Abstract.

Zeolites are microporous crystalline materials showing channels and cavities of molecular dimensions in its interior. The main advantage of these materials is their high thermal and chemical stability as well as the possibility to change the topology and dimensions of the channels and cavities.

The main goal of this thesis is to obtain new microporous materials (zeolites) and to widen the composition range of some existing materials, using high-throughput techniques of synthesis and characterization.

Four families of structure directing agents (SDAs) are synthesized to obtain these microporous materials and each family is formed by quaternary tetraalkylammonium cations. The size and the volume of the members of each SDA family are increased to carry out a study on how it affects this increase on the type of zeolite that crystallizes

Taking into account the importance of each of the various parameters that influence on the hydrothermal synthesis of zeolites and trying to cover all the possible range of composition, a factorial design of experiments for each obtained and characterized SDA is performed. The materials of interest obtained in these experiments are subjected to an exhaustive characterization, in order to determine its structure and properties.

Known materials such as zeolites *ITQ-3*, *ITQ-43* and *ITQ-44* have been obtained with the SDAs used. But the most important thing of this thesis has been obtaining two new materials, which we refer to as ITQ-57 and ITQ-60. The structure of the zeolite *ITQ-60* is completely determined and we can conclude that it is an intergrown material, formed by two layers and presenting a two-dimensional system of 10 x 12 MR channels. On the other hand, the structure of the zeolite *ITQ-57* is in its final stages of definition, but we are able to determine is that it presents a large orthorhombic unit cell.

We must also mention the obtaining of an optimized synthesis method of the chiral zeolite *SU-32*. This zeolite has been synthesized as a racemic mixture with a chiral SDA. Using theoretical calculations it has been found that every one of the enantiomers of the SDA is able to lead to the formation of each one of the enantiomers of chiral zeolite. The last step is to synthesize each enantiomer of the SDA separately, allowing us to obtain the two chiral zeolites.