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APPENDICES

APPENDIX A
SAMPLES OF CALCULATION

1.) Calculation of Reaction flow rate

The catalyst used	=	0.20	g
Packed catalyst into quartz reactor diameter	=	0.6	cm
Determine the average high of catalyst bed	=	X	cm
So that, volume of catalyst bed	=	$\pi \times (0.3)^2 \times X$	ml
Used GHSV (Gas Hourly Space Velocity)	=	20,000	hr ⁻¹
GHSV =	=	$\frac{\text{volumetric flow rate}}{\text{volume of catalyst}}$	hr ⁻¹

$$\text{Volumetric flow rate} = \text{volume flow rate}^t \times (273.15/(273.15+t))$$

where t = room temperature, °C

2.) Calculation of amount of nitrogen and carbon on catalyst

The amounts of carbon on catalyst and the nitrogen from the oxidizing gas were calculated from TPO results. (The calculation of the amount of carbon on catalyst and the amount of nitrogen from the oxidizing gas were show in appendix B).

3.) The calculation of ratio of the amount of nitrogen from the oxidizing gas per the amount of carbon on catalyst (N/C ratio)

This value was derived from the result of temperature programmed oxidation. The N/C ratio was calculated from the dividing of the amount of nitrogen from the oxidizing gas and the amount of carbon on catalyst.

APPENDIX B

CALIBRATION CURVE

Thermal conductivity detector gas chromatograph, model 8-ATP was used to analyze the concentrations of oxygen and nitrogen by using Molecular Sieve 5-A while model 8-AIT was used to analyze the concentrations of propene and carbondioxide by using Porapak-Q.

The calibration curves of carbondioxide and nitrogen are illustrated in the following figures.

Table B-1 Detected area and estimated weight of carbon by feeding 100%CO₂ 0.405 ml/min mixed with helium in various flow rate through porapak-Q column on GC 8AIT at 110 °C detector temperature and 90 °C column temperature, using (1.5 ml) sampling loop

Carbon content (mg)	Average area (a.u.)
0.00129294	2218
0.00213777	3738
0.00405113	7079
0.00537520	9379
0.00723933	12587

The assumption of gas content calculation was based on the ideal gas law. Therefore, the data fitted with linear equation can be express below;

$$\text{Amount of carbon (mg), } Y = 7 \times 10^{-7}$$

$$\text{Where least square error, } R^2 = 1.0000$$

Table B-2 Detected area and estimated weight of nitrogen by feeding 0.1%N₂ mixed with helium in various flow rate through molecular sieve 5-A column on GC 8ATP at 100 °C detector temperature and 70 °C column temperature, using (2.5 ml) sampling loop

Nitrogen content (mg)	Average area (a.u.)
0.00020833	257
0.00053068	689
0.00104447	1413
0.00126548	1683
0.0015653	2083
0.00182994	2536

The assumption of gas content calculation was based on the ideal gas law. Therefore, the data fitted with linear equation can be express below;

$$\text{Amount of nitrogen (mg), } Y = 1 \times 10^{-6}$$

$$\text{Where least square error, } R^2 = 1.0000$$

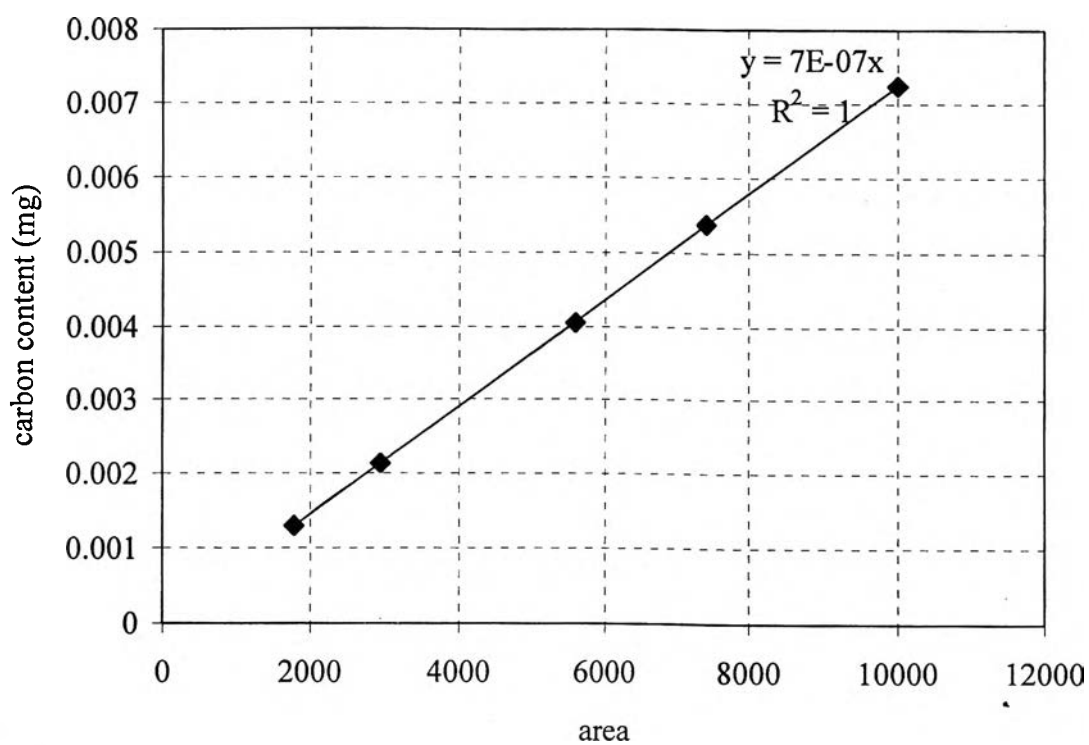


Figure B-1 Calibration curve of carbon dioxide on GC 8 AIT

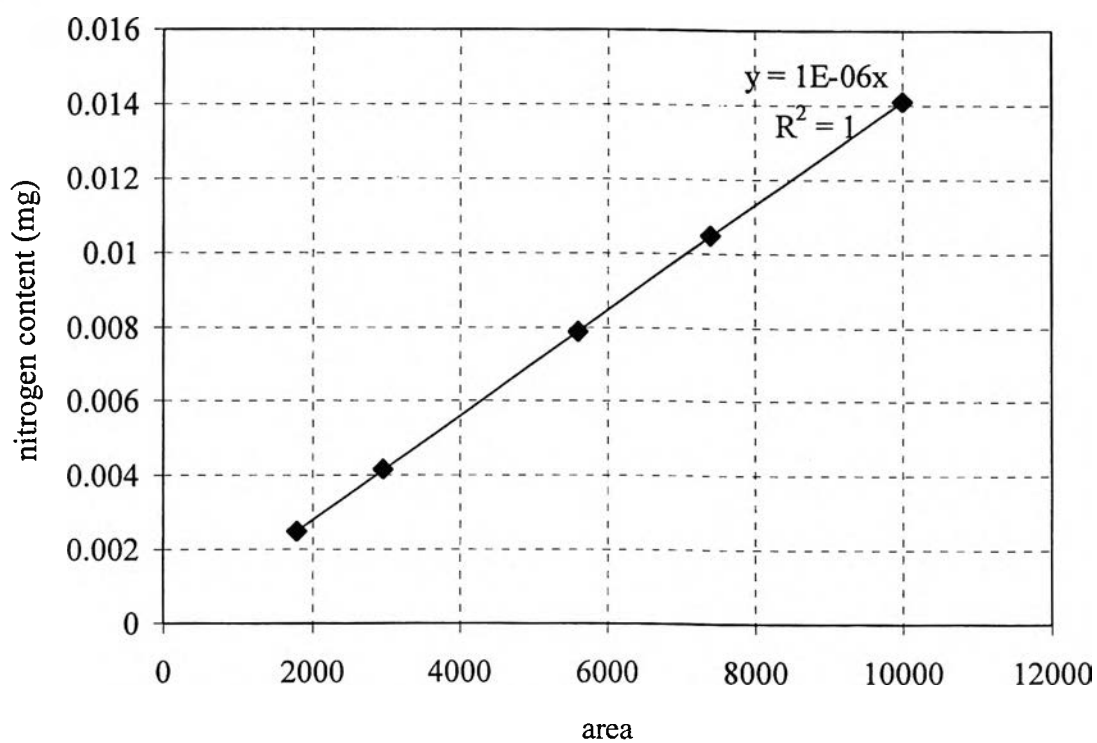


Figure B-2 Calibration curve of nitrogen on GC 8 ATP

APPENDIX C
CALCULATION OF TEMPERATURE IN SATURATOR

Set the vapor pressure of reactants to the requirement by adjust the temperature of saturator following the antoine equation [Reid (1977)]:

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

When P = vapor pressure of reactant, mmHg

t = temperature °C

A, B, C = constants

The values of constants are in Table C-1

Table C-1 The value of constant

Reactant	A	B	C
n-Pentane	15.8333	2477.07	-39.94
n-Hexane	15.8366	2697.55	-48.78
n-Heptane	15.8737	2911.32	-56.51
n-Octane	15.9426	3120.29	-63.63
Benzene	6.90565	1211.03	220.79
Toluene	6.95464	1344.80	219.48

VITA

Miss Sirinkan Isarangura na ayutthaya was born in Cholburi, Thailand, on November 27, 1976. She received her Bachelor degree of Science from Chulalongkorn University in May 1999. Then, she has continued studying Master degree of Engineering from the department of Chemical Engineering, Chulalongkorn University since June 1999.

