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APPENDIX

ศูนย์วิทยทรัพยากร
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APPENDIX A

SAMPLE OF CALCULATIONS

A-1 Calculation of Si/Metal Atomic Ratio for Metallosilicates Preparation

The calculations is based on weight of Sodium Silicate ($Na_2O.SiO_2.H_2O$) in A_2 and B_2 solutions.

Molecular Weight of Si = 28.0855

Molecular Weight of SiO_2 = 60.0843

Weight percent of SiO_2 in Sodium Silicate = 28.5

Using Sodium Silicate 69 g with 45 g of water as a A2 and B2 solution.

$$\text{Mole of Si used} = \text{wt} \times \frac{(\%)}{100} \times \frac{(\text{M.W. of Si})}{(\text{M.W. of } SiO_2)} \times \frac{(1 \text{ mole})}{(\text{M.W. of Si})} \quad \text{(A-1.1)}$$

$$= 69 \times (27/100) \times (1/60.0843)$$

$$= 0.3101 \quad \text{mole}$$

ZSM-5 Catalyst

For example, to prepare ZSM-5 at Si/Al atomic ratio of 25 by using $AlCl_3$ for aluminium source.

Molecular Weight of Al = 26.9815

Molecular Weight of $AlCl_3$ = 133.3405

Si/Al atomic ratio of 25

$$\text{we must use } AlCl_3 = \frac{\text{mole of Si}}{\text{charged ratio (x)}} \cdot (\text{MW.}AlCl_3)$$

$$= \frac{0.3101}{x}(133.3405)$$

we must use $AlCl_3$ $= \frac{0.3101}{25}(133.3405)$

$= 1.654$ g.

Ga-silicate Catalyst

For example, to prepare Ga-silicate with Si/Ga atomic ratio of 25 by using $Ga(NO_3)_3$

Molecular Weight of Ga = 69.72

Molecular Weight of $Ga(NO_3)_3$ = 255.7347

Si/Ga atomic ratio of 25

we must use $Ga(NO_3)_3$ $= \frac{\text{mole of Si}}{\text{charged ratio (x)}} \cdot \left[\text{M.W. } Ga(NO_3)_3\right]$

$= \frac{0.3101}{x} \cdot (255.7347)$

$= \frac{0.3101}{25} \cdot (255.7347)$

$= 3.172$ g.

Zn-silicate Catalyst

For example, to prepare Zn-silicate with Si/Zn atomic ratio of 25 by using $Zn(NO_3)_2 \cdot 6H_2O$

Molecular Weight of Zn = 65.39

Molecular Weight of $Zn(NO_3)_2 \cdot 6H_2O$ = 297.48

Si/Zn atomic ratio of 25

we must use $Zn(NO_3)_2 \cdot 6H_2O$

$= \frac{\text{mole of Si}}{\text{charged ratio (x)}} \cdot \left[\text{M.W } Zn(NO_3)_2 \cdot 6H_2O\right]$

$= \frac{(0.3101)}{x} \cdot (297.48)$

$= \frac{0.3101}{25} \cdot (297.48)$

$= 3.6899$ g.

Fe-silicate Catalyst

For example, to prepare H-Fe-Silicate with Si/Fe atomic ratio of 25 by using $FeCl_3.6H_2O$

Molecular Weight of Fe = 55.847

Molecular Weight of $FeCl_3.6H_2O$ = 270.30

Si/Fe atomic ratio of 25

we must use $FeCl_3.6H_2O$ = $\frac{\text{mole of Si}}{\text{charged ratio (x)}} \cdot [\text{M.W. } FeCl_3.6H_2O]$

= $\frac{(0.3101)}{25} \cdot (270.30)$

= 3.3528 g.

Silicalite

we have no atomic ratio of Silicalite. We can preparation silicalite by using Sodium Silicate 69 g. without metal mixes into solution.

This is the amount of $AlCl_3, Ga(NO_3)_3, Zn(NO_3)_2 \cdot 6H_2O, Fe_2O_3$ and/or Silicalite used in A1 to C1 solutions and A2 to C2 solutions

A-2 Calculation of %Crystallinity

$$\%\text{Crystallinity} = \frac{\text{Area under XRD pattern of sample} \times 100}{\text{Area under XRD pattern of refference}}$$

Reference is the Silicalite (fresh)

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APPENDIX B

VAPOR PRESSURE OF WATER

The partial vapor pressure of water to the requirement was set by adjusting the temperature of saturator following Antoine equation (Reid *et al.,* 1977).

$$\ln P = A - \frac{B}{(t + C)}$$

When P = vapor pressure of reactant, (mm Hg)

t = temperature, K

A, B and C are constants shown in Table B.1

Range of temperature that applied ability 284-441 K

Table B.1 The values of constants.

Constant	Value of constant
A	18.3036
B	3816.44
C	-46.13

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