

# Re: surface tension of an aqueous solution

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  - *Date:* 30 Jun 2005 13:40:29 -0700
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There is no simple way to calculate this that I know of. The reason is that it depends on the surface depletion or surface excess of solute, which is dependent on the geometry of the solvation of glycerol with water. The Gibbs adsorption equation is:

$d(\gamma) = -RT(\Gamma_2) d(\ln C_2)$ , where  $\gamma$  is surface tension,  $\Gamma_2$  is surface excess of the solute, and  $C_2$  is concentration of the solute.

Not knowing  $\Gamma_2$ , you can only make qualitative observations, eg it will probably be very slightly positive or very slightly negative, so I speculate glycerol has a very minute effect. It's not dependent on the surface tensions of the individual liquids. Take sucrose in water, sucrose by itself has a lower surface tension than water, but adding sucrose to water increases the surface tension higher than water's. This is because sucrose is surrounded by OH groups and prefers to be solvated by water than partitioned to the surface, and its  $\Gamma_2$  is negative (surface depletion).

It is not an expensive measurement. A surface tensiometer is an extremely simple and cheap instrument. However, this is such a common system that you should just look in the literature. I'd be willing to bet a large amount of money that this has been measured and published to death. There are also plenty of published empirical equations, but why bother with these and all the physical parameters involved when you can probably just find real data. If you know a few data points, you can fit it to the equation above to get  $\Gamma_2$ , and then you can backcalculate surface tension for any concentration.

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- *References:*
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◇ *From:* brian stahl
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