INTRODUCTION

EPM elastomers, discovered around the middle of the 1950's by Natta and co-workers, quickly became a subject of research in many laboratories throughout the world. Thus, the research efforts were started, directed towards ever improved knowledge of the properties of these products, the development of more effective catalyst systems suitable for better performance and in improvement in the production processes. This report deals with the possibility of producing elastomeric ethylene-propylene copolymers with special high yield catalysts:

ZIEGLER-NATTA HIGH YIELD CATALYST PERFORMANCE

The titanium salt-based high yield catalysts are employed to produce thermoplastic poly-alpha-olefins and the common opinion still prevails that these catalysts are not useful for the synthesis of elastomeric EP copolymers. Nevertheless, the research efforts at ME/DUTRAL S.p.A. have identified catalysts capable of yielding amorphous ethylene-propylene copolymers. The elastomers produced are similar to, and better than those produced with vanadium-based catalysts.

Three families of titanium catalysts have been studied which will be called A, B and C. The copolymers obtained with these catalysts, as demonstrated by $^{13}$C-NMR analysis, are free from inversions and have $r_1 \times r_2 > 1$ for type A and B catalysts and $r_1 \times r_2 < 1$ for the type C catalyst, whereas the vanadium-based catalyst contains a considerable amount of inversions (about 15%) and has $r_1 \times r_2 < 1$. This proves that there is an increasing reduction of propylenic and ethylenic type sequence blocking from catalyst A, B, C to V, respectively and consequently the degree of crystallinity changes according to the type of supported catalyst used (Figure 1). The most interesting catalysts are B and C. Figure 2 reports molecular weight distribution (MWD) of products obtained with these two catalysts in comparison with a similar product obtained with a vanadium catalyst: all high yield products have broader MWD.

NEW SIMPLIFIED HIGH YIELD PROCESS

Most EPM/EPDM elastomer manufacturers are currently employing solution
Fig. 1. Polyethylene or Polypropylene Crystallinity Content (From X-rays Analysis)

Fig. 2. Molecular Weight Distribution