

Memo to Marlene Huerta

From Dan Joseph, June 18, 1998

This memo suggests some experiments to test the idea that gas solubility in heavy crudes is related to the foaminess of those oils. I am thinking of foaminess as measured by the height of "chocolate mousse" that develops at the top surface of a crude in a depressurization cell. This is strictly like the head on a beer. I am sure you have a good idea of how to measure foaminess in Venezuela oils. The foams in these oils are non-polar (Maine & Sharma, Role of Nonpolar Foams in Production of Heavy Oils, Advances in Chemistry Series, 1994, 242, 405-420). I believe that foams cannot be produced without surfactants; the nature of these surfactants are evidently not known. The surfactants have to act at an interface; two fluids are involved. One of these fluids is the crude oil and the other is the gas which has vaporized. There is evidently a surfactant between the crude oil and the gas and the gas (or vapor) may matter. To test we should

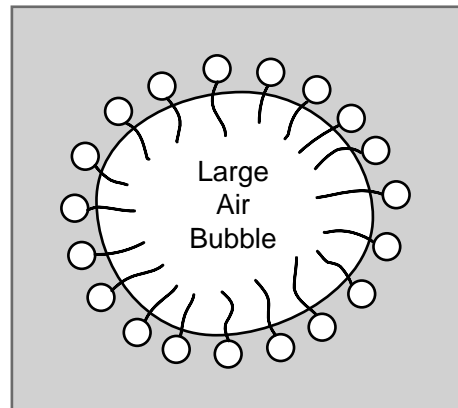
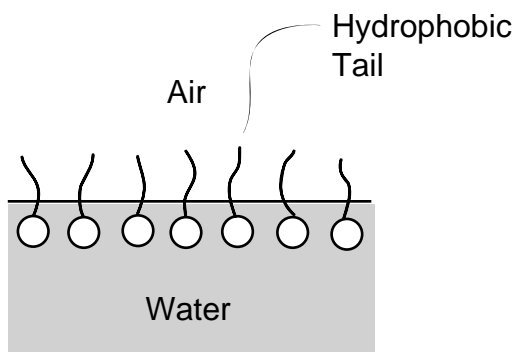
- Compare of the foaminess and solubility of the same oil with different dissolved gasses

The other experiments I am suggesting are exactly the same as Svrcek & Mehrota [1982] and others summarized by Peng, Fu and Bird (Unitar) with the caveat that foaminess should add a new column to tables 2, 3, 4 of Svrcek & Mehrota giving a measure of foaminess. These experiments could be decisive in determining the extent of the correlation between foaminess and solubility.

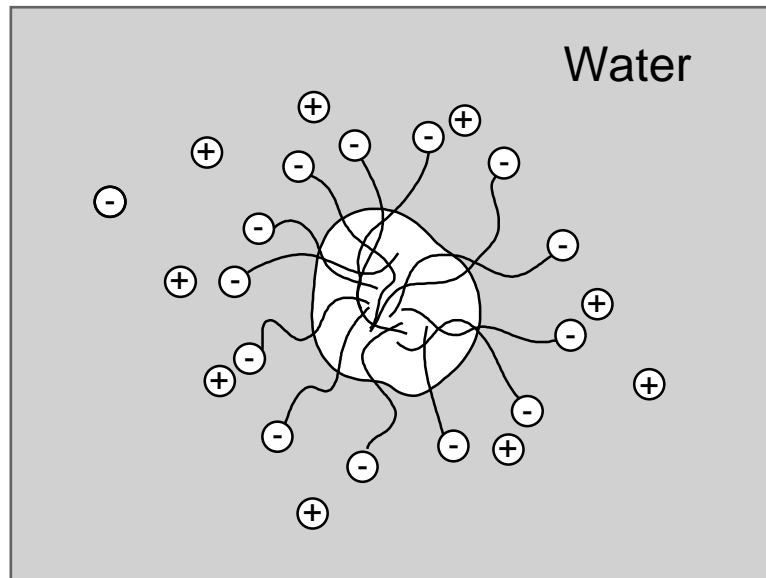
I have been thinking that the presence of surfactants which make liquids foam also increase the solubility of gas in those liquids. I don't have any clear idea why this should be true, but I suspect that it is true.

From Dan Joseph, August 11, 1998

Today I thought of a reason why surfactants should increase the solubility of air in water; it's due to micelles.



When the bubbles are small the hydrophobic tails interact, they expel air and form micelles; more air goes into solution because of micelle formation.



Schematic of an aqueous ionic micelle.