

How thick is a Soap Bubble?

Question - How thick is a soap bubble? Of course the thickness must change; I understand that. But when you see the colors so vividly, does that mean you have thicknesses on the order of microns, and does the black come when you are below .4 microns, the wavelength of blue? Or perhaps below .2 microns? Or perhaps even much less? When I consider that the bubble needs only to be as thick as the length of a soap molecule, it could actually be much less than 200 nm, perhaps as little as 20 nm. But I can not find the sizes of these small molecules or the thicknesses of soap films. This is for our study of magnitudes.

As the thickness of a soap bubble gets smaller than any wavelength of visible light, its ability to reflect visible light decreases, and it stops preferentially reflecting any particular wavelength of visible light. You see the bubble looking sort of gray in this case. The most striking colors occur when the thickness of the film is greater than, but still comparable to, the wavelengths present in visible light.

=====
The brilliant colors observed in soap bubbles occur because of interference of light reflected from the outer and inner surfaces of the bubble. So at that stage, the thickness of the bubble is the order of magnitude of the wavelength of visible light.

In addition, there is a stage in the life of bubbles referred to as "black bubbles". This occurs when the thickness of the bubble is less than the wavelength of visible light, but still a coherent film. When that happens, the bubble appears to disappear, but its existence is known because droplets

=====

با شکر! سید حسن کمالی
مہندسی تروٹیمی، دانشگاہ صنعتی ارومیه