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APPENDICES

APPENDIX A

CALCULATION OF CATALYST PREPAPATION

Calculation for the preparation of the silica-modified aluminas

The silica-modified aluminas in the thesis have 5 weight ratios. AS1, AS2, AS8, AS15, AS30 mean the AIP/TEOS weight ratios that can calculate as follow. Aluminum isopropoxide (AIP, Aldrich,98%+) and tetraethyl orthosilicate (TEOS,Aldrich,99+%) is used as the reactant

If the AS8 is the product, AIP 12.5 g is used for every preparation.

The amount of AIP	=	12.5*0.98	g
	=	12.25	g
The amount of TEOS in the reaction	=	12.25/8	g
	=	1.53	g
The amount of TEOS in this preparation	=	1.53/0.99	g
	=	1.55	g

APPENDIX B

CALCULATION OF CATALYST PROPERTIES

BET surface area calculation

From BET equation :

$$\frac{X}{V(1-X)} = \frac{1}{VmC} + \frac{(C-1)(X)}{VmC} \qquad (A.1.1)$$

Where : X = relative partial pressure of N_2, P/Po

Po = saturated vapor pressure of N_2 (or adsorbed gas) at the experimental temperature

P = equilibrium vapor pressure of N_2

V = volume of gas adsorbed at pressure P, ml. at the NTP/gram of sample

Vm = volume of gas adsorbed at monolayer, ml. at the NTP/gram of sample

C = $\exp(E_1-E_2/RT)$

Where : E_1 = heat of adsorption at the first layer

E_2 = heat of condensation of adsorbed gas on all other layers

Assume C $\longrightarrow \infty$, then

$$\frac{X}{V(1-X)} = \frac{1(X)}{VmC} \qquad (A.1.2)$$

Let : Vm = Vm′

Vm' = volume of gas adsorbed to form the N_2 complete monolayer

V = volume of gas adsorbed measured by G.C.

X = P/Po

$$\frac{PbV}{273} = \frac{PtV}{T} \qquad (A.1.3)$$

Where : V = constant volume

Pb = pressure at 0 C

Pt = pressure at t C

T = 273.15 + t, K

Pb = (273.15/T)Pt = 1 atm

Partial pressure

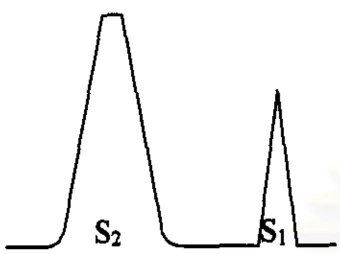
$$P = \frac{[\text{Flow of }(He+N_2) - \text{Flow of }He]\ .\ Pb}{\text{Flow of }(He+N_2)} \qquad (A.1.4)$$

= 0.3 atm

N_2 saturated vapor pressure, Po = 1.1 atm = 836 mm.Hg

X = P/Po = P/1.1

How to measure V



1 ml./1atm at room temperature

Desorption of N_2 area

N_2 calibration area

$$V = \frac{S_2}{S_1} \cdot \frac{1}{W} \cdot \frac{273.15}{T} \text{ ml./g of catalyst} \quad (A.1.5)$$

Where : W = weight of sample

$$Vm' = V\left[1 - \frac{[\text{Flow of }(He+N_2) - \text{Flow of }He] / 1.1}{\text{Flow of }(He+N_2)}\right] \quad (A.1.5)$$

Where : S = Surface area from literature of N_2

= $4.373\ m^2/ml.$ of N_2

So that : Sb = $4.373.Vm'\ m^2/g$ cat

VITA

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