EVALUATION OF SEPIOLITE DISPERSION BY THE USE OF IONIC LIQUIDS

Juliana Aristéia de Lima¹, Fernanda Ferraz Camilo², Roselena Faez³, Sandra Andréa Cruz¹
¹Centro de Engenharia, Modelagem e Ciências Sociais Aplicadas - Universidade Federal do ABC, 09210-170, Santo André – SP. (sandra.cruz@ufabc.edu.br); ²Instituto de Ciências Ambientais, Químicas e Farmacêuticas, Universidade Federal de São Paulo, Rua São Nicolau, 210 – CEP: 09972-270 – Diadema, Brazil; ³Departamento de Ciências da Natureza, Matemática e Educação, Universidade Federal de São Carlos, Rodovia Anhanguera Km 174, Araras, 13600-970 SP, Brazil.

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Introduction
Sepiolite (SEP) is a hydrated magnesium silicate with half unit-cell formula: Si₁₂O₃₀Mg₈(OH)₄.8H₂O. The acicular morphology of SEP and its very high surface improve adhesion/compatibility with polymeric matrices and provide an excellent reinforcing effect on polymers, however, SEP shows a needle-like clay morphology usually lying in a highly aggregated state [1-2]. Consequently, the breakdown of the SEP beams could significantly improve the clay performances and extend its applications when incorporated in polymeric matrices.

With this view in mind, in order to discover a more convenient and eco-friendly method for separating the SEP agglomerated bundles it was focused in impregnation methods without the use, or with low concentration, of solvents. In the last years, ionic liquids (IL) based on imidazolium cations have attracted much interest because of their unique physical and chemical properties. Among these characteristics, they present remarkably superior chemical and thermal stabilities and non-flammability [3]. To our knowledge, there are no reports in the literature using the ionic liquids to disaggregation SEP fibers.

In this context, this work reports the different impregnation methods of sepiolite with the ionic liquid 1-methyl-3-butylimidazolium bis(trifluoromethanesulfonyl) imide, BMImTf₂N, besides presenting good thermal and chemical stability has lower viscosity when compared to non-Tf₂N-based IL, which may favor the impregnation of SEP.

Métodos
Sepiolite was purchased by Tolsa S/A and used as received without any purification. Samples of sepiolite (300 mg) impregnated with liquid ionic (SEP/IL - 5 wt %) was prepared by: (1) ultrasound bath - U - for 1 hour; (2) maceration (mechanochemical) - M and (3) using dimethylformamide as solvent -S.

Results
Fig. 1 shows the micrographs obtained by SEM for pure SEP and sepiolite impregnated with the IL by different methods.
The micrograph (A) shows that pure sepiolite fibers are fully agglomerated. SEP samples impregnated with IL (micrograph B, C and D) still have some aggregates, however a well-dispersed fibrilar structure is clearly observable while only compact bundles are found on pure SEP. Thus, the dispersion of sepiolite with IL represents a good strategy to enhance its compatibility with other matrices.

References