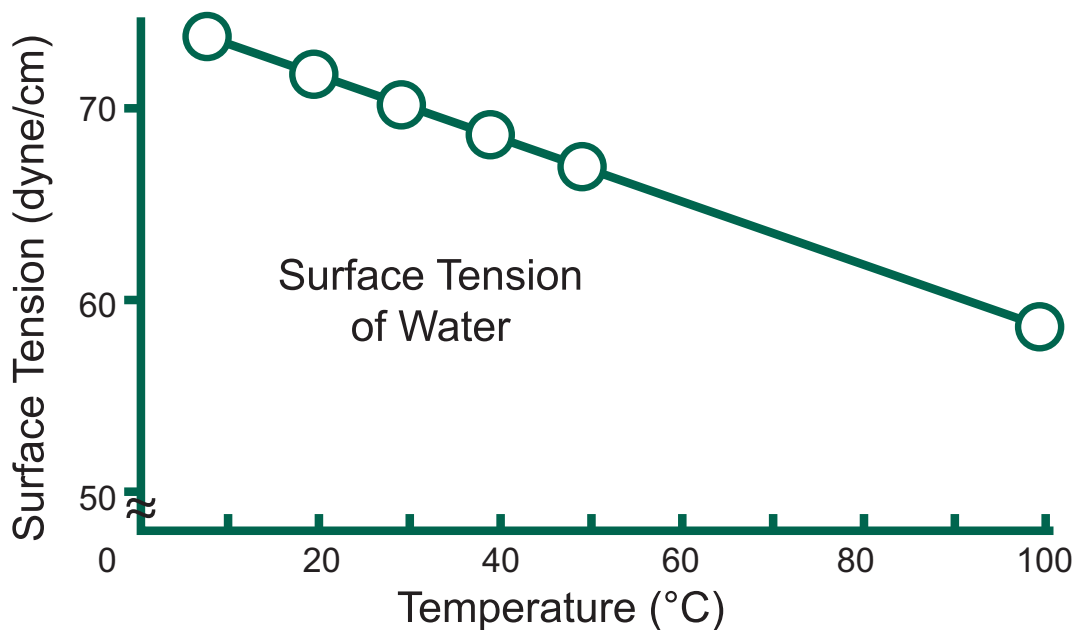


How surface tension effects integrity testing of filters

The surface tension of water is 72 dynes/cm at 25°C . It would take a force of 72 dynes to break a surface film of water 1cm long. The surface tension of water decreases significantly with temperature as shown in the graph. The surface tension arises from the polar nature of the water molecule.

Hot water is a better cleaning agent because the lower surface tension makes it a better "wetting agent" to get into pores and fissures rather than bridging them with surface tension. Soaps and detergents further lower the surface tension.



Surface Tension Examples

Walking on water

Small insects such as the water strider can walk on water because their weight is not enough to penetrate the surface.

Floating a needle

If carefully placed on the surface, a small needle can be made to float on the surface of water even though it is several times as dense as water. If the surface is agitated to break up the surface tension, then needle will quickly sink.

Don't touch the tent!

Common tent materials are somewhat rainproof in that the surface tension of water will bridge the pores in the finely woven material. But if you touch the tent material with your finger, you break the surface tension and the rain will drip through.

Soaps and detergents

help the cleaning of clothes by lowering the surface tension of the water so that it more readily soaks into pores and soiled areas.

Clinical test for jaundice

Normal urine has a surface tension of about 66 dynes/cm but if bile is present (a test for jaundice), it drops to about 55. In the Hay test, powdered sulfur is sprinkled on the urine surface. It will float on normal urine, but sink if the S.T. is lowered by the bile.

Washing with cold water

The major reason for using hot water for washing is that its surface tension is lower and it is a better wetting agent. But if the detergent lowers the surface tension, the heating may be unnecessary.

Surface tension disinfectants

Disinfectants are usually solutions of low surface tension. This allow them to spread out on the cell walls of bacteria and disrupt them. One such disinfectant, S.T.37, has a name which points to its low surface tension compared to the 72 dynes/cm for water.