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DMC (double metal cyanide) catalyst

- DMC catalyst is used for epoxide polymerization, that is, for polymerizing alkylene oxides such as propylene oxide and ethylene oxide to yield high molecular weight polether polyols.
- In conventional base catalyzed oxyalkylation reaction, propylene oxide and certain other alkylene oxides are subject to a competing internal rearrangement that generates unsaturated alcohols. The resulting products will contain allyl alcohol initiated, monofunctional impurities. The monofunctional impurities tend to reduce the average functionality and broaden the polydispersity of the polyols.
- Compared with similar polyols made using conventional basic catalyst, polyether polyols made from the DMC catalyst have low unsaturations, narrow molecular weight distributions, can have high molecular weight, and are useful in making a variety of polyurethane products.
- Moreover this catalyst can be used with less amount (ppm) and reaction time of polymerization is reduced largely.

An exemplary record from dynamic trends of the reaction parameters during the Activity Control Test (ATS) of MEO-DMC catalyst, produced by MEXEO, is presented in Fig. 1.

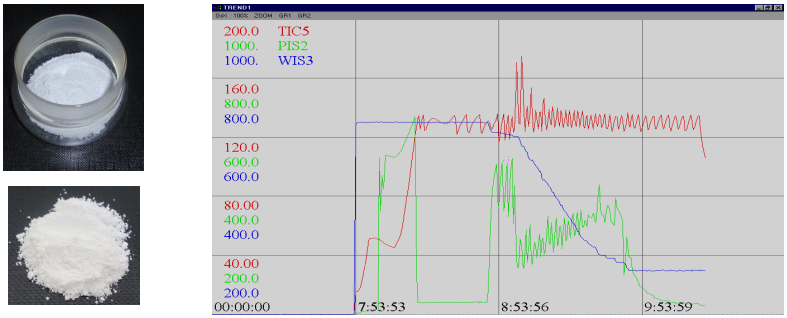


Fig. 1. Activity Control Test of MEO-DMC catalyst during propoxylation of polypropylene glycol 450, at 27 ppm concentration, where: **blue line means weight of alkylene oxides in feeding vessel, red line denotes temperature, green line sets pressure during synthesis.**

The synthesis was performed in a computerized 1 dm^3 laboratory reactor equipped with PLCS system, mechanical stirrer, heating jacket and cooling coil. The reaction temperature was 130ºC and overpressure 0,3 – 0,6 MPa.

PERFORMANCE CERTIFICATE

MEO-DMC alkoxylation catalyst Initial Sstage Activity Test (ISAT)

Definition:

To examine performance of the catalyst at the initial stage of the reaction a model test is performed, where c.a 1 mole of methyloxirane (PO) is dropped into the reactor charged with 100 g of castor oil mixed with 27 ppm concentration of catalyst. The PO feed is commenced in one portion, at 130°C.

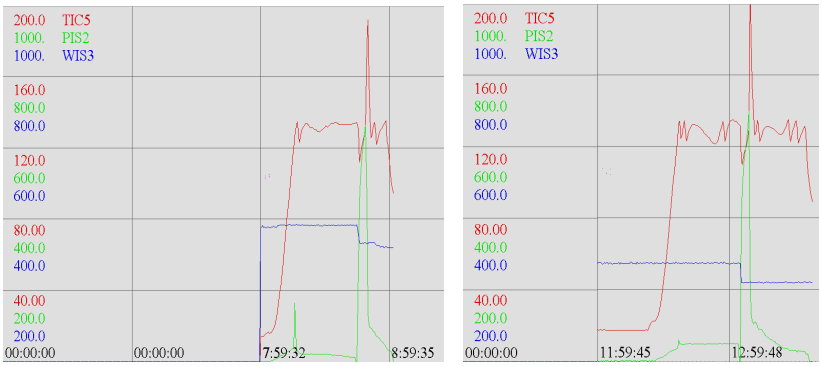
The assumed reaction temperature is controlled by the system through periodic heating and cooling of the reactor charge within the range of ±5°C, following by respective fluctuation of the recorded overpressure in the reactor. The records of dynamic trends from the model Initial Stage Activity Test is shown in Fig.1.

Experimental:

The activity test was performed in a computerized 1 dm^3 laboratory reactor equipped with PLCS system, mechanical stirrer, heating jacket and cooling coil. The reaction temperature was 130°C and overpressure 0,3 – 0,6 MPa.

Table 1. Reactor charge and the reaction conditions

Charge:	
Castor oil	100 g
PO	50 g
DMC, commercial MEO–DMC, MEXEO	0,017 g
Reaction conditions	
Drying:	130°C/ 30 min.
Temperature:	130°C
Overpressure:	300 – 600 kPa



a) Commercial DMC b) MEO–DMC (MEXEO)

Fig. 2. Dynamic trends from the comparative ISAT syntheses