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APPENDICES

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APPENDICES

A-1 Physical Properties of Two Commercial Mordenite Catalysts

	Na-mordenite	H-mordenite
Si/Al mol ratio (in catalog)	9.15	110
Si/Al mol ratio (Analysis)	11	127
Na ₂ O (wt%)	4.5	<0.05
Surface area (BET, m ² /g)	360	420
Crystal size (μm)	0.1 × 0.5	0.1 × 0.5
Mean particle size (μm)	10-12	5-7

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A-2 Determination of %Conversion and Product Yields

$$\text{Yield of gaseous products (\%)} = \frac{W_3 \times 100}{W_1}$$

$$\text{Yield of liquid products (\%)} = \frac{(W_4 + W_5) \times 100}{W_1}$$

$$\text{Coke (\% wt of catalyst)} = \frac{W_6 \times 100}{W_2}$$

$$\text{Conversion (\%)} = \frac{(W_3 + W_4 + W_5 + W_6) \times 100}{W_1}$$

where

W_1 = polymer weight

W_2 = catalyst weight

W_3 = a weight loss after polymer degradation

W_4 = weight of the volatile liquid products in the cold trap after vacuum distillation from the tubular reactor

W_5 = weight loss after extraction of the non-volatile liquid products with diethyl ether from the reactor containing the used catalyst

W_6 = weight loss after calcination of the dried used catalyst at 540°C 10 h

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A-3 Calculation for Product Selectivity

The chromatograms of the standard-gas mixture mixture and a gaseous sample are illustrated in the Figure A-1 and Figure A-2, respectively.

%Selectivity to Gas Products

$$\% \text{Selectivity to X} = \frac{C_X \times 100}{C_T}$$

$$C_X = \frac{A_X \times C_S \times V_S}{A_S \times V_X}$$

- where
- C_X = Concentration of X in the sample, mol
 - C_S = %mol of X in the standard-gas mixture, %mol
 - C_T = Summation of molar quantity of all gaseous components in the sample, mol
 - A_S = Peak area of X in the standard-gas mixture, au.
 - A_X = Peak area of X in the sample products, au.
 - V_S = Injected volume of the standard mixture, μL .
 - V_X = Injected volume of the sample, μL .

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Figure A-1 The gas chromatogram of the standard-gas mixture obtained from GC.

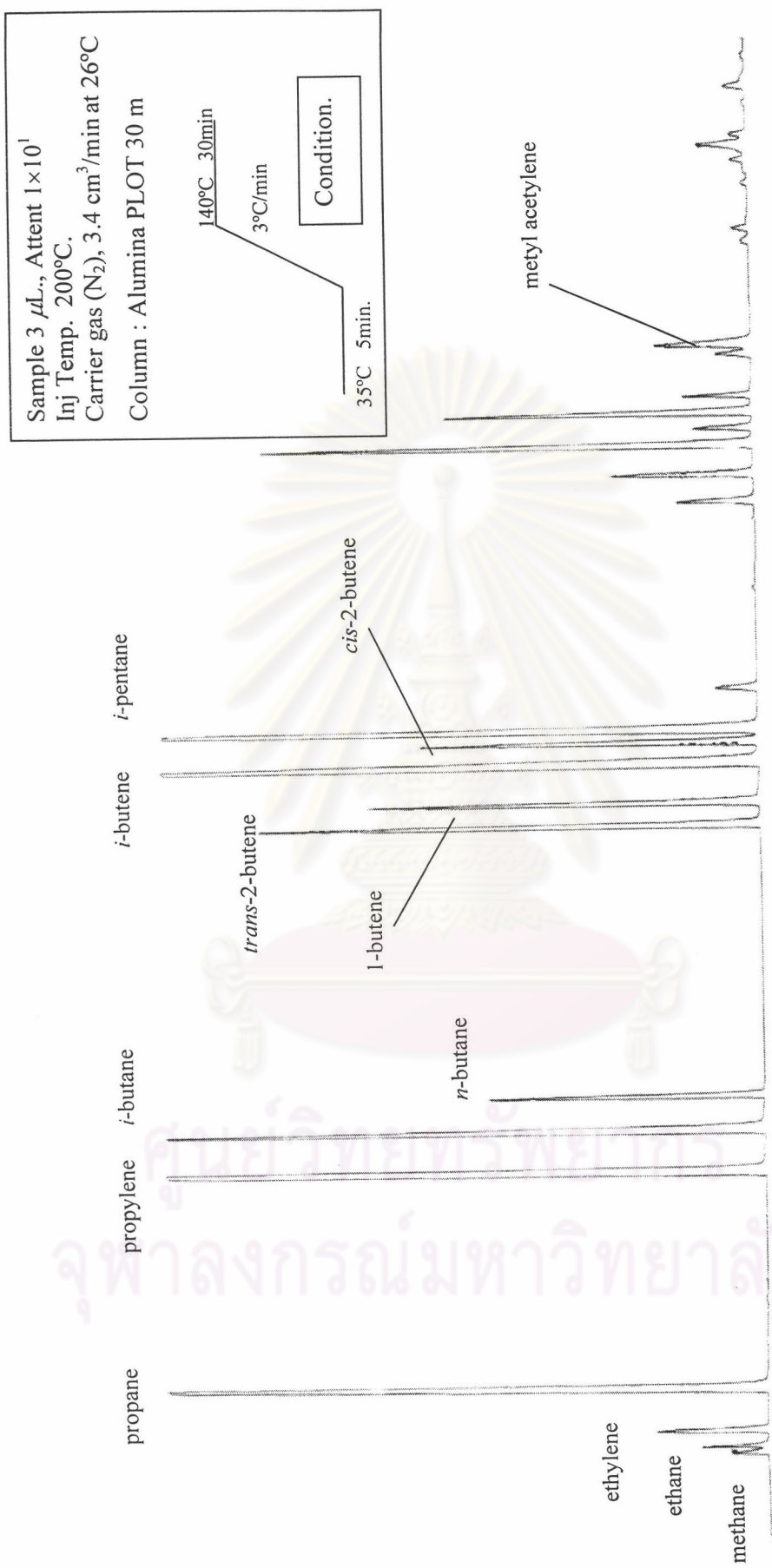


Figure A-2 A gas chromatogram of gaseous products from polypropylene cracking over the mordenite catalyst with the Si/Al ratio of 11 at the temperature of 450°C.

%Selectivity to Volatile Liquid Products

$$\% \text{Selectivity to Y} = \frac{M_Y \times 100}{M_T}$$

where M_Y = Mol of Y

M_T = Summation of molar quantity of all volatile liquid products



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VITAE

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