22nd Iranian Inorganic Chemistry Conference,
23-25 August, 2023
University of Kurdistan

Investigation on effect of nanoclay particles on curing of unsaturated polyester resin and evaluation synthesized nanocomposite properties

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In this work, Unsaturated-clay nanocomposite (UP-Clay) prepared by a new method of in situ synthesis. The Cloisite 15A was used as nanofiller and isophtalic resin as matrix. In this new method, the nanocomposite prepared during synthesis of UP oligomers. UP monomers diffuse into the interlayer spacing of Cloisite 15A easily. Occurring condensation reaction between UP monomers leads to delamination of layered Cloisite 15A. In conventional methods for the preparation of nanocomposites, such as direct mixing, high viscosity and oligomers with high volume is the biggest barrier to dispersion of nanoclay in matrix that this causes local aggregation of nanoclay. In this new way was tried to overcome these problem. Condensation reaction in the presence of Cloisite 15A causes the functional group of surfactants of Cloisite 15A reacts with UP monomers, In order to achieve a strong interaction between the two components [1,2].

In this work, according to the results of XRD and SEM, dispersion of Cloisite 15A in matrix was increased for UP-nanocomposite prepared by in situ method. Iso- thermal curing of UP-Clay nanocomposite prepared by in situ method and pure UP resin system was performed in 55, 65 and 75. The results revealed decrease in the final conversion of curing with Cloisite 15A loading. Tensile teste was performed on UP-Clay nanocomposites prepared by both methods and pure UP resin. The result revealed increase in modulus and strength with Cloisite 15A loading. This increase was higher UP-clay nanocomposite prepared by in situ method. Optical image obtained from uncured UP-Clay nanocomposite prepared by both method revealed good stability of Cloisite 15A in matrix after nanocomposite storage for a long time, this relate strong interaction between two component.

***Keywords**:* Nanocomposite, Unsaturated Polyester, Cloisite 15A, Mechanical properties

References

[1] M. Alexandre; P. Dubois; *J.Materials Science and Engineering*, **2000**, 28, 1-63.

[2] Malik, M; Choudhary, V; Varma, I, K; *Review Macromolecular Chemistry and Physics*, **2000**, 40 (2 & 3), 139-165.