Efficient Extraction of Dye Remazol Yellow Gold Utilizing Aqueous Two-Phase Systems

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Introdução

Remazol Yellow Gold (YR) is a widely used dye in the textile industry and is commonly found in effluents and neighbouring aquatic environments. Current methods for the removal of this dye are either inefficient or too expensive to implement on a large scale. Therefore, there is a demand to develop efficient and cost effective methods that can be employed by smaller manufactures. Aqueous two-phase systems (ATPS) are an attractive solution that satisfy the principles of green chemistry and has become the method of choice[1,2]. In this respect, the extraction efficiency of dye YR ($\%E_{YR}$) in SAB composed of polymers and salts or ionic liquids (IL-ATPS) and salts were investigated. The $\%E_{YR}$ in the presence of real effluent was also studied.

Resultados e Discussão

The $\%E_{YR}$ was obtained by calculating the ratio of the quantity of YR in the upper phase and total amount of YR in the system. The quantification of YR in each phase was determined by UV-VIS spectroscopy at 256nm. Figure 1 shows the $\%E_{YR}$ as a function of TLL in different SABs.

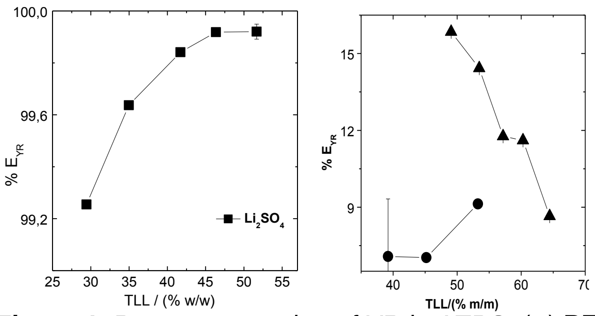

Figure 1. Percent extraction of YR in ATPS. (■) PEG 1500 + Li_2SO_4 + H2O; (▲)[Bmim]BF_4 + $MnSO_4$ + H_2O; (●)[Bmim]BF_4 + $(NH_4)_2SO_4$ + H_2O.

It is notable that for ATPS formed from PEG 1500 and lithium sulphate, the $\%E_{YR}$ is greater than 99% for all the TLL studied and thus demonstrates the capacity and efficiency of ATPS to extract YR.

The values shown in figure 1 for the systems formed from salt and ionic liquids demonstrate the ability of this system to remove YR in the lower phase of the ATPS.

Table 1 displays the results obtained from our recovery experiments of YR when utilizing SAB composed of PEG 1500 + Li_2SO_4 + effluent.

Table 1. Recovery values of the YR for PEG 1500+ Li_2SO_4 + effluent ATPS at 298 K.

TLL (% m/m)	Top phase recovery (%)
29.43	100.5 ± 0.5
34.97	103.2 ± 0.9
41.71	94.7 ± 0.7
46.36	99.7 ± 0.3
51.67	98.2 ± 0.7

Even though the effluent represents a complex medium, the SAB was capable of removing the dye with an $\%E_{YR}$ close to 100% for all the TLL evaluated.

Conclusões

The high $\%E_{YR}$ values in systems composed of polymers and salt demonstrate the potential of this method for extracting YR from aqueous media. The $\%E_{YR}$ values for IL-ATPS also show that it is possible to extract the dye in the lower phase of the system.

Agradecimentos

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