

NAME _____ MAT _____

Please reply yes or no, more than one answer can be yes (+0.5 if correct, otherwise 0)

Ionic surfactant

	yes	no
Work below Kraft's point		
Are not charged		
Sulfate has $-\text{SO}_3^-$ as polar head		
Apolar tail is never aliphatic		

Surface tension

	yes	no
Depends on the surface area		
Is measured in ms		
Can be decreased with surfactants		
Decreases when micelles are formed		

Micelles

	yes	no
Are planar structures		
Are formed by surfactants with CPP=1		
Are formed below the cmc		
Are formed together with dimers, trimers, tetramers, ...		

Microemulsions

	yes	no
Are thermodynamically unstable		
Present extremely low interface tensions		
Can be formed without any surfactant		
Present very high entropy		

Non-ionic surfactants

	yes	no
Have charged polar head		
Have small polar head		
Aggregation number is temperature dependent		
Have large aggregation number		

Suspensions

	yes	no
Need the use of a wetting agent		
Very low LV tension is need for preparation		
Can be sterically stabilized		
Are gas into liquid dispersions		

Surfactants

	yes	no
For sulfate HLB is high		
Can form bilayers		
Increase the surface tension		
Cannot be used as emulsifiers		

Vesicles

	yes	no
Are smaller than micelles		
Are formed by surfactant with CPP=1/3		
Can be polymerizez		
Cannot be used for controlled release		

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Nanoemulsions

	yes	no
Are thermodynamically stable		
Contain very high % of surfactant		
Are quite transparent		
Cannot be used for the delivery of actives		

Temperature

	yes	no
Effect of temperature is the same for all the surfactants		
Aggregation number never depends on the temperature		
Ionic surfactant cannot be used at high temperature		
Minimum of energy of the ground and excited state is for the same geometry		

Liquid Crystals

	yes	no
Are formed at low surfactant concentration		
Viscosity is lower for hexagonal structures than lamellar		
Their formation depends on temperature		
Only one structure is possible		

Kinetic stabilization

	yes	no
Is not affected by the temperature		
Decreases the Gibbs free energy of the emulsions		
Cannot be just steric		
It never depends on the charge of the surfactants		

Exercise (9 points)

A suspension of spherical titania particles ($n_p=2.67$) in water ($n_s=1.33$) scatters 0.01% of light at 800 nm. Radius of the particles is 15 nm.

What is the percentage of scattering at 400 nm?