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APPENDIX

APPENDIX A

SAMPLE CALCULATION OF CATALYST PREPARATION

The sample calculation shown below is for 0.3 wt % Pt-0.3 wt% Sn - 0.6 wt % Li/Al_2O_3 catalyst. The hydrochloric acid is also added to the impregnating solution by 5 wt% of the alumina support. The alumina support weight used for all preparation is 2 grams.

If X grams of alumina support is used , so each 100 grams of the catalyst is composed of

Platinum	0.30	g.
Tin	0.30	g.
Lithium	0.60	g.
Hydrochloric acid	0.05 x X	g.
Alumina support	X	g.
then 0.30+0.30+0.60+(0.05 x X) + X	= 100	g.
X	= 94.0952	g.

The platinum compound used is chloroplatinic acid ($H_2PtCl_2.6H_2o$), its molecular weigh is 517.92 and the platinum content in the compound is 37.67 wt %.

The tin compound used is stannous chloride dihydrate ($SnCl_2.2H_2o$), its molecular weigh is 118.69 and the tin content in the compound is 51.02 wt %.

The lithium compound used is lithium nitrate ($LiNo_3$), its molecular

weight is 68.94 and the lithium content is 10.07 wt %.

Concentration of hydrochloric acid solution is 37 % volume by volume its density is 1.19 kilogram per liter.

The calculation procedure of the amount of each ingredients shows below.

For 2 grams of alumina support :

1. Platinum required	= 2 x 0.30/94.0952	g.
	= 6.376×10^{-3}	g.
Chloroplatinic acid required	= 6.376×10^{-3} x 100 x 25/37.67	ml.
	= 0.4232	ml.
2. Tin required	= 2 x 0.30/94.0952	g.
	= 6.376×10^{-3}	g.
Stannous chloride dihydrate require	= 6.376×10^{-3} x 100/51.02	g.
	= 0.0125	g.
3. Lithium required	= 2 x 0.60/94.0952	g.
	= 0.0128	g.
Lithium nitrate required	= 0.0128 x 100 x 5 /10.07	ml.
	= 0.6332	ml.
4. Hydrochloric and solution required	= 2 x 0.05	g.
	= 0.10	g.

The amount of hydrochloric acid by volume

= 0.10 (1.190 x 0.37) ml.

= 0.2271 ml.

As the pore volume of the alumina support is 1 ml./g., the total volume of impregnating solution that must be used is 2 ml. by the requirement of dry impregnation method, the de-ionized water is added until the volume of impregnating solution is 2 ml.

APPENDIX B

METAL ACTIVE SITE ON CATALYST CALCULATION

Let the weigh of catalyst used	= w	g.
height of CO peak after adsorption	= A	unit.
height of 0.18 ml. of standard CO peak	= B	unit.
Amounts of CO adsorbed on catalyst	= B-A	unit
Volume of CO adsorbed on catalyst	= (B-A) /B x 0.18	ml.
Volume of gas 1 moles at 30 ^{o}C	= 24.86 x 10^{3}	ml.
Mole of CO adsorbed on catalyst	= (B-A) x 0.18 / Bx24.86x10^{3}	mole.
Molecule of CO adsorbed on catalyst	= 7.24x10^{-6}(B-A)/Bx6.02x10^{23}	molecule.
Metal active site	= 4.36 x 10^{18} (B-A)/B molecule	of CO/g cat

APPENDIX C

SPECIFICATION OF ALUNINA SUPPORT (Al_2O_3) TYPE KNH-3 FROM SUMITOMO ALUMINIUM SMELTING CO., LTD.

Chemical Composition (weight percent)		
- Al_2O_3	60-70	%
- SiO_2	30-35	%
- Fe_2O_3	0.3-0.5	%
- TiO_2	0.5-0.7	%
- CaO	0.1-0.2	%
- MgO	0.2-0.4	%
- Na_2O	0.3-0.4	%
- K_2O	0.2-0.3	%
- $ZrO_2 + HfO_2$	0.03-0.04	%
Physical Properties		
- Bulk Density (g/cc)	1.3-1.5	
- Apparent Specific Gravity	3.1-3.3	
- Packing Density (lb/ft^3)	20-25	
- Pore Volume (cc/g)	1.0-1.3	
- Surface Area (m^2/g)	340-350	

VITA

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