

Efficient trimerization catalyst for aliphatic and alicyclic isocyanates

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Polyurethane has excellent physical and mechanical properties and chemical resistance. It is widely used in foams, coatings, elastomers, adhesives, leather and other fields. However, it also has defects such as poor heat resistance, low softening temperature and low decomposition temperature, which limit it in Applications in certain fields. Later, it was discovered that both aromatic and aliphatic isocyanates can self-add trimerize to isocyanurate under heating. Because the isocyanurate ring has a strong electron-withdrawing effect, the polarity of the C=N bond of NCO in the molecule is increased, thereby increasing its reactivity, and it can crosslink and cure to form a film by reacting with hydroxyl groups, and the degree of crosslinking of the cured product When it is increased within an appropriate range, its hardness increases and adhesion increases.

Polyurethane products containing isocyanurate rings have the following characteristics:

- ① Because the isocyanurate ring has high radiation resistance, the prepared polymer material has high protection performance against radiation.
- ② Has good corrosion resistance and yellowing resistance.
- ③ The isocyanuric acid ring does not contain active hydrogen atoms, so that no hydrogen bond is formed, so the isocyanate containing isocyanurate has low viscosity and high solid content.
- ④ The isocyanurate ring is very stable, so it has a longer storage time and has better heat resistance.
- ⑤ Since the isocyanurate ring contains a flame-retardant nitrogen element, the materials made with it are flame-retardant.

Therefore, the isocyanate trimer has attracted great attention, and has been applied in the fields of coatings, adhesives, sealants, elastomers, foams, etc., and has also been reported in the fields of textiles, paper, ink, etc.

Foreign countries began to produce isocyanate containing isocyanate trimer industrially in the 1970s, and a series of products have been formed. Among them, the more famous manufacturers are HULS, Bayer, and SAPICI.

However, the aliphatic and alicyclic isocyanates have low activity, so in the actual production of aliphatic and alicyclic isocyanate trimers need to add a suitable catalyst for catalysis. Unlike conventional TDI trimer preparation, conventional tertiary amine catalysts such as DMP-30 have little catalytic effect on the trimerization of aliphatic and cycloaliphatic isocyanates, and conventional potassium metal salt catalysts have an effect on aliphatic and cycloaliphatic isocyanates. There is a certain effect of trimerization, but the actual production requirements are still not met. In this regard, Song Chunmei of East China University of Science and Technology used potassium acetate (Polycat 46) as a catalyst to synthesize IPDI trimer at a certain temperature, and then combined with 2,4,6-tris(dimethylaminomethyl)phenol (DMP-30) Comparison, the results are as follows:

C1-C4 is potassium acetate, S1-S3 is DMP-30

催化剂种类	质量分数/%	时间/h	温度/℃	反应后NCO质量分数/%	NCO减少的质量分数/%	平均常数k
C1	1.40	34.08	70	22.00	15.80	0.4638
C2	1.40	34.08	50	34.46	3.33	0.0980
C3	2.80	48.00	60	20.20	17.60	0.3760
C4	2.80	24.08	70	18.90	18.90	0.7850
S1	1.37	34.25	70	36.90	0.90	
S2	2.80	34.01	70	34.01	3.79	
S3	4.12	24.25	70	36.00	1.80	

It can be seen from the data in the above table that DMP-30 has no obvious catalytic effect on IPDI trimerization, and potassium acetate has an effect on IPDI trimerization, but its conversion rate is not high.

In response to this situation, Xindian Chemical has developed a new trimerization catalyst NT CAT P200 for many years to effectively trimerize aliphatic and cycloaliphatic isocyanates. Taking IPDI as an example for comparative experiments:

Take 710 g of IPDI monomer in a 1-liter four-necked flask and stir mechanically. Stir rapidly under the protection of nitrogen and heat the reactor to 85 ° C. The catalysts NT CAT P200 were added separately, the temperature was maintained, and stirring was continued for two hours. The sample analyzed by FTIR showed a conversion rate of 57%. Phosphoric acid was added to deactivate the catalyst to obtain 700 g of a substantially colorless reaction product. The product viscosity was 2200 mPa.s (25 ° C) and the NCO% index was 28.6. Add 84.7g of IPDI monomer to dilute the product, the viscosity of the diluted product is 730mPa.s (25 ° C). The oligomer distribution determined by GPC is: 78.3% for trimers; 16.4% for pentamers; 5.3% for heptamers and higher oligomers.

The experimental results show that the NT CAT P200 catalyst not only has higher reactivity, but also has better selectivity, and also has great advantages in reducing the viscosity, color, odor, etc. of the product.

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FAQ

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Re: Yes, Sample are available. For normal products, samples are for free and you just need to bear the freight; For those high value products, you just need to freight and certain product cost. When we both cooperate for some times or when you are our VIP customer, free sample will be offered when you need.

Q2: Which payment is available for your company?

Re: T/T, L/C ,You can choose the one which is convenient for you.

Q3: How and when can I get my goods after payment?

Re: For small quantity products, they will be delivered to you by international courier(DHL, FedEx, TNT etc.)

or by air. Usually it will cost 3-5days that you can get the goods after delivery.For large quantity products, shipping by sea is worthwhile.It will cost days to weeks to come to your destination port, which depends on where the port is.

Q4: Is there any possible to use my appointed label or package?

Re: Yes. If needed, we'd like to use label or package according to your requirement.

Q5: How can you guarantee the goods you offer is qualified?

Re: We always believe honesty and responsibility are basis of one company, so whatever products we provide for you all are qualified.