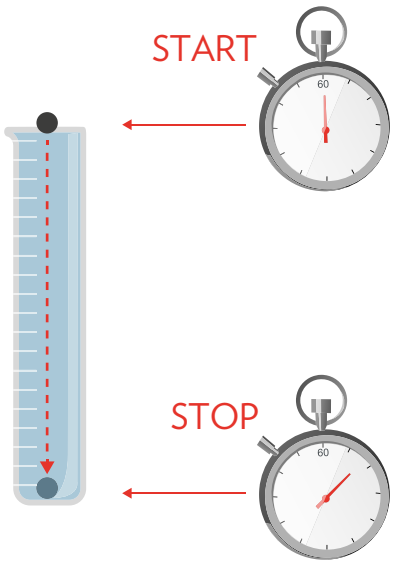
SAMPLE	A	B	C	D	E	F	G	H	I
SURFACTANT SOLUTION (ml) + **SALT SOLUTION (ml)**	200 + **48**	200 + **56**	200 + **64**	200 + **72**	200 + **80**	200 + **88**	200 + **96**	200 + **104**	200 + **112**

1. Pour 200ml surfactant solution into the 400ml beaker.
2. Measure the correct amount of salt solution (eg **56ml** for sample **B**) from the batch of salt solution at the front of the class and add it to the 400ml beaker.
3. Stir for two minutes. Be careful not to allow too many bubbles to get into your mixture.
4. Let the sample sit for a few minutes.



2. TEST YOUR SAMPLE'S VISCOSITY

1. Fill your 100ml measuring cylinder right to the top with your sample
2. Hold the ball bearing so it's touching the surface of your sample (you may need tweezers).
3. Let the ball bearing go and start your stopwatch.
4. Stop the stopwatch when the ball bearing touches the bottom. Record your results.
5. If you have more than one ball bearing, repeat your test and work out the average time.



If you are going to make up another sample:

6. Pour all the mixture from the 100ml measuring cylinder back into the 400ml beaker.
7. Add only the additional salt solution you need (eg if you have tested sample **D** and must now test sample **F**, add another **16ml** salt solution).
8. Repeat steps 1 – 5 above.
9. Share results among your classmates so that everybody has a full set of results including every sample (from A to I). Plot these results on a graph using an appropriate scale. What do the results show?