

## IMPACT OF GEOMETRIC PROPERTIES OF SILICA SUPPORTS ON METALLOCENE CATALYST BEHAVIOUR

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The objective of this work was to evaluate the effect of the physical properties of several different commercial silicas on the performance of metallocene catalysts when used in gas and slurry phase polymerization. A lot is known about how the chemistry of the silica affects the polymerization and the final product, but very little is described in the literature concerning parameters such as pore volume and pore diameter. This work dealt with these issues by using two different metallocenes in homo and copolymerization of ethylene and ethylene 1-hexene respectively.

In terms of silica porosity, the metallocene/MAO catalyst supported on the silica with lower pore volume appears to polymerize faster than the one which is supported on the silica with higher pore volume. This behavior can be attributed to the fact that the fragmentation of the growing catalyst/polymer particle with lower pore volume will be faster than its counterpart.

In terms of mean particle size, if other physical properties like pore volume, pore diameter and surface area of the silica supported metallocene/MAO catalysts are kept similar along with the metal loadings, the smaller catalyst particles are more active than their bigger counterparts. This effect of particle size on instantaneous activity seems to be the same at different monomer pressures and in the presence and absence of a comonomer (like 1-hexene).

Finally, the effect of pore diameter is very complex. The normal trend would be the smaller the pore diameter the faster the polymerization should be, due to the reasons explained for the pore volume. However, by using the technique we employed for the previous parameters, it was not possible to draw a valid conclusion. It seems that MAO penetration depends on the pore size, and that it might not penetrate into particles with small pore diameters.