## Exercise 5 Exercise 1: The ternary phase diagram below shows the phase behaviour for the 3-component system of water, anionic surfactant NaC<sub>8</sub> and C<sub>10</sub>OH (co-surfactant). a. What is the minimum amount of $C_{10}OH$ that is required to make a pure phase of inverted micelles in the 3-component system? What is the composition of the 3-component system at the solubility limit for $C_{10}OH$ when the co-surfactant is added to a micellar solution with the binary b. composition of 30% NaC8 and 70% water? c. When the total composition of the system is 50% C<sub>10</sub>OH, 24% water and 26% NaC<sub>8</sub> there is a phase separation into a lamellar phase and an inverted hexagonal phase. What is the composition of each of the two phases? Inverted micelles ۵, 64%. CIDOH 200 20 90 NaC8 H<sub>2</sub>C 30 an 899 893 99 53 Ŋ, C10OH 10% ( ,, OH, 25% NAC , 65% H.D 5 L,+D+F D+E+G G E + G 20 70 50 60 80 90 NaC8 8 A 6 A A 0 A 53 Inverted haragonal phase: 62% C100H, 19% NaCs, 19% A20 Lamellor phase 43% C100H, 30% NaCr, 27% H20 D+F+6 90 NaC8 H20 800 800 53

## Exercise 2:

The adsorption of four straight-chain fatty acids from n-heptane on Fe<sub>2</sub>O<sub>3</sub> particles has been determined experimentally. The experimental adsorption isotherms are well described by the Langmuir isotherm, and the adsorbed amounts of fatty acid at saturation are given in the table below.  $n_2^s$  is the amount of fatty acid at saturation, while w is the weight of particles.

Fatty acid	$\left(\frac{n_2^s}{w}\right)_{sat}$ (mol/g)
Acetic acid	$3.00 \times 10^{-5}$
Propionic acid	2.36× 10 <sup>-5</sup>
Palmitic acid	0.91×10 <sup>-5</sup>
Stearic acid	0.81×10 <sup>-5</sup>

The specific surface area for the  $Fe_2O_3$  particles is 3.45 m<sup>2</sup>/g.

- a. Calculate the area per molecule at the saturated surface for each of the fatty acids. Do the results indicate that the adsorbed molecules are in the same 2-
- b.

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Exercise 3: The BET equation for the adsorption of nitrogen on silica at 77 K can be expressed by the following equation (fitted in the range of reduced pressures between 0.05 and 0.3): P = page test to page P		• •	• •	• •	•	• •		•	• •	•	•
$\frac{1}{V(P_0 - P)} = 2.85 \times 10^{-4} + 0.0257 \frac{1}{P_0}$	• •	• •	• •	• •	0	• •	• •	٠	• •	•	
where the units of the slope and of the intercept are g/cm <sup>3</sup> .	• •	• •	• •	• •	٠	• •	• •			•	•
a. Estimate the volume for monolayer coverage $V_m$ (in cm <sup>3</sup> /g) and the parameter C of the BET equation.	• •	• •	• •		٠	• •	• •				•
b. Estimate the specific surface area of solid silica (in m <sup>4</sup> g) if the area occupied by one nitrogen molecule is $16.2 \times 10^{-20} m^2$ .		• •	• •	• •	0	• •	• •	٠	• •	•	
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b) The CPP increases with increas SDS, which allows the molecules C) Using the formula Vsurf = (0,02.74 + 0) $J_c = (0,154 + 0,12)$ $CPP = \frac{Vsurf}{A_0}$ At the lowest concentrations of which coincides with a cylinder as the salt con	sing salt concentration. This is be a to be packed more densely, this from the previous e $(0264 \cdot 12) \cdot 1 = 0,3502 \text{ nm}^3$ (5.12) = 1,672  nm from the CPP coincides with a spheric order the structure of the struc	cause the extra s means that the s exercise: $\frac{c_1 = 1 \text{ mM}}{c_1 = 10 \text{ mM}}$ ical micelle. As th ucture to become	alt ions blo rea per m CPP = CPP = CPP = ( e salt conc more oval,	O, 41 O, 41 O, 46 O, 46 O, 46 O, 46 O, 46 O, 46 O, 46 O, 46 O, 46 O, 41 O, 46 O, 41 O, 41	repulsion ecrease <u>-</u> increase me some	ns betw s, which s, the C thing clo	een the in turr	head d increa	groups ises C	s of the pp		• • • • • • • • • • • • • • •	