

# **MDI ISOCYANATE-BASED BITUMINOUS FOAMS: EFFECT OF POLYMER MOLECULAR WEIGHT**

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The main objective of this research was to study the influence of prepolymer molecular weight on the final properties of bituminous foams. Stable bituminous foams were prepared by using 4,4'-diphenylmethane diisocyanate/polypropylene glycol (MDI/PPG) prepolymers. Firstly, MDI-PPG and bitumen were let to react, at 90°C, and, then, an excess of water was added, which reacted with the remaining isocyanate (–NCO) groups and generating CO<sub>2</sub>, which was used as a chemical foaming agent to produce stable bituminous foams. All the samples were manufactured by adding the same concentration of free isocyanate groups.

The results obtained demonstrate that these bitumen/MDI-PPG blends yield new and more complex compounds, by reaction of isocyanate groups with bitumen molecules through urethane/urea linkages. In addition, the foaming process favours the development of a chemically-based three-dimensional network through the bitumen.

In general, the foaming process strongly improves bitumen rheological properties, mainly in the high in-service temperature region, although, paradoxically, the enhancement degree is inversely proportional to polymer molecular weight.