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APPENDICES

Appendix A Calculation for Support and Catalyst Preparation

Calculation for Support Preparation

The mixed support $\text{Fe}_2\text{O}_3\text{-TiO}_2$ was prepared by incipient-wetness impregnation method with various atomic ratio of Fe:Ti.

Fe:Ti (1:4) atomic ratio (5 g of support)

Where

$$\text{MW. of TiO}_2 = 79.87$$

$$\text{MW. of Fe} = 55.85$$

$$\frac{\text{atom Ti}}{\text{atom Fe}} = 4 = \frac{\text{mol Ti} \times 6.02 \times 10^{23}}{\text{mol Fe} \times 6.02 \times 10^{23}}$$

$$4 = \frac{\text{mol TiO}_2}{\text{mol Fe}}$$

$$4 = \frac{\left(\frac{g_{\text{TiO}_2}}{\text{MW. TiO}_2}\right)}{\left(\frac{g_{\text{Fe}}}{\text{MW. Fe}}\right)}$$

$$g_{\text{Fe}} = \left(\frac{5}{79.87}\right) \left(\frac{55.85}{4}\right)$$

$$g_{\text{Fe}} = 0.847$$

Fe 55.85 g in $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ 404 g

Fe 0.847 g in $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ 6.323 g

Therefore, the desire amount of $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ to prepare 5 g of mixed support equals 6.323 g

Fixed volume of solution 25 ml.

TiO ₂ support	1 g	used water	0.8772 g
TiO ₂ support	5 g	used water	4.3642 g

Therefore, the desire solution of Fe(NO₃)₃.9H₂O for prepare 5 g of mixed support equals 4.3642 g

Note: The calculation for different ratio, follow as shown above.

Calculation for Catalyst Preparation

Deposition precipitation is used for deposit gold on prepared support.

For 1 %wt of Au

support	99 g	deposit Au	1 g
support	1 g	deposit Au	0.0101 g

Where

$$\text{MW. of TiO}_2 = 79.87$$

$$\text{MW. of Fe} = 55.85$$

$$\text{mol Au} = \text{mol Au in precursor}$$

$$\frac{0.0101}{196.967} = \frac{\text{gAu}_{\text{precursor}}}{393.967}$$

$$\text{gAu-precursor} = 0.0202$$

Solution concentration = 0.005 M

$$\text{mol}_{\text{Au-precursor}} = \frac{NV}{1000}$$

$$V = \frac{0.0202 \times 1000}{393.967 \times 0.005}$$

$$V = 10.257 \text{ ml}$$

Note: The calculation for different gold loading, follow as shown above.

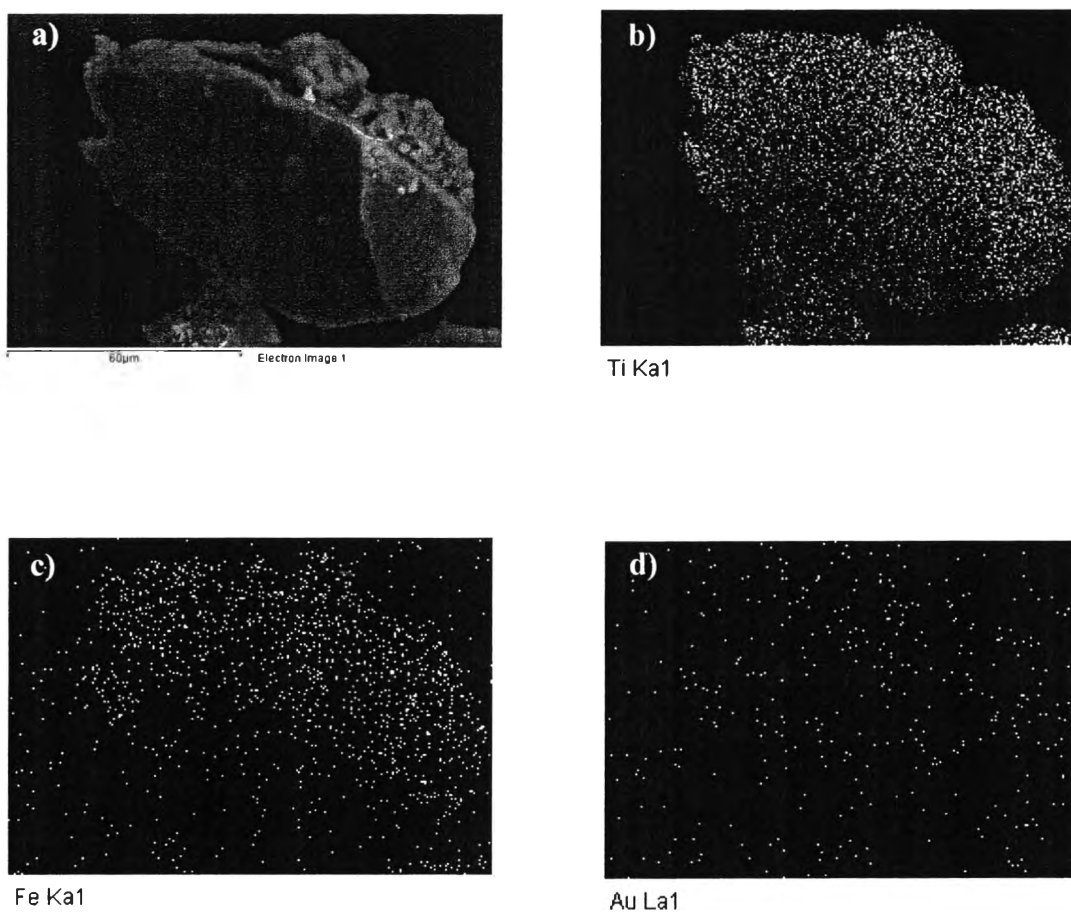
Appendix B SEM-EDS of 1% Au/Fe₂O₃-TiO₂ (1:4) calcined at 400 °C

Figure B1 SEM-EDS of 1% Au/Fe₂O₃-TiO₂ (1:4): (a) SEM image of 1 % Au/Fe₂O₃-TiO₂ (1:4), (b) mapping of Ti, (c) mapping of Ti, (d) mapping of Fe, and (d) mapping of Au.

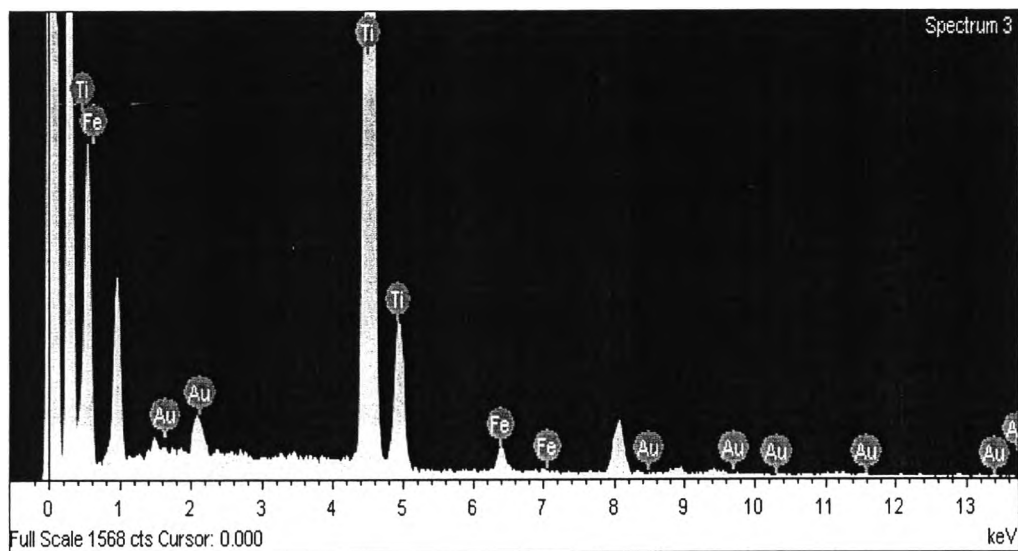
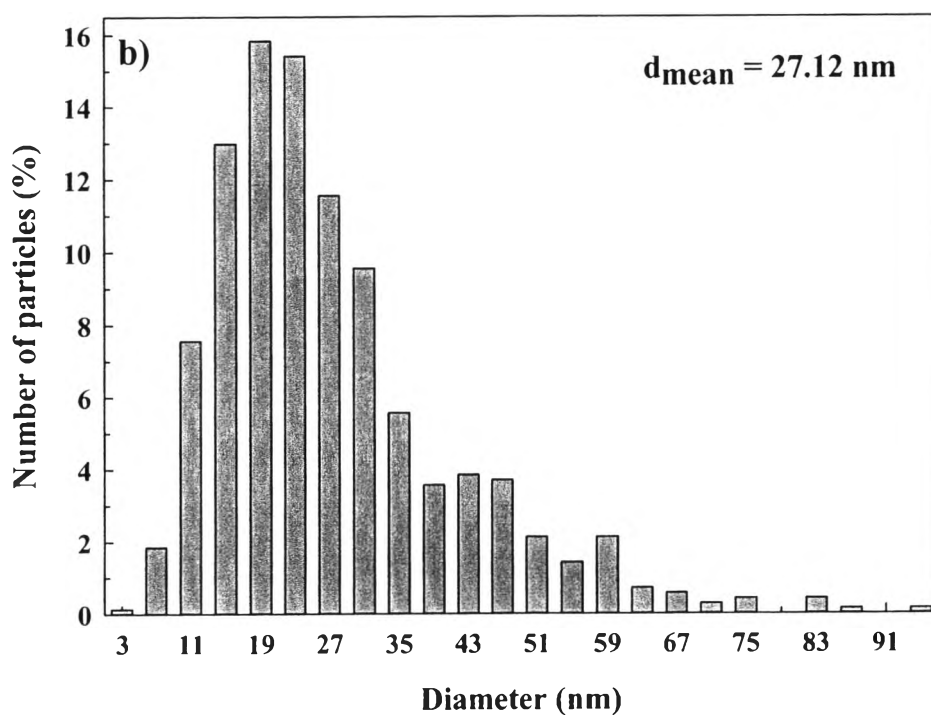
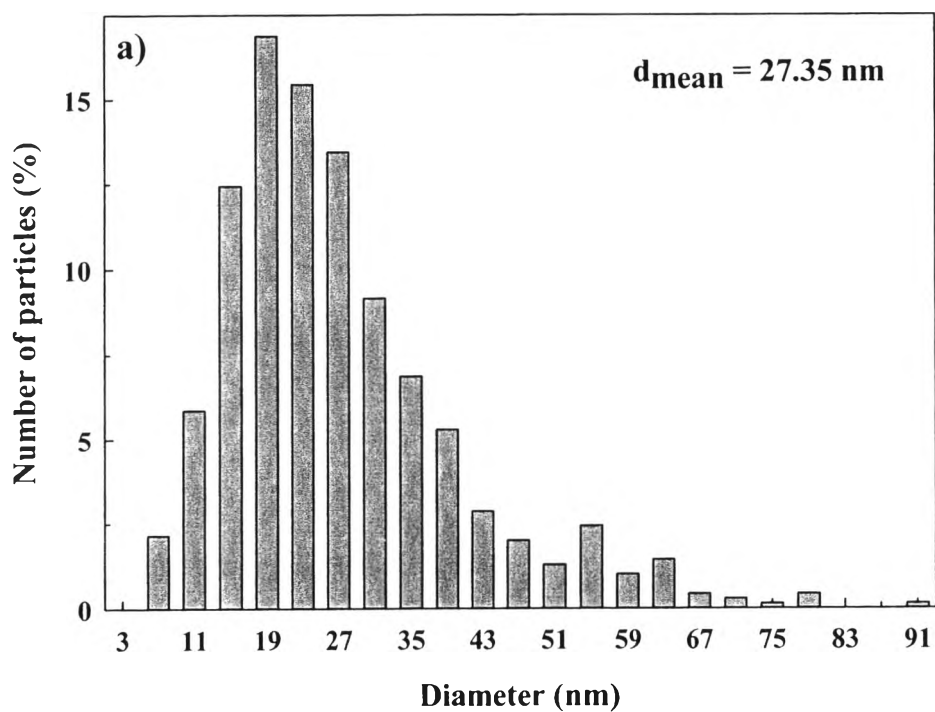


Figure B2 Composition of 1% Au/Fe₂O₃-TiO₂ (1:4) catalyst.

Table B1 Composition of 1% Au/Fe₂O₃-TiO₂ (1:4) catalyst

No.	Au (wt%)	% Atomic	
		Ti	Fe
1	0.63	97.32	2.53
2	0.75	95.99	3.65
3	1.12	97.31	2.41
4	1.26	94.86	4.82
5	1.49	93.27	6.36
Average	0.85	95.75	3.54

Appendix C Particle size distribution bar graph of support in Au/Fe₂O₃-TiO₂ (1:4) catalysts.



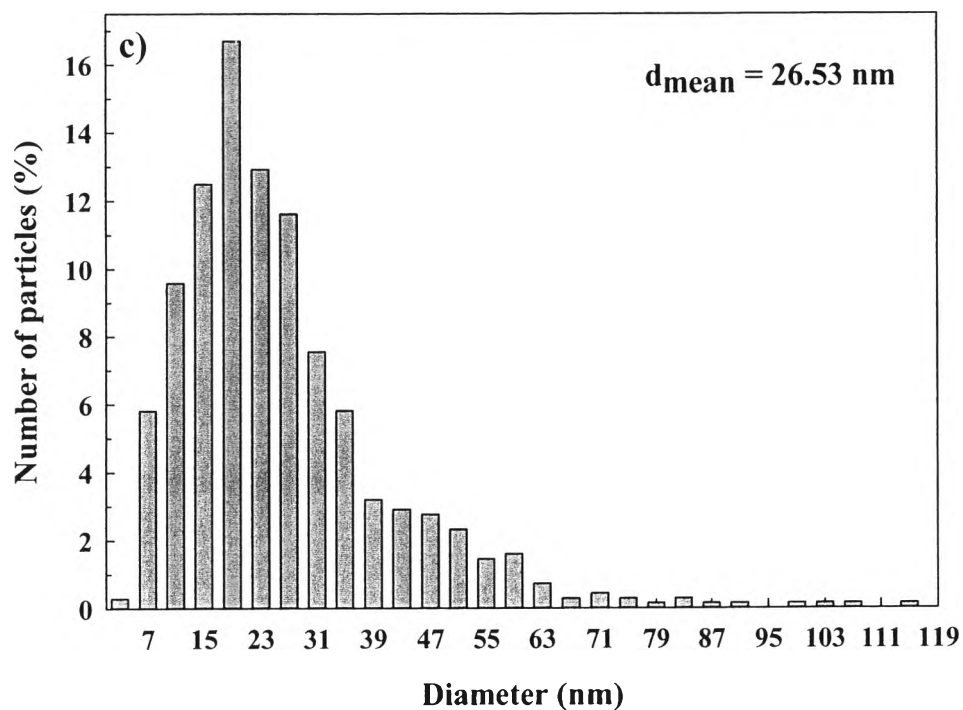
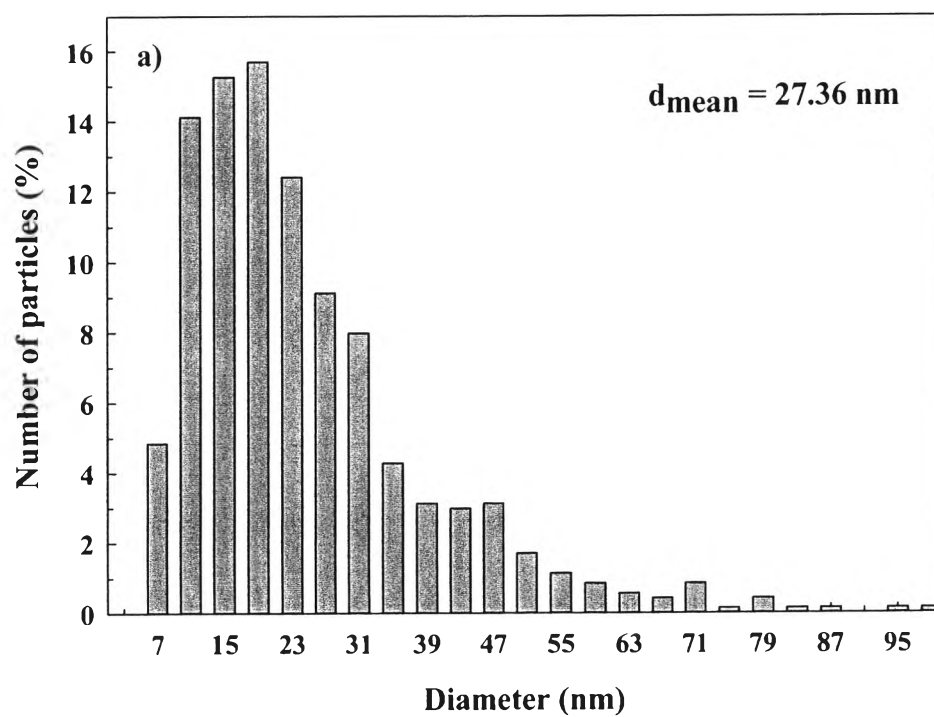


Figure C1 Particle size distribution bar graph of support in 1% Au/Fe₂O₃-TiO₂ (1:4) catalysts; a) calcined at 200 °C, b) calcined at 300 °C, and c) calcined at 400 °C.



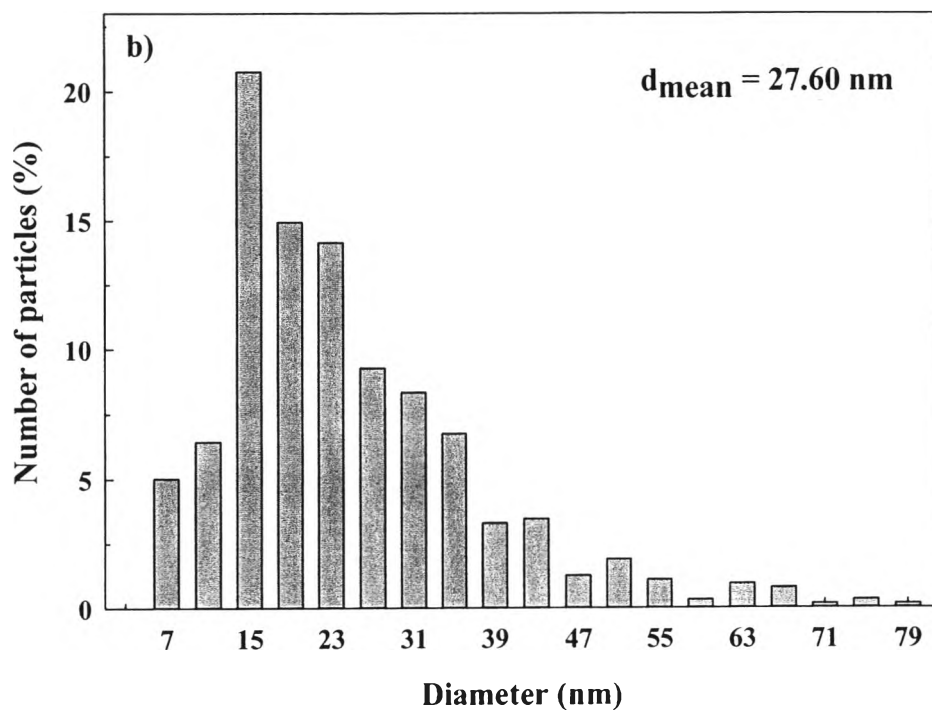


Figure C2 Particle size distribution bar graph of support in 1% Au/Fe₂O₃-TiO₂ (1:4); calcined at 400 °C with different gold loadings; a) 3%, and b) 5 wt%.

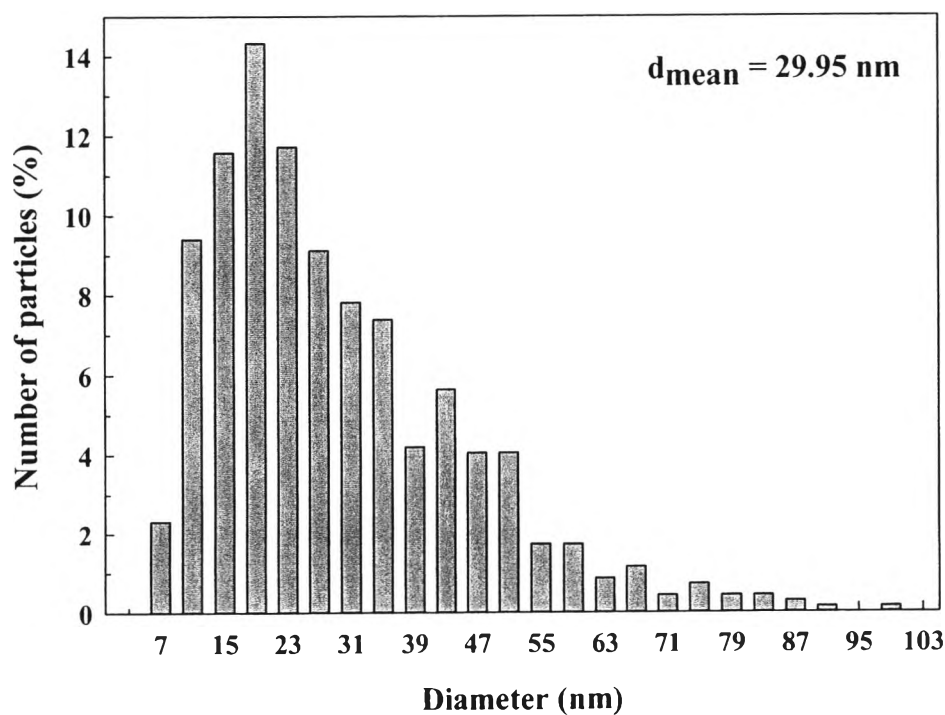


Figure C3 Particle size distribution bar graph of support in 1% Au/Fe₂O₃-TiO₂ (1:4) catalysts calcined at 400 °C with O₂ pretreatment at 200 °C for 2 h.

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Proceeding:

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