Supporting Information

Determination of the critical micelle concentration of SDS

Electrical conductivity and light scattering measurements were used to determine the CMC value of SDS. Since the mobility of the ionic surfactant, when present as monomer, resembles that of dissociated salts and differs significantly from that of aggregated surfactant, there is a change in the conductivity at the CMC.²¹ The conductance C (S), defined as the reciprocal of resistance, for a solution is related to the distance between the electrodes (l) and the microscopic surface area of each electrode (A) (eq (S1)).

$$C = \chi \frac{A}{l} = \chi k \tag{S1}$$

Conductivity: The measured conductance C (S) was introduced in eq S1 to obtain conductivity χ (S cm⁻¹) using the factory provided cell constant k. The obtained conductivities, χ , were converted to molar conductivities ($\Lambda = \chi/[SDS]$) and plotted versus the square root of SDS concentration (Figure S1), according to the Kohlraush equation (eq (S2))

$$\Lambda = \Lambda_0 - K \sqrt{[SDS]} \tag{S2}$$

where Λ_0 is the molar conductivity at infinite dilution and K is a coefficient related to the electrolyte theory. A linear decrease in molar conductivity was observed up to [SDS] = 7.8×10^{-3} M, corresponding to the CMC value.

Light scattering: Aggregation of surfactant monomers is also revealed by an increasing of the light scattering at 90°. In this work light scattering intensity values at 275 nm were collected and plotted versus the surfactant concentration (Figure S2). A visible increase of the light intensity is observed up to surfactant concentrations equal to the CMC. The value so obtained $(7.9 \times 10^{-3} \text{ M})$ is in good agreement with that obtained from conductivity measurements and with the literature value $(8 \times 10^{-3} \text{ M})$.⁴¹

^{41.} R. J. Williams, J. N. Phillips, K. J. Mysels, Trans. Faraday Soc., 1955, 51, 728.



Figure S1. Molar conductivity dependence on $\sqrt{[SDS]}$.



Figure S2. Light scattering intensity dependence on SDS concentration. $\lambda = 275$ nm.



Figure S3. Analysis of a spectrophotometric titration for the determination of pK_{HL} of PBHA in SDS 1.5×10^{-2} M; $C_{HL} = 1 \times 10^{-4}$ M; $CNa_2HPO_4 = 1 \times 10^{-2}$ M; I = 0.2 M (NaClO₄); $\lambda = 291$ nm; T = 298 K.





Figure S4. Absorption spectra of complexation reactions of Ni(II) with hydroxamic acids (HL) in micellar solution. (A) (a) 5×10^{-5} M PBHA; (b) 5×10^{-5} M PBHA + 1×10^{-1} M Ni(ClO₄)₂; [SDS] = 2.7×10^{-2} M; (B) (a) 8×10^{-5} M SHA; (b) 8×10^{-5} M SHA + 5×10^{-2} M Ni(ClO₄)₂; [SDS] = 3.5×10^{-2} M. pH = 6.9; I = 0.2 M (NaClO₄) and T = 298 K. Insets show the isosbestic points obtained during titrations.



Figure S5. Binding isotherm of a spectrophotometric titration of PBHA with Ni²⁺. CL = 5×10^{-5} M, pH = 6.0, [SDS] = 1×10^{-2} M, I = 0.2 M (NaClO₄), $\lambda = 255$ nm, T = 298 K. Inset: analysis of the titration by means of eq (6).



Figure S6. (A) Kinetic curve for the complexation reaction of PBHA/Ni(II) system. (B) Dependence of $1/\tau$ on metal concentration for the PBHA/Ni(II) system. [SDS] = 3.5×10^{-2} M; pH = 7.0; λ = 255 nm; T = 298 K.



Figure S7. Dependence of the apparent equilibrium constant on SDS concentration for the PBHA/Ni(II) system. (•) Data obtained from spectrophotometric titrations. (•) Values expressed as k_f^{SDS}/k_d^{SDS} , obtained from kinetic experiments. pH = 7.0; T = 298 K.

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Figure S8. Dependence of $1/R_{HL}$ on [SDS] for SHA. pH = 7.0, I = 0.2 M, T = 298 K.