

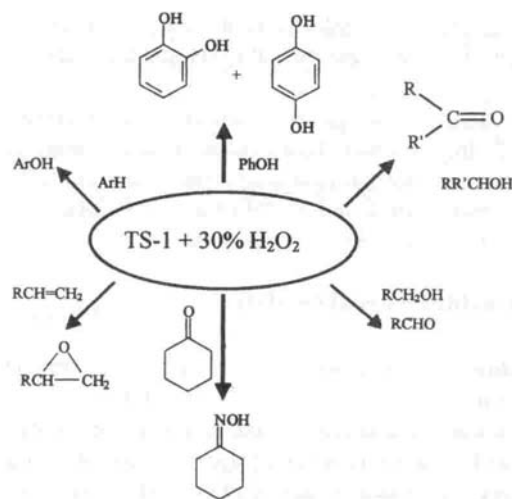
7 : Titanium silicalite-1(TS-1) epoxidation

(solid acid)

가 / 가
가 , review 가
가

(PO)

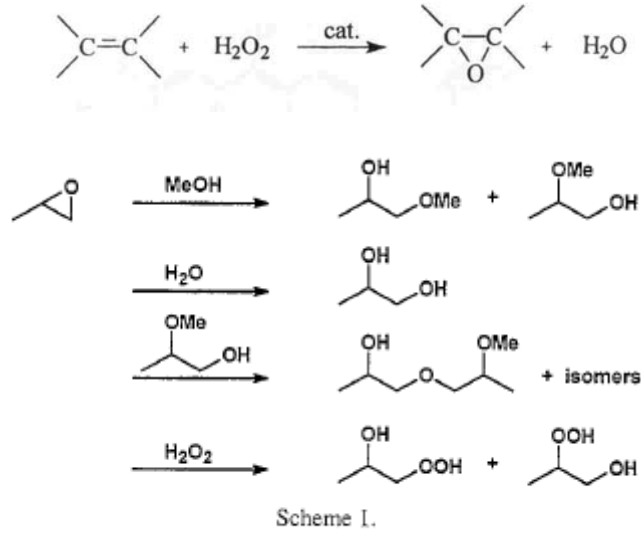
PO hydroperoxide
epichlorohydrin epoxidation
epoxidation
PO MFI
titanium silicalite-1 (TS-1)가 PO
TS-1 1980 Enichem
1 H₂O₂ [1, 2], PO 가
TS-1 가
가 2-3



1 : TS-1

TS-1 epoxidation

2



2. TS-1

Clerici [3] TS-1 가
 epoxidation /
 40 , 90
 90% 가 , 97 % PO
 glycol(PG) monomethyl ether(MME)가
 formaldehyde가
 가 , 550
 가 .

Thiele Roland [4] autoclave 3 40
 batch mode
 가 , Na₂SO₄ NaH₂PO₄가
 PO , TS-1 defect

deprotonation ,

TS-1

reflux 가



Chen [5] TS-1, TiO₂/SiO₂ xerogel, Ti-MCM-41,
 ZSM-5 TiCl₄ (Ti-ZSM-5) 47가
 epoxidation
 TOF(turn-over frequency) TS-1 Ti-
 ZSM-5 (hyrophobicity) Ti-ZSM-5
 PO diol ether가
 TS-1 Si/Ti 가 가 TOF가 가 PO
 defect 가 가
 가 PO 가
 가 PO / 가 50 %
 PO 550
 Li [6] PO TS-1 2가
 TS-1 TPAOH
 (tetrapropylammonium hydroxide) 가
 TS-1
 가 TPABr(tetrapropylammonium bromide)
 n-butylamine TS-1
 extrusion molding
 가
 PO ring opening propylene glycol(PG)
 mono-methyl ether(MME)
 TS-1 spray coating lamina TS-1 PO
 TS-1
 PO diffusion 가 PO
 PG/MME
 PO 가 lamina TS-1
 PO 30 PO

가 200

PO

TS-1 가

in-situ

가

2가 가

anthrahydroquinone (AHQ)

AHQ 가

TS-1

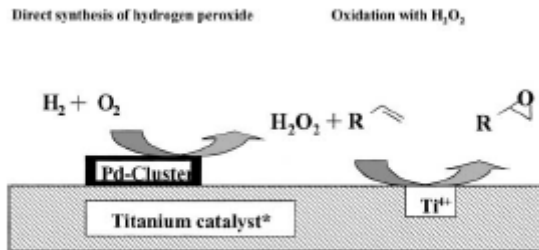
epoxidation

PO

TS-1

가

3



*TS-1, TS-2, Ti-B, Ti-MCM-41 etc.

3. Pd/TS-1

Hoelderich [7]

1 wt % Pd TS-1

TS-1

Pd/TS-1

가

[Pd(NH₃)₄](NO₃)₂

150

TS-1

PO

50

[50

가]

10-20

2-15 wt %

PO

Pd/TS-1

TS-1

PO 40 %

Pd

Pd가

가

가

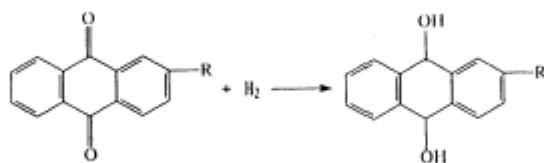
가

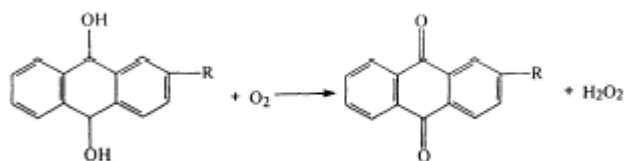
PO

PdCl₂

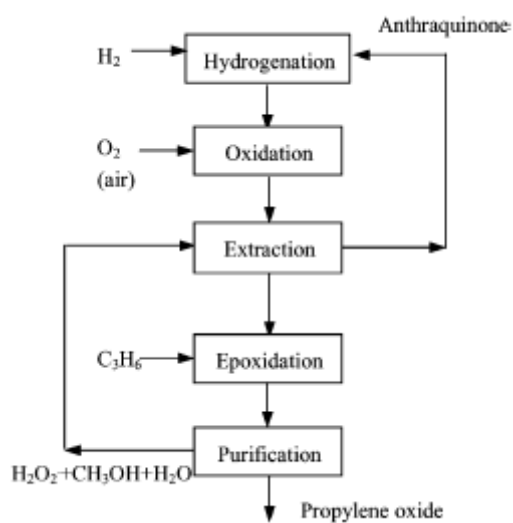
가

[8] Pd(Pt)/TS-1 epoxidation (7) PO (3 :1), 43 NaBr PO 1:1 -1:2 0.5 -1.0 mmol/l PO 가 batch 150 0.01 -0.02 wt %가 cluster isopropanol PO Jenger [9] Hoelderich Pd(Pt)/TS-1 50 -120 Pt Pd formic acid , formic acid가 ,35 PO Wang [10] anthraquinone (AQ) TS-1 AHQ in-situ 40 -50 4 PO 가

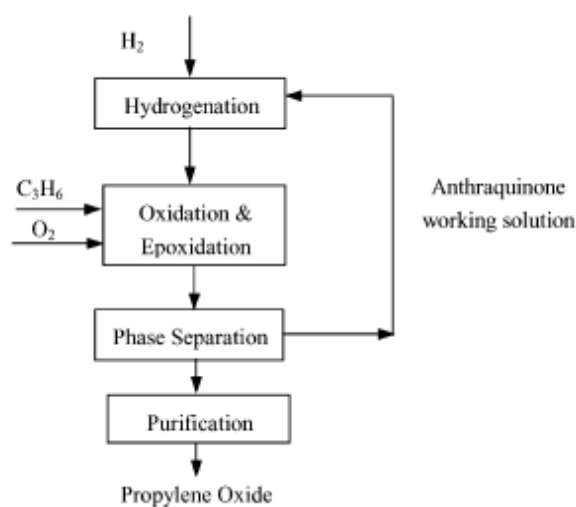




4. AQ AHQ



a)



b)

5. AQ/AHQ

1. Notari B., *Advances in Catalysis* **41** (1996) 253.
2. Vayssilov G. N., *Catal. Rev. Sci. Eng.* **39** (1997) 209.
3. Clerici, M.G., Bellussi, G., Romano, U., *J.Catal.* 129(1991) 159.
4. Thiele, G.F., Roland, E., *J.Mol.Catal. A:Chemical* 117 (1997) 351.
5. Chen, L.Y., Chuah, G.K., Jaenicke, S., *J.Mol.Catal. A:Chemical* 132 (1998) 281.
6. Li, G., Wang, X.S., Yan, H.S., Liu, Y.H., Liu, X.W., *Appl. Catal. A: General* 236 (2002) 1.
7. Laufer, W., Meiers, R., Holderich, W., *J.Mol.Catal. A:Chemical* 141 (1999) 215.
8. Laufer, W., Hoelderich, W.F., *Appl.Catal. A: General* 213 (2001) 163.
9. Jenzer, G., Mallat, T., Maciejewski, M., Eigenmann, F., Baiker, A., *Appl. Catal. A: General* 208 (2001) 125.
10. Wang, C.Y., Wang, B.G., Meng, X.K., Mi, Z.T., *Catal.Today* 74 (2002) 15