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## APPENDICES

### APPENDIX A

#### Data from Synthesis Part

**Table A-1** Effect of TEA concentration from the reaction using  $\text{Al}(\text{OH})_3$ :TEA = 1:x where x = 0.1, 0.2, 0.4, 0.5, 0.6 and 1 at the reaction temperature of 200 °C and the reaction time of 3 h

TEA (mmol)	% Ceramic yield	SD.
10	33.1	0.141
	33.3	
20	32.0	0.141
	31.8	
40	29.8	0.212
	29.5	
50	27.8	0.141
	28.0	
60	26.5	0.071
	26.4	
80	24.2	0.141
	24.0	

**Table A-2** Effect of Reaction Temperature from the reaction using  $\text{Al}(\text{OH})_3$ :TEA = 2:1 at the various reaction temperatures and reaction time 3 h

Reaction Temperature (°C)	% Ceramic yield	SD.
140	44.2	0.141
	44.0	
160	37.7	0.141
	37.9	
180	30.7	0.000
	30.7	
200	29.3	0.212
	29.6	
220	26.3	0.141
	26.1	

**Table A-3** Effect of Reaction time from the reaction using  $\text{Al}(\text{OH})_3$ :TEA = 2:1 at various reaction times and the reaction temperature of 200 °C

Reaction time (h)	% Ceramic yield	SD.
1	39.1	0.071
	39.0	
2	30.5	0.000
	30.5	
3	27.8	0.071
	27.9	
4	26.7	0.141
	26.5	
5	25.1	0.141
	25.3	
6	23.5	0.283
	23.9	

**Table A-4** Effect of TETA concentration from the reaction using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:x where  $x = 1:2.5:5:7.5:10:15$  at the reaction temperature of 200 °C and the reaction time of 3 h

TETA (mmol)	% Ceramic yield	SD.
10	36.6	0.212
	36.3	
25	35.2	0.000
	35.2	
50	34.4	0.283
	34.0	
75	29.1	0.283
	28.7	
100	27.6	0.000
	27.6	
150	26.6	0.212
	26.3	

## APPENDIX B

### Data from Viscosity Measurement

**Table B-1** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA = 1:0.1 at the reaction temperature of 200 °C and the reaction time of 3 h (Figure B-1 and B-2)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	715.60 715.78	0.127	-	-	-	-
0.365	719.89 719.90	0.007	1.01 1.01	0.006 0.006	0.016 0.016	0.016 0.016
1.28	730.92 730.8	0.085	1.02 1.02	0.021 0.021	0.016 0.016	0.016 0.016
1.69	735.91 735.90	0.007	1.03 1.03	0.028 0.028	0.017 0.017	0.016 0.016
2.31	743.98 744.06	0.056	1.04 1.04	0.040 0.040	0.017 0.017	0.017 0.017
2.86	751.17 750.96	0.148	1.05 1.05	0.050 0.050	0.017 0.017	0.017 0.017

**Table B-2** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3\text{:TEA} = 1\text{:}0.2$  at the reaction temperature of 200 °C and the reaction time of 3 h (Figure B-1 and B-2)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	713.18 713.59	0.290	-	-	-	-
0.52	722.7 722.7	0.014	1.01 1.01	0.013 0.013	0.025 0.025	0.025 0.025
1.27	736.51 736.44	0.049	1.03 1.03	0.032 0.032	0.026 0.025	0.025 0.025
1.59	742.62 742.69	0.049	1.04 1.04	0.041 0.041	0.026 0.026	0.025 0.025
2.12	753.18 752.96	0.156	1.06 1.06	0.056 0.056	0.026 0.026	0.026 0.025
2.64	763.78 763.76	0.014	1.07 1.07	0.071 0.071	0.027 0.027	0.026 0.026

**Table B-3** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3\text{:TEA} = 1\text{:}0.4$  at the reaction temperature of 200 °C and the reaction time of 3 h (Figure B-1 and B-2)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	717.35 717.29	0.042	-	-	-	-
0.43	727.20 727.07	0.092	1.01 1.01	0.014 0.014	0.032 0.031	0.032 0.031
1.30	748.38 747.83	0.389	1.04 1.04	0.043 0.043	0.033 0.033	0.033 0.032
1.62	756.86 756.71	0.106	1.06 1.05	0.055 0.055	0.034 0.034	0.033 0.033
2.14	770.67 770.99	0.226	1.07 1.07	0.074 0.075	0.035 0.035	0.034 0.034
2.73	787.59 785.77	1.287	1.10 1.10	0.098 0.095	0.036 0.035	0.034 0.033

**Table B-4** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al}(\text{OH})_3:\text{TEA} = 1:0.5$  at the reaction temperature of 200 °C and the reaction time of 3 h (Figure B-1 and B-2)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	712.02 712.67	0.460	-	-	-	-
0.43	723.74 723.70	0.028	1.02 1.02	0.016 0.016	0.037 0.037	0.037 0.037
1.24	745.54 745.81	0.191	1.05 1.05	0.047 0.047	0.038 0.038	0.037 0.037
2.01	767.73 766.82	0.431	1.08 1.08	0.078 0.077	0.038 0.038	0.037 0.037
2.73	788.27 787.67	0.424	1.11 1.11	0.107 0.106	0.039 0.039	0.037 0.037
3.02	797.22 796.53	0.219	1.12 1.12	0.118 0.118	0.039 0.039	0.037 0.037

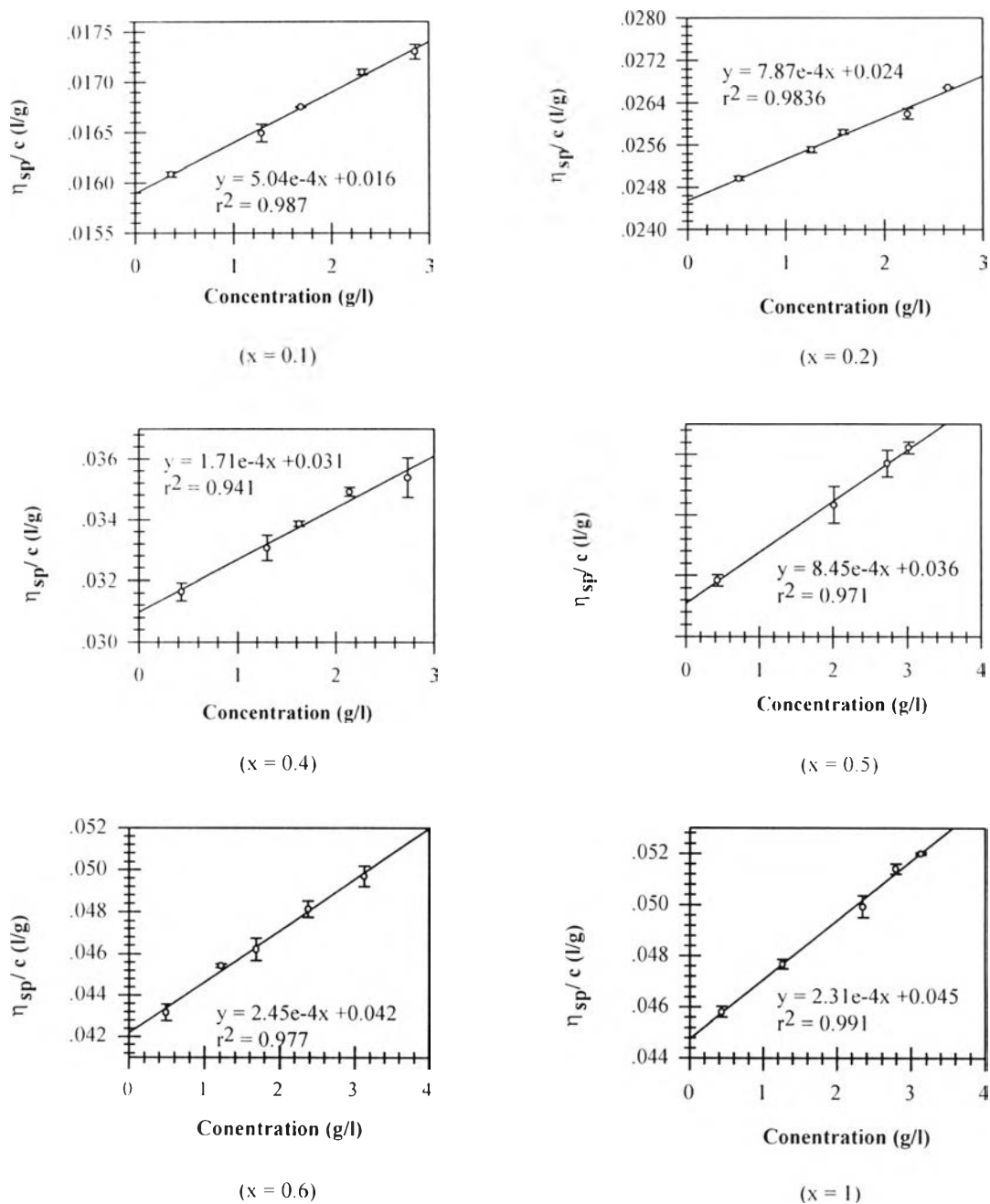
**Table B-5** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al}(\text{OH})_3:\text{TEA} = 1:0.6$  at the reaction temperature of 200 °C and the reaction time of 3 h (Figure B-1 and B-2)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	710.65 710.23	0.297	-	-	-	-
0.48	725.42 725.22	0.141	1.02 1.02	0.021 0.021	0.043 0.043	0.043 0.042
1.22	749.66 749.76	0.071	1.06 1.06	0.055 0.055	0.045 0.045	0.044 0.044
1.68	766.23 765.32	0.643	1.08 1.08	0.078 0.078	0.046 0.046	0.044 0.044
2.38	792.25 791.30	0.672	1.12 1.11	0.115 0.114	0.048 0.048	0.046 0.045
3.00	817.21 815.75	1.032	1.15 1.15	0.150 0.148	0.050 0.049	0.047 0.047

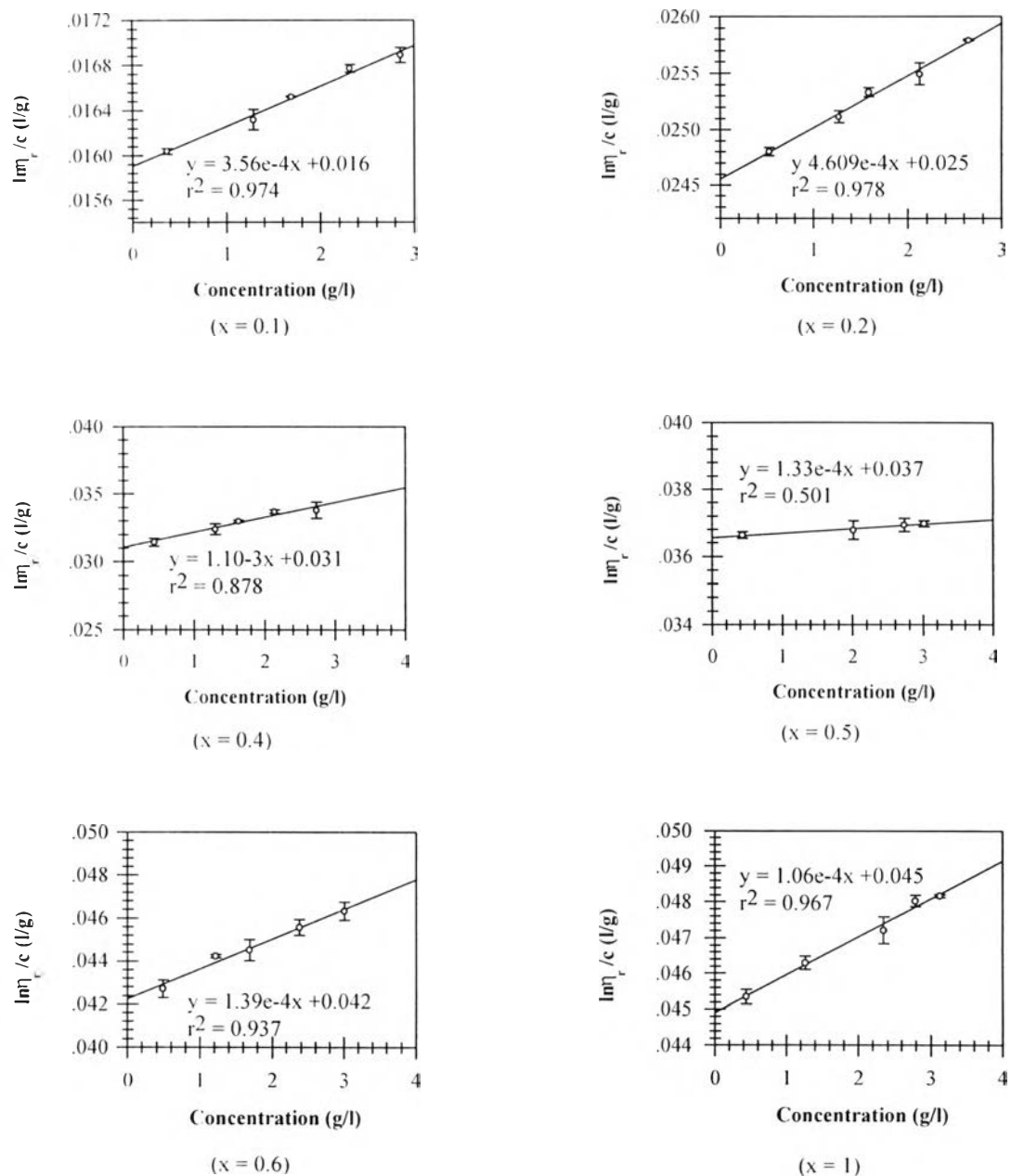


**Table B-6.** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3:\text{TEA} = 1:1$  at the reaction temperature of 200 °C and the reaction time of 3 h (Figure B-1 and B-2)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$ (l/g)	$\eta_{red}$	$\eta_{inh}$ (l/g)
0.00	712.50 712.58	0.057	-	-	-	-
0.43	726.71 726.62	0.064	1.02 1.02	0.020 0.020	0.046 0.046	0.045 0.045
1.26	755.55 755.30	0.144	1.06 1.06	0.060 0.060	0.048 0.048	0.046 0.046
2.34	796.50 795.51	0.700	1.12 1.12	0.118 0.116	0.050 0.050	0.047 0.047
2.78	814.27 814.80	0.375	1.14 1.14	0.143 0.144	0.051 0.051	0.048 0.048
3.12	828.24 828.38	0.099	1.16 1.16	0.162 0.162	0.052 0.052	0.048 0.048



**Figure B-1** Reduced specific viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $Al(OH)_3:TEA = 1:x$  where  $x = 0.1, 0.2, 0.4, 0.5, 0.6$  and 1 at the reaction temperature of 200 °C and the reaction time of 3 h.



**Figure B-2** Inherent viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3:\text{TEA} = 1:x$  where  $x = 0.1, 0.2, 0.4, 0.5, 0.6$  and 1 at the reaction temperature of 200 °C and the reaction time of 3 h.

**Table B-7** Viscometric data of polymer solutions, measured at 30°C, that synthesized from Al(OH)<sub>3</sub>:TEA = 2:1 at reaction temperatures of 140 °C and at the reaction time of 3 h (FigureB-3 and B-4)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	714.16 714.45	0.049	-	-	-	-
0.49	721.92 721.85	0.339	1.01 1.01	0.011 0.011	0.022 0.022	0.022 0.022
1.26	734.42 733.94	0.085	1.02 1.03	0.028 0.027	0.022 0.022	0.022 0.022
1.77	742.99 743.11	0.035	1.04 1.04	0.040 0.040	0.022 0.023	0.022 0.023
2.36	753.38 767.81	0.834	1.05 1.05	0.055 0.055	0.023 0.023	0.023 0.023
3.17	768.99 714.16	0.205	1.07 1.08	0.075 0.076	0.024 0.024	0.023 0.023

**Table B-8** Viscometric data of polymer solutions, measured at 30°C, that synthesized from Al(OH)<sub>3</sub>:TEA = 2:1 at reaction temperatures of 160 °C and at the reaction time of 3 h (FigureB-3 and B-4)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	714.76 714.63	0.092	-	-	-	-
0.57	725.17 725.04	0.092	1.01 1.01	0.015 0.014	0.026 0.025	0.026 0.025
1.42	741.41 741.01	0.283	1.04 1.04	0.037 0.037	0.026 0.026	0.026 0.026
2.07	754.31 753.94	0.262	1.06 1.05	0.055 0.055	0.027 0.027	0.026 0.026
2.38	760.41 760.51	0.071	1.06 1.06	0.064 0.064	0.027 0.027	0.026 0.026
3.40	782.08 781.57	0.361	1.09 1.09	0.094 0.094	0.028 0.028	0.027 0.026

**Table B-9** Viscometric data of polymer solutions, measured at 30°C, that synthesized from Al(OH)<sub>3</sub>:TEA = 2:1 at reaction temperatures of 180 °C and at the reaction time of 3 h (FigureB-3 and B-4)

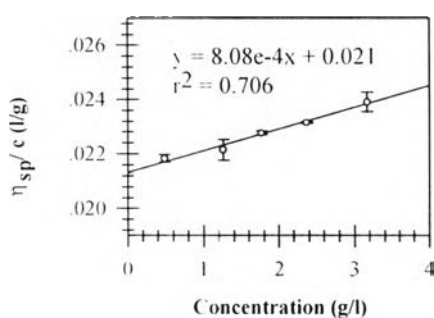
Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	716.09 716.54	0.318	-	-	-	-
0.73	732.20 732.41	0.148	1.02 1.02	0.022 0.022	0.030 0.031	0.030 0.030
1.49	749.76 749.35	0.290	1.05 1.05	0.047 0.046	0.031 0.031	0.031 0.030
2.09	764.72 763.22	1.061	1.07 1.06	0.068 0.065	0.032 0.031	0.031 0.030
2.69	780.10 780.34	0.170	1.09 1.09	0.089 0.089	0.033 0.033	0.032 0.032
3.36	798.55 798.21	0.240	1.11 1.11	0.114 0.114	0.034 0.034	0.032 0.032

**Table B-10** Viscometric data of polymer solutions, measured at 30°C, that synthesized from Al(OH)<sub>3</sub>:TEA = 2:1 at reaction temperatures of 200 °C and at the reaction time of 3 h (FigureB-3 and B-4)

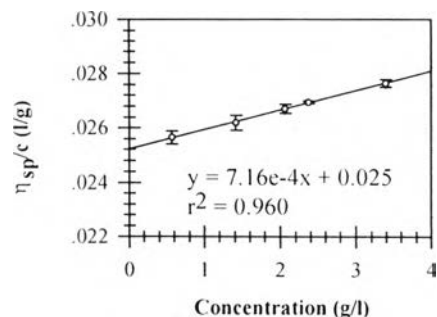
Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$ (l/g)	$\eta_{red}$	$\eta_{inh}$ (l/g)
0.00	713.78 713.87	0.064	-	-	-	-
0.62	730.85 730.53	0.226	1.024 1.023	0.024 0.023	0.038 0.038	0.038 0.037
1.29	750.16 749.53	0.446	1.051 1.050	0.051 0.050	0.039 0.039	0.038 0.038
2.01	772.51 772.30	0.149	1.082 1.082	0.082 0.082	0.041 0.041	0.039 0.039
2.32	782.23 782.39	0.113	1.096 1.096	0.096 0.096	0.041 0.041	0.039 0.040
2.85	799.74 800.52	0.551	1.120 1.121	0.120 0.121	0.042 0.043	0.040 0.040

**Table B-11** Viscometric data of polymer solutions, measured at 30°C, that synthesized from  $\text{Al(OH)}_3$ :TEA = 2:1 at reaction temperatures of 220 °C and at the reaction time of 3 h (FigureB-3 and B-4)

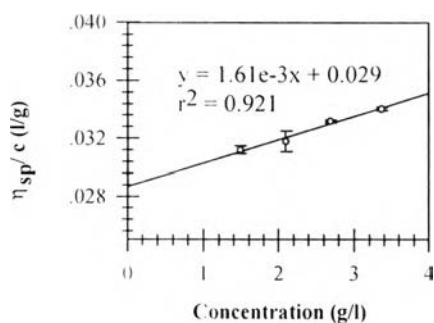
Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	714.65 715.21	0.396	-	-	-	-
0.77	738.63 738.42	0.149	1.03 1.03	0.033 0.033	0.043 0.043	0.042 0.042
1.40	759.26 758.83	0.304	1.06 1.06	0.062 0.061	0.044 0.044	0.043 0.043
2.27	790.00 788.45	1.10	1.11 1.10	0.105 0.103	0.046 0.045	0.044 0.044
2.68	805.11 805.74	0.44	1.13 1.13	0.126 0.127	0.047 0.047	0.044 0.045
3.38	832.05 832.69	0.45	1.16 1.16	0.164 0.165	0.048 0.048	0.045 0.045



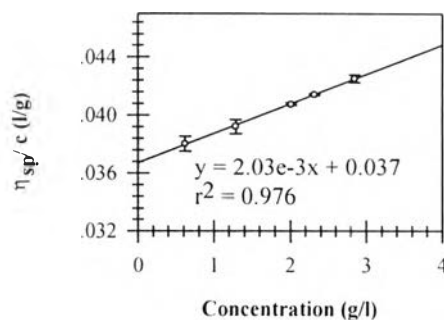
Reaction temperature = 140 °C



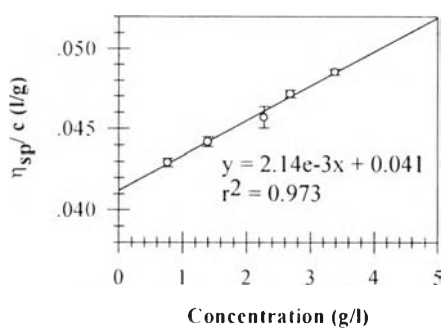
Reaction temperature = 160 °C



Reaction temperature = 180 °C

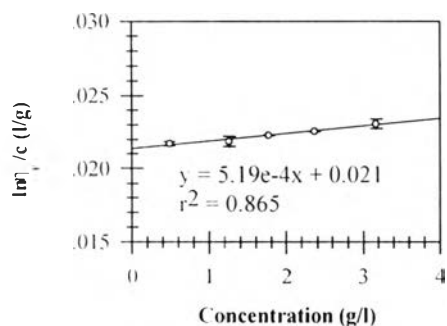


Reaction temperature = 200 °C

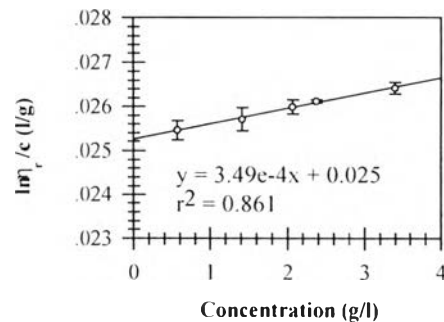


Reaction temperature = 220 °C

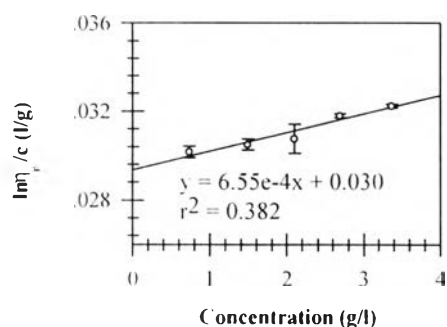
**Figure B-3** Reduce specific viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3$ :TEA = 2:1 at the various reaction temperatures and the reaction time of 3 h.



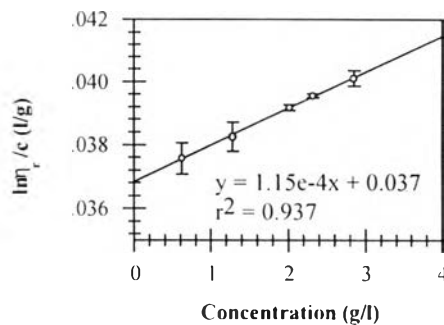
Reaction temperature = 140 °C



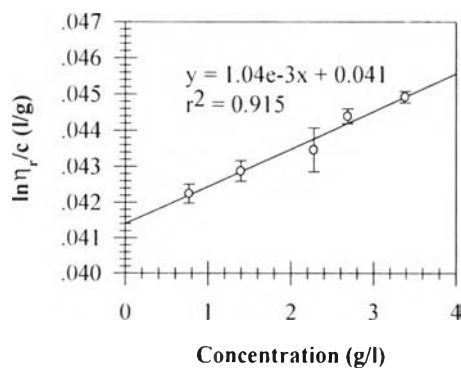
Reaction temperature = 160 °C



Reaction temperature = 180 °C



Reaction temperature = 200 °C



Reaction temperature = 220 °C

**Figure B-4** Inherent viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3$ :TEA = 2:1 at the various reaction temperatures and the reaction time of 3 h.



**Table B-12** Viscometric data of polymer solutions, measured at 30°C, that synthesized from Al(OH)<sub>3</sub>:TEA = 2:1 at reaction time of 1 h and the reaction temperature 200°C (FigureB-5 and B-6)

Concentration (g/l)	Time (sec)	SD.	$\eta_i$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	717.63 717.84	0.148	-	-	-	-
0.432	721.24 721.25	0.007	1.00 1.00	0.005 0.005	0.011 0.011	0.011 0.011
1.69	731.82 731.77	0.035	1.02 1.02	0.020 0.020	0.012 0.012	0.012 0.011
2.17	736.03 736.06	0.021	1.02 1.03	0.025 0.026	0.012 0.012	0.012 0.012
2.77	741.35 741.81	0.325	1.03 1.03	0.033 0.034	0.012 0.012	0.012 0.012
3.27	745.95 746.27	0.226	1.04 1.04	0.039 0.040	0.012 0.012	0.012 0.012

**Table B-13** Viscometric data of polymer solutions, measured at 30°C, that synthesized from Al(OH)<sub>3</sub>:TEA = 2:1 at reaction time of 2 h and the reaction temperature 200°C (FigureB-5 and B-6)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	712.43 712.55	0.085	-	-	-	-
0.43	717.68 717.68	0.000	1.01 1.01	0.001 0.001	0.017 0.017	0.017 0.017
1.27	727.92 727.83	0.064	1.02 1.02	0.022 0.022	0.017 0.017	0.017 0.017
1.54	731.26 731.34	0.056	1.03 1.03	0.026 0.026	0.017 0.017	0.017 0.017
2.12	738.62 738.64	0.014	1.04 1.04	0.037 0.037	0.017 0.017	0.017 0.017
2.86	748.11 748.08	0.021	1.05 1.05	0.050 0.050	0.018 0.017	0.017 0.017

**Table B-14** Viscometric data of polymer solutions, measured at 30°C, that synthesized from  $\text{Al(OH)}_3\text{:TEA} = 2\text{:}1$  at reaction time of 3 h and the reaction temperature 200°C (FigureB-5 and B-6)

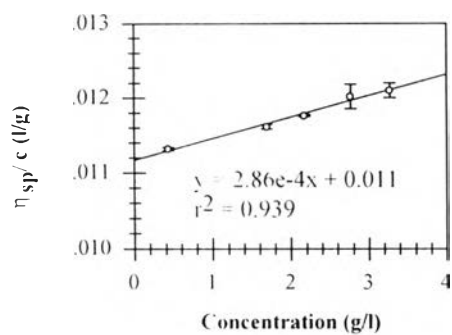
Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	714.82 714.25	0.403	-	-	-	-
0.38	721.04 721.08	0.028	1.01 1.01	0.009 0.009	0.024 0.024	0.024 0.024
1.06	733.28 733.41	0.092	1.03 1.03	0.026 0.026	0.025 0.025	0.024 0.024
1.44	740.21 740.13	0.056	1.04 1.04	0.036 0.036	0.025 0.025	0.024 0.024
2.03	751.75 751.35	0.283	1.05 1.05	0.052 0.052	0.026 0.025	0.025 0.025
2.75	766.14 765.23	0.643	1.07 1.07	0.072 0.071	0.026 0.026	0.025 0.025

**Table B-15** Viscometric data of polymer solutions, measured at 30°C, that synthesized from  $\text{Al(OH)}_3\text{:TEA} = 2\text{:}1$  at reaction time of 4 h and the reaction temperature 200°C (FigureB-5 and B-6)

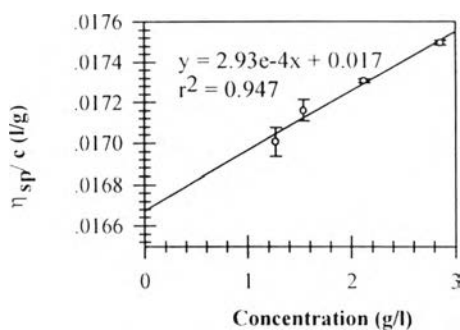
Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	717.42 717.02	0.283	1.02 1.02	-	-	-
0.65	729.39 729.42	0.021	1.03 1.03	0.017 0.017	0.026 0.026	0.026 0.026
1.22	740.36 740.42	0.042	1.04 1.04	0.032 0.032	0.026 0.026	0.026 0.026
1.64	748.51 748.55	0.028	1.06 1.06	0.044 0.044	0.027 0.027	0.026 0.026
2.31	762.41 761.95	0.325	1.06 1.06	0.063 0.062	0.027 0.027	0.026 0.026
2.76	771.49 771.60	0.078	1.08 1.08	0.076 0.076	0.027 0.027	0.026 0.026

**Table B-16** Viscometric data of polymer solutions, measured at 30°C, that synthesized from  $\text{Al(OH)}_3$ :TEA = 2:1 at reaction time of 5 h and the reaction temperature 200°C (FigureB-5 and B-6)

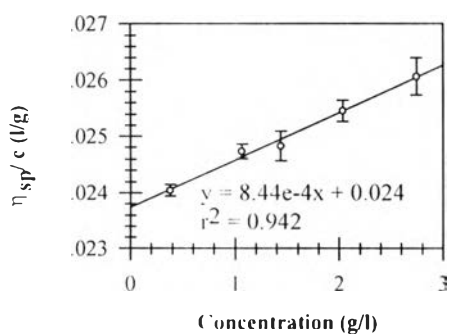
Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	712.86 712.95	0.064	-	-	-	-
0.49	722.32 722.35	0.021	1.01 1.01	0.013 0.013	0.027 0.027	0.027 0.027
1.32	739.23 739.13	0.071	1.04 1.04	0.037 0.037	0.028 0.028	0.027 0.027
2.17	757.13 757.46	0.233	1.06 1.06	0.062 0.062	0.029 0.029	0.027 0.028
2.61	766.97 767.17	0.141	1.08 1.08	0.076 0.076	0.029 0.029	0.028 0.028
3.20	780.40 781.11	0.502	1.095 1.096	0.095 0.096	0.030 0.030	0.028 0.028



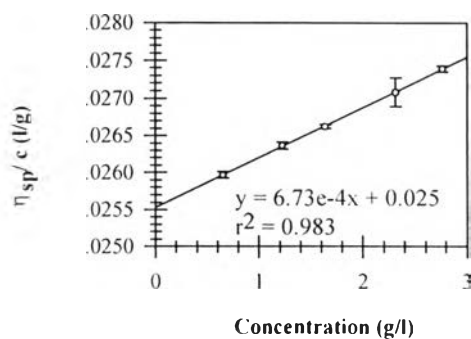
Reaction time = 1 h



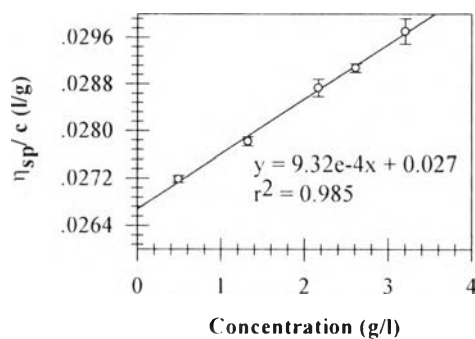
Reaction time = 2 h



Reaction time = 3 h



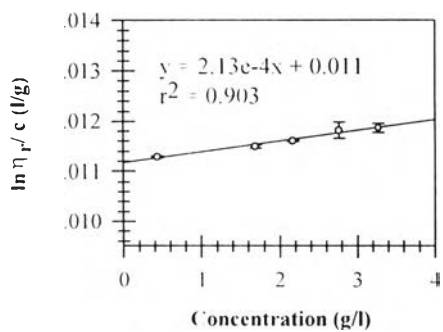
Reaction time = 4 h



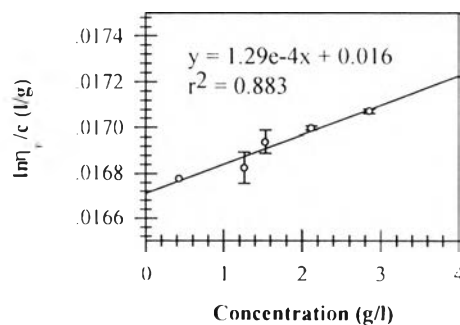
Reaction time = 5 h

**Figure B-5** Reduced specific viscosity versus polymer concentration.

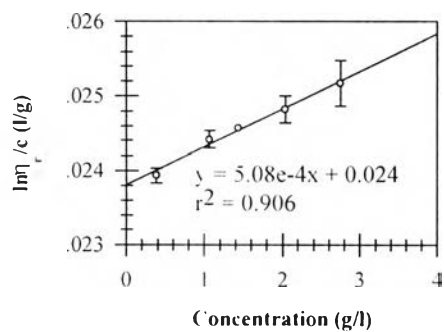
measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3:\text{TEA} = 2:1$  at various reaction times and at the reaction temperature of 200°C.



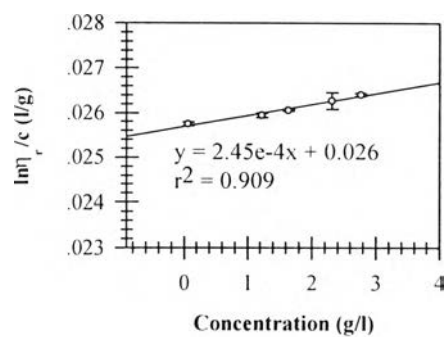
Reaction time = 1 h



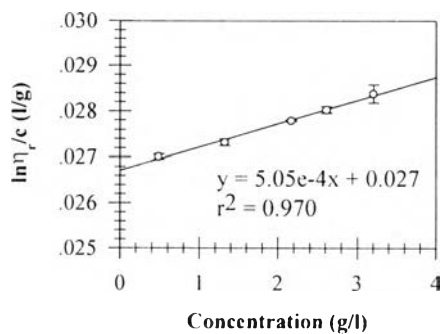
Reaction time = 2 h



Reaction time = 3 h



Reaction time = 4 h



Reaction time = 5 h

**Figure B-6** Inherent viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3$ :TEA = 2:1 at various reaction times and at the reaction temperature of 200°C.

**Table B-17** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al}(\text{OH})_3$ :TEA:TETA = 2:1:1 at the reaction time of 3 h and the reaction temperature of 200 °C (FigureB-7 and B-8)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	715.48 715.26	0.156	-	-	-	-
0.53	721.47 721.43	0.028	1.01 1.01	0.008 0.008	0.016 0.016	0.016 0.016
1.30	730.55 730.49	0.042	1.02 1.02	0.021 0.021	0.016 0.016	0.016 0.016
1.64	734.68 734.39	0.205	1.03 1.03	0.027 0.027	0.016 0.016	0.016 0.016
2.33	743.27 743.15	0.084	1.04 1.04	0.039 0.039	0.017 0.017	0.016 0.016
2.76	748.77 749.12	0.248	1.05 1.05	0.047 0.047	0.017 0.017	0.016 0.017

**Table B-18** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al}(\text{OH})_3$ :TEA:TETA = 2:1:2.5 at the reaction time of 3 h and the reaction temperature of 200 °C (FigureB-7 and B-8)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	714.02 714.36	0.240	-	-	-	-
0.39	718.87 718.83	0.0283	1.01 1.01	0.007 0.006	0.017 0.017	0.017 0.017
1.32	730.94 731.02	0.057	1.02 1.02	0.023 0.024	0.018 0.018	0.018 0.018
1.63	735.13 735.26	0.092	1.03 1.03	0.029 0.029	0.018 0.018	0.018 0.018
2.26	744.13 744.09	0.028	1.04 1.04	0.042 0.042	0.018 0.018	0.018 0.018
2.86	752.92 752.95	0.022	1.05 1.05	0.054 0.054	0.019 0.019	0.018 0.018

**Table B-19** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3$ :TEA:TETA = 2:1:5 at the reaction time of 3 h and the reaction temperature of 200 °C (FigureB-7 and B-8)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	712.64 712.65	0.010	-	-	-	-
0.46	721.44 721.41	0.022	1.01 1.01	0.012 0.012	0.027 0.026	0.026 0.026
1.24	737.43 737.52	0.064	1.03 1.03	0.035 0.035	0.028 0.028	0.027 0.027
1.64	746.14 746.29	0.106	1.05 1.05	0.047 0.047	0.028 0.029	0.028 0.028
2.65	769.80 769.36	0.311	1.08 1.08	0.080 0.080	0.030 0.030	0.029 0.029
3.12	781.59 782.33	0.523	1.10 1.10	0.097 0.098	0.031 0.031	0.030 0.030

**Table B-20** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3$ :TEA:TETA = 2:1:7.5 at the reaction time of 3 h and the reaction temperature of 200 °C (FigureB-7 and B-8)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	713.69 713.45	0.170	-	-	-	-
0.53	726.30 726.25	0.036	1.02 1.02	0.018 0.018	0.034 0.034	0.034 0.033
1.23	745.42 745.16	0.184	1.04 1.04	0.045 0.044	0.036 0.036	0.035 0.035
1.66	757.97 758.34	0.262	1.06 1.06	0.062 0.063	0.037 0.038	0.036 0.037
2.37	780.96 781.47	0.361	1.09 1.10	0.094 0.100	0.040 0.040	0.038 0.038
3.01	803.84 803.86	0.014	1.13 1.13	0.126 0.126	0.041 0.042	0.039 0.040

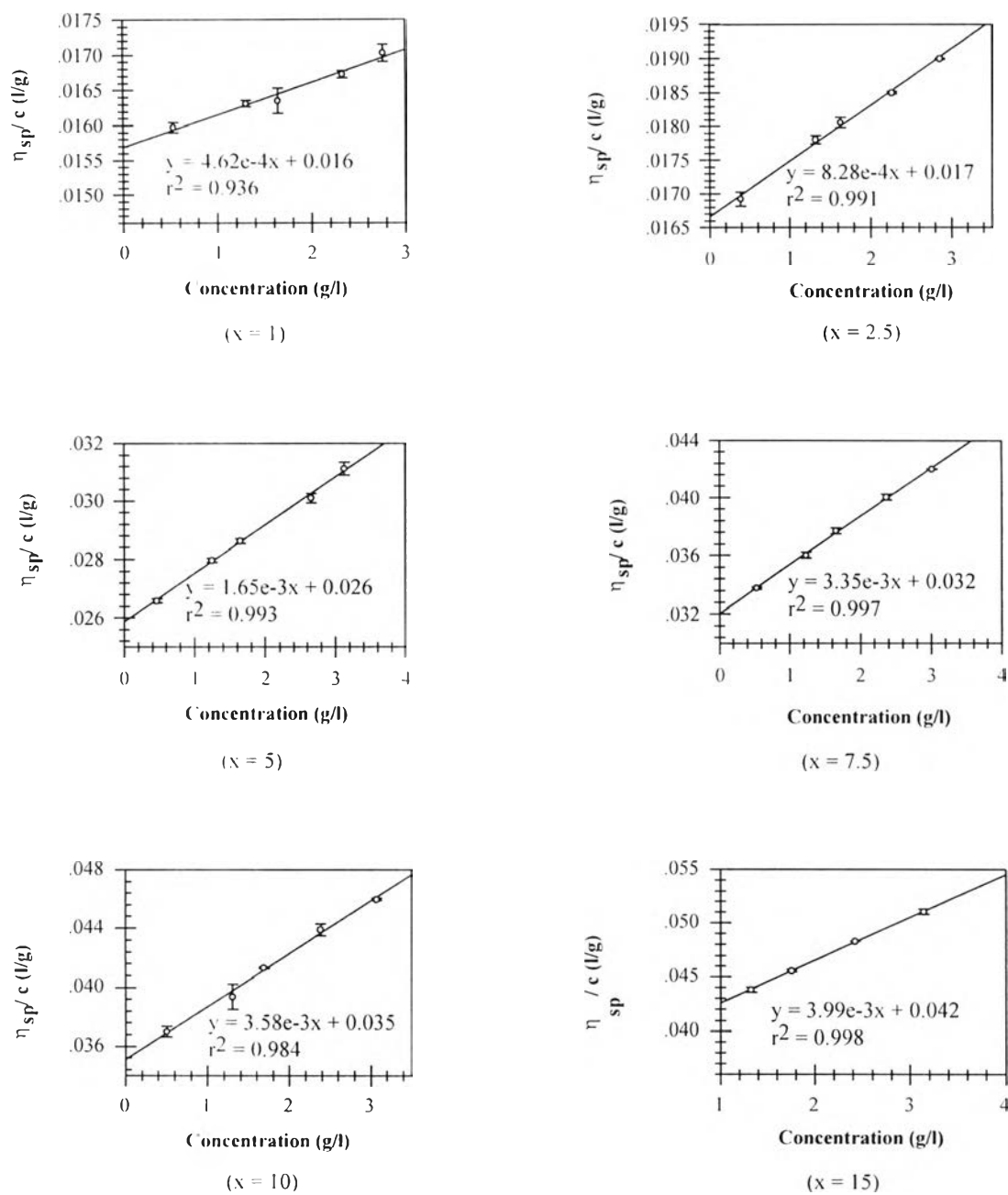
**Table B-21** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3$ :TEA:TETA = 2:1:10 at the reaction time of 3 h and the reaction temperature of 200 °C (FigureB-7 and B-8)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	713.11 713.68	0.403	-	-	-	-
0.50	726.73 726.55	0.127	1.02 1.02	0.019 0.018	0.037 0.037	0.037 0.036
1.30	750.52 749.41	0.785	1.05 1.05	0.052 0.050	0.040 0.039	0.039 0.038
1.68	762.96 763.09	0.092	1.07 1.07	0.069 0.070	0.041 0.041	0.040 0.040
2.38	787.57 788.59	0.721	1.04 1.05	0.104 0.105	0.044 0.044	0.041 0.042
3.07	813.91 814.21	0.212	1.14 1.14	0.141 0.141	0.046 0.046	0.043 0.043

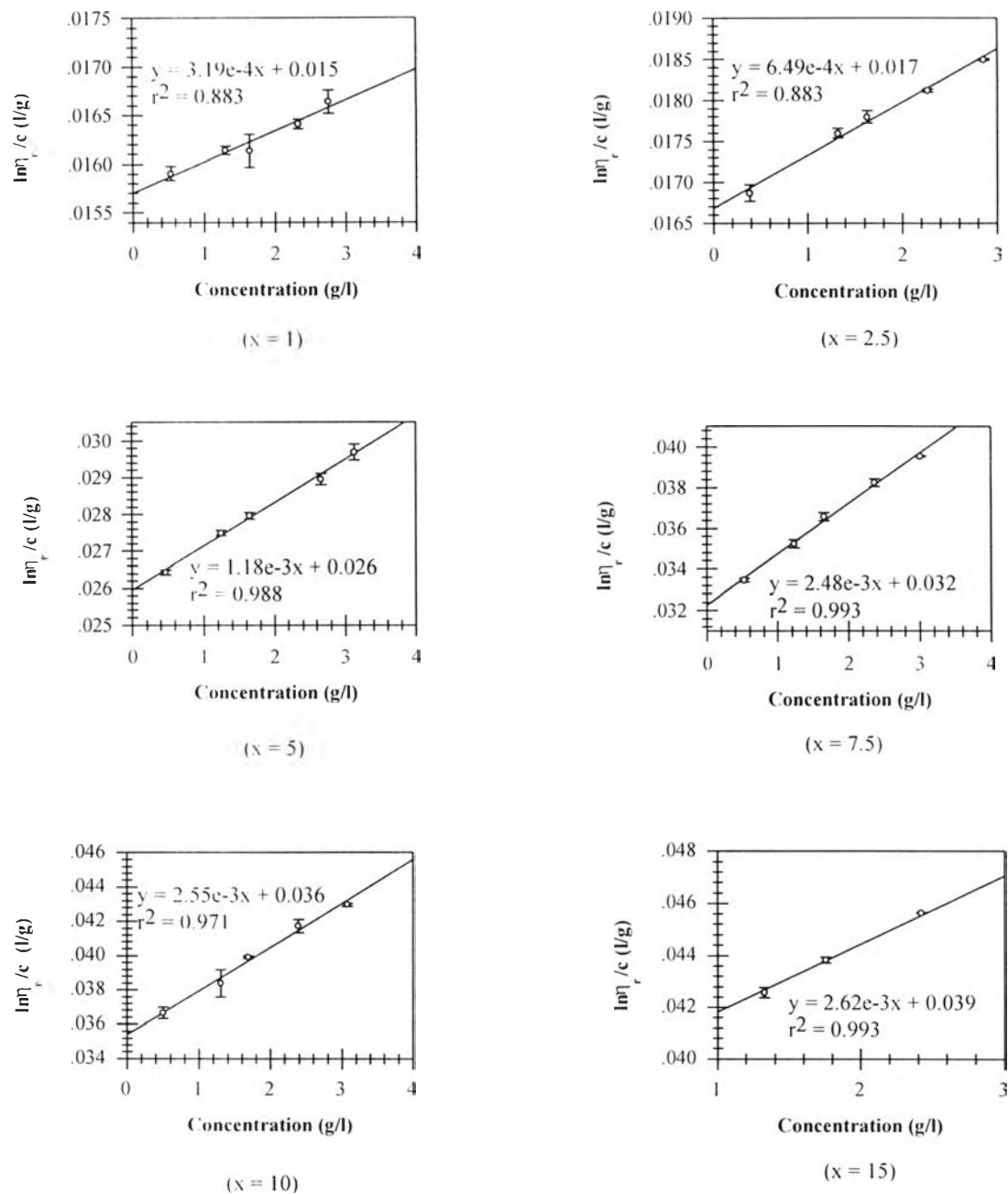
**Table B-22** Viscometric data of polymer solutions, measured at 30 °C, that synthesized from  $\text{Al(OH)}_3$ :TEA:TETA = 2:1:15 at the reaction time of 3 h and the reaction temperature of 200 °C (FigureB-7 and B-8)

Concentration (g/l)	Time (sec)	SD.	$\eta_r$	$\eta_{sp}$	$\eta_{red}$ (l/g)	$\eta_{inh}$ (l/g)
0.00	715.68 715.32	0.255	-	-	-	-
0.527	730.89 731.95	0.750	1.02 1.02	0.022 0.023	0.041 0.044	0.040 0.043
1.33	757.22 756.94	0.198	1.06 1.06	0.058 0.058	0.044 0.044	0.043 0.042
1.76	772.87 772.65	0.156	1.08 1.08	0.080 0.080	0.046 0.046	0.044 0.044
2.42	799.17 799.20	0.022	1.12 1.12	0.117 0.117	0.048 0.048	0.046 0.046
3.14	830.66 829.84	0.580	1.16 1.16	0.161 0.160	0.051 0.051	0.047 0.047





**Figure B-7** Reduced specific viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:x where  $x = 1:2.5:5:7.5:10:15$  at the reaction time of 3 h, and the reaction temperature of 200 °C.



**Figure B-8** Inherent viscosity versus polymer concentration, measured at 30 °C, of alumatrane complexes synthesized from  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5: $x$  where  $x = 1:2.5:5:7.5:10:15$  at the reaction time of 3 h, and the reaction temperature of 200 °C.

## APPENDIX C

### Data from Light Scattering Measurement.

**Table C-1** Viscometric data of polymer solutions at concentration of 0.473 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:1, at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-1)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	194.0	88.8	47.2	1.32e-9	0.776
	10	192.8	86.0	45.3	1.48e-9	0.691
	10	196.8	84.8	46.1	1.30e-9	0.707
	10	199.7	88.6	46.8	1.28e-9	0.718
Average	-	195.8	-	-	1.34e-9	0.723
S.D.	-	3.079	-	-	9.15e-11	0.037
75°	7	153.9	93.3	50.6	1.66e-9	0.506
	7	137.8	92.4	49.9	1.85e-9	0.452
	7	157.8	90.3	49.5	1.62e-9	0.519
	7	170.5	92.3	50.6	1.5e-9	0.561
Average	-	155.0	-	-	1.66e-9	0.510
S.D.	-	13.48	-	-	1.45e-10	0.045
90°	5	193.9	89.8	47.8	1.32e-9	0.348
	5	198.1	90.0	48.2	1.29e-9	0.356
	5	202.5	84.7	50.3	1.26e-9	0.364
	5	192.6	91.6	49.7	1.32e-9	0.346
Average	-	196.8	-	-	1.30e-9	0.354
S.D.	-	4.481	-	-	2.87e-11	8.07e-3
105°	3	134.1	93.6	40.5	1.90e-9	0.191
	3	130.6	93.0	39.8	1.95e-9	0.186
	3	144.9	92.9	39.0	1.76e-9	0.207
	3	120.4	93.5	40.3	2.12e-9	0.172
Average	-	132.5	-	-	1.93e-9	0.189
S.D.	-	10.10	-	-	1.49e-10	0.014

**Table C-2** Viscometric data of polymer solutions at concentration of 1.183 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:1, at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-1)

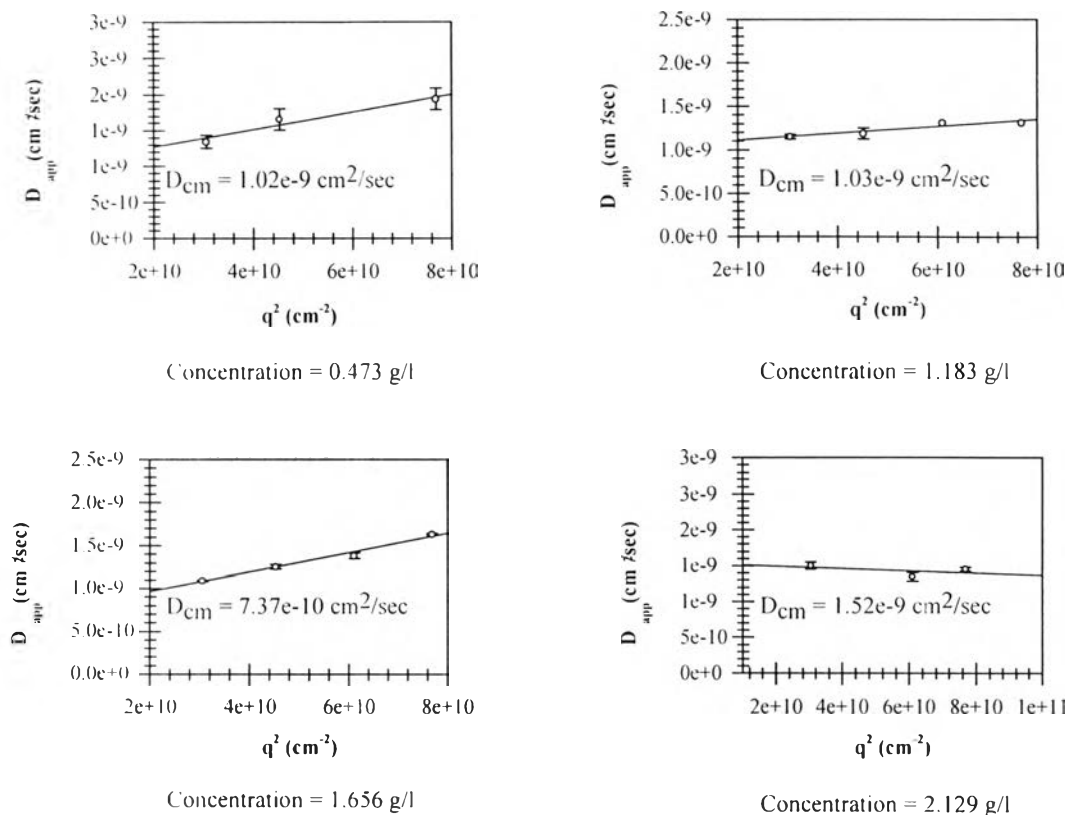
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	228.9	89.3	49.3	1.11e-9	0.822
	10	217.4	91.3	50.2	1.17e-9	0.781
	10	220.1	93.0	48.4	1.16e-9	0.791
	10	219.7	90.4	48.2	1.16e-9	0.789
Average	-	221.5	-	-	1.15e-9	0.796
S.D.	-	5.059	-	-	2.71e-11	0.018
75°	7	227.8	92.3	50.2	1.12e-9	0.552
	7	205.9	92.1	49.0	1.24e-9	0.499
	7	210.9	90.0	49.8	1.21e-9	0.511
	7	217.4	88.6	45.0	1.15e-9	0.537
Average	-	215.5	-	-	1.19e-9	0.525
S.D.	-	9.456	-	-	6.24e-11	0.024
90°	5	193.9	84.4	51.8	1.32e-9	0.348
	5	196.2	92.7	50.8	1.32e-9	0.352
	5	192.8	84.8	51.4	1.32e-9	0.346
	5	199.3	84.6	50.4	1.32e-9	0.358
Average	-	195.6	-	-	1.32e-9	0.351
S.D.	-	2.873	-	-	0.00	5.17e-3
105°	3	169.2	85.2	46.5	1.32e-9	0.241
	3	177.4	87.2	46.7	1.32e-9	0.253
	3	174.7	88.6	46.6	1.32e-9	0.249
	3	179.9	86.8	46.4	1.32e-9	0.257
Average	-	175.3	-	-	1.32e-9	0.250
S.D.	-	4.588	-	-	0.00	6.56e-3

**Table C-3** Viscometric data of polymer solutions at concentration of 1.656 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:1, at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-1)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	232.6	84.6	40.9	1.10e-9	0.836
	10	234.2	84.7	42.0	1.09e-9	0.893
	10	235.5	87.4	42.5	1.08e-9	0.846
	10	231.9	88.0	43.4	1.10e-9	0.983
Average	-	233.6	-	-	1.09e-9	0.889
S.D.	-	1.618	-	-	9.57e-12	0.067
75°	7	199.3	92.6	46.5	1.28e-9	0.483
	7	204.8	95.9	47.4	1.25e-9	0.497
	7	207.6	92.3	48.6	1.23e-9	0.503
	7	200.4	90.5	47.0	1.27e-9	0.486
Average	-	203.0	-	-	1.26e-9	0.492
S.D.	-	3.866	-	-	2.22e-11	9.42e-3
90°	5	184.4	86.9	50.7	1.38e-9	0.331
	5	185.7	92.6	49.6	1.37e-9	0.334
	5	178.8	86.3	51.3	1.43e-9	0.321
	5	188.7	85.3	50.3	1.35e-9	0.339
Average	-	184.4	-	-	1.38e-9	0.331
S.D.	-	4.145	-	-	3.40e-11	7.40e-3
105°	3	156.9	84.3	49.1	1.63e-9	0.224
	3	155.5	89.5	50.2	1.64e-9	0.222
	3	156.7	86.5	51.1	1.63e-9	0.224
	3	155.5	85.2	50.7	1.64e-9	0.222
Average	-	156.2	-	-	1.63e-9	0.223
S.D.	-	0.755	-	-	5.77e-12	1.06e-3

**Table C-4** Viscometric data of polymer solutions at concentration of 2.129 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:1, at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-1)

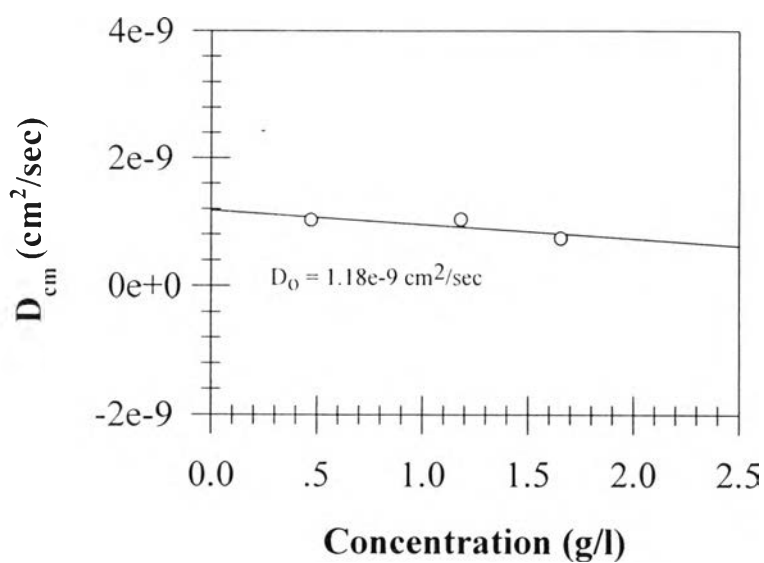
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	172.5	94.5	55.2	1.48e-9	0.936
	10	173.2	96.3	50.9	1.47e-9	0.994
	10	171.8	89.7	52.9	1.49e-9	0.907
	10	162.1	89.1	52.4	1.57e-9	0.910
Average	-	169.9	-	-	1.50e-9	0.937
S.D.	-	5.231	-	-	4.57e-11	0.040
75°	7	219.7	88.6	59.7	1.16e-9	0.533
	7	221.1	90.6	53.8	1.15e-9	0.536
	7	218.1	93.4	54.1	1.17e-9	0.529
	7	221.7	86.9	56.0	1.15e-9	0.537
Average	-	220.2	-	-	1.16e-9	0.534
S.D.	-	1.603	-	-	9.57e-12	3.86e-3
90°	5	193.9	89.0	52.2	1.38e-9	0.348
	5	192.6	89.6	50.3	1.37e-9	0.346
	5	194.2	94.2	53.7	1.43e-9	0.349
	5	195.3	86.9	54.7	1.35e-9	0.351
Average	-	194.0	-	-	1.35e-9	0.348
S.D.	-	1.111	-	-	3.40e-11	2.03e-3
105°	3	177.3	93.8	56.0	1.43e-9	0.253
	3	178.0	88.6	54.7	1.49e-9	0.254
	3	170.7	87.6	57.8	1.45e-9	0.244
	3	176.1	93.3	56.6	1.44e-9	0.251
Average	-	175.5	-	-	1.45e-9	0.250
S.D.	-	3.311	-	-	2.63e-11	4.76e-3



**Figure C-1** Angle-dependence of the apparent diffusion coefficient of the alumatrane complex versus  $q^2$  at various concentration, measured at 30 °C using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:1, the reaction time of 3 h , and the reaction temperature of 200 °C.

**Table C-5** Center of mass diffusion coefficients of the alumatrane complexes at various concentrations, measured at 30 °C, using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:1, the reaction time of 3 h, and the reaction temperature of 200 °C

Concentration (g/l)	$D_{cm}$ ( $\text{cm}^2/\text{sec}$ )
0.473	1.02e-9
1.183	1.03e-9
1.656	7.37e-10
2.129	1.52e-9



**Figure C-2** Center of mass diffusion coefficients of the alumatrane complexes versus polymer concentration, measured at 30 °C, using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:1, the reaction time of 3 h, and the reaction temperature of 200 °C.



**Table C-6** Viscometric data of polymer solutions at concentration of 0.695 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:2.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-3)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	232.7	89.8	47.6	1.10e-9	0.985
	10	227.0	90.4	49.2	1.12e-9	0.967
	10	215.6	89.6	45.5	1.18e-9	0.985
	10	220.3	88.7	50.1	1.16e-9	0.991
Average	-	223.9	-	-	1.14e-9	0.982
S.D.	-	7.503	-	-	3.65e-11	0.010
75°	7	217.3	92.7	46.8	1.17e-9	0.528
	7	22.8	89.5	49.5	1.15e-9	0.546
	7	221.3	91.3	44.3	1.15e-9	0.539
	7	216.5	93.3	51.4	1.18e-9	0.528
Average	-	219.5	-	-	1.16e-9	0.535
S.D.	-	3.053	-	-	1.50e-11	8.870e-3
90°	5	170.9	89.5	45.5	1.44e-9	0.318
	5	191.8	90.5	49.3	1.33e-9	0.346
	5	189.4	90.0	47.1	1.35e-9	0.337
	5	196.6	92.8	47.3	1.30e-9	0.359
Average	-	187.2	-	-	1.36e-9	0.340
S.D.	-	11.26	-	-	6.03e-11	0.017
105°	3	158.1	87.2	54.2	1.61e-9	0.226
	3	159.8	91.2	51.2	1.60e-9	0.228
	3	153.9	90.0	57.2	1.66e-9	0.220
	3	161.0	86.3	55.4	1.58e-9	0.238
Average	-	158.2	-	-	1.61e-9	0.228
S.D.	-	3.104	-	-	3.40e-11	7.63e-3

**Table C-7** Viscometric data of polymer solutions at concentration of 1.737 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:2.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-3)

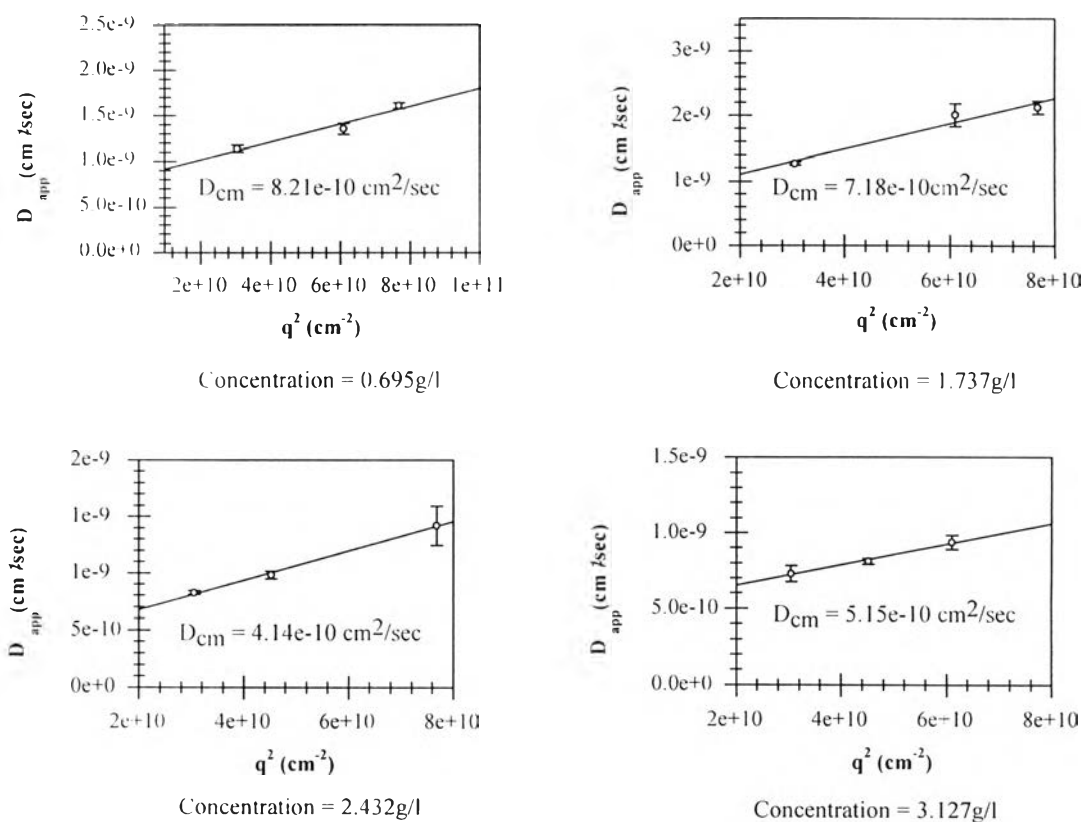
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	195.9	90.2	50.3	1.30e-9	0.964
	10	199.8	88.5	48.2	1.28e-9	0.978
	10	206.7	86.3	46.8	1.23e-9	0.982
	10	201.9	87.2	44.9	1.26e-9	0.968
Average	-	201.1	-	-	1.27e-9	0.973
S.D.	-	4.500	-	-	2.99e-11	8.41e-3
75°	7	191.2	90.0	49.5	1.33e-9	0.464
	7	192.1	89.9	48.7	1.33e-9	0.466
	7	190.1	94.5	53.2	1.59e-9	0.386
	7	189.3	87.9	43.5	1.30e-9	0.431
Average	-	190.7	-	-	1.38e-9	0.437
S.D.	-	1.228	-	-	1.36e-10	0.037
90°	5	177.1	86.6	51.3	1.88e-9	0.318
	5	176.8	93.2	52.2	1.97e-9	0.318
	5	209.0	85.2	49.9	2.26e-9	0.376
	5	186.3	88.8	48.3	1.93e-9	0.387
Average	-	172.3	-	-	2.01e-9	0.350
S.D.	-	39.20	-	-	1.71e-10	0.037
105°	3	115.0	87.6	42.5	2.22e-9	0.164
	3	122.7	92.4	48.6	2.08e-9	0.175
	3	127.0	89.6	49.1	2.01e-9	0.186
	3	115.6	91.5	47.5	2.21e-9	0.170
Average	-	117.3	-	-	2.13e-9	0.174
S.D.	-	15.12	-	-	1.02e-10	9.46e-3

**Table C-8** Viscometric data of polymer solutions at concentration of 2.432 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:2.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-3)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	318.4	90.4	48.3	8.01e-10	0.997
	10	302.4	87.6	48.2	8.43e-10	0.971
	10	309.3	91.3	49.7	8.25e-10	0.986
	10	308.8	88.9	50.3	8.26e-10	0.982
Average	-	309.8	-	-	8.24e-10	0.984
S.D.	-	6.510	-	-	1.73e-11	0.011
75°	7	267.0	85.3	43.1	9.56e-10	0.696
	7	258.2	87.4	42.6	9.88e-10	0.629
	7	249.3	87.3	42.5	1.02e-9	0.607
	7	266.1	88.9	40.6	9.59e-10	0.648
Average	-	260.2	-	-	9.81e-10	0.645
S.D.	-	8.243	-	-	2.99e-11	0.038
90°	5	239.1	90.3	44.1	1.07e-9	0.429
	5	244.9	86.4	47.6	1.04e-9	0.501
	5	248.5	88.6	50.8	1.03e-9	0.516
	5	240.6	87.4	44.3	1.05e-9	0.473
Average	-	243.3	-	-	1.05e-9	0.480
S.D.	-	4.263	-	-	1.71e-11	0.038
105°	3	209.2	89.5	42.1	1.22e-9	0.298
	3	162.4	86.9	39.9	1.57e-9	0.237
	3	163.7	90.7	46.0	1.56e-9	0.265
	3	192.4	92.5	40.3	1.33e-9	0.248
Average	-	181.9	• -	-	1.42e-9	0.262
S.D.	-	22.86	-	-	1.73e-10	0.027

**Table C-9** Viscometric data of polymer solutions at concentration of 3.127 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:2.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-3)

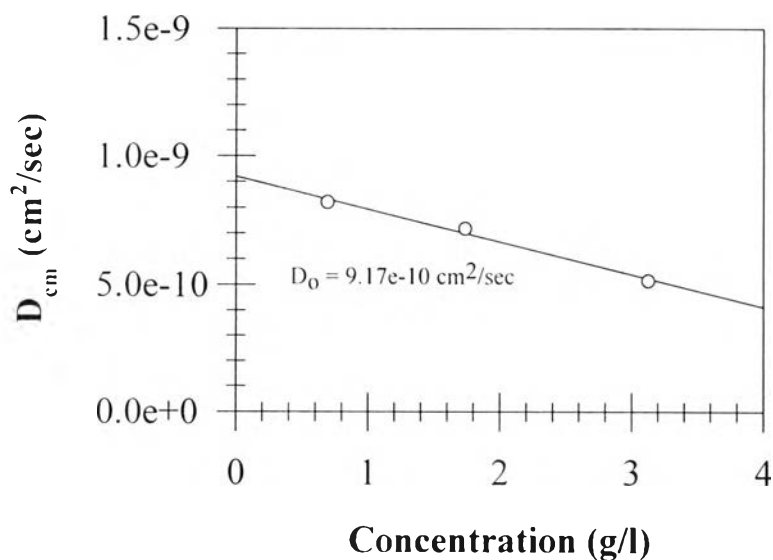
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	368.5	94.2	48.7	6.92e-10	0.997
	10	335.2	93.6	53.1	7.61e-10	0.989
	10	377.1	89.7	49.2	6.77e-10	0.999
	10	324.6	90.1	46.6	7.86e-10	0.980
Average	-	351.4	-	-	7.29e-10	0.991
S.D.	-	25.39	-	-	5.27e-11	8.66e-3
75°	7	324.9	89.9	47.9	7.85e-10	0.787
	7	311.3	91.3	48.9	8.20e-10	0.757
	7	314.9	87.6	48.6	8.10e-10	0.764
	7	308.7	90.3	49.8	8.27e-10	0.736
Average	-	315.0	-	-	8.11e-10	0.761
S.D.	-	7.104	-	-	1.84e-11	0.021
90°	5	288.0	89.6	52.8	8.86e-10	0.534
	5	256.7	89.7	48.3	9.94e-10	0.436
	5	269.3	88.5	49.7	9.48e-10	0.484
	5	278.2	90.4	50.3	9.17e-10	0.513
Average	-	273.1	-	-	9.36e-10	0.492
S.D.	-	13.31	-	-	4.6075e-11	0.042
105°	3	124.2	87.2	42.5	2.05e-9	0.177
	3	166.2	89.4	47.3	1.54e-9	0.237
	3	137.0	91.5	45.1	1.86e-9	0.200
	3	138.6	88.9	40.6	1.84e-9	0.221
Average	-	141.5	-	-	1.82e-9	0.209
S.D.	-	17.68	-	-	2.11e-10	0.026



**Figure C-3** Angle-dependence of the apparent diffusion coefficient of the alumatrane complexe versus  $q^2$  at various concentration, measured at 30 °C using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:2.5, the reaction time of 3 h , and the reaction temperature of 200 °C.

**Table C-10** Center of mass diffusion coefficients of the alumatrane complexes at various concentrations, measured at 30 °C, using  $\text{Al(OH)}_3$ :TEA:TETA = 10:5:2.5, the reaction time of 3 h , and the reaction temperature of 200 °C

Concentration (g/l)	$D_{cm}$ ( $\text{cm}^2/\text{sec}$ )
0.695	$8.21\text{e-}10$
1.737	$7.18\text{e-}10$
2.432	$4.14\text{e-}10$
3.127	$5.15\text{e-}10$



**Figure C-4** Center of mass diffusion coefficients of the alumatrane complexes versus polymer concentration, measured at 30 °C, using  $\text{Al(OH)}_3$ :TEA:TETA = 10:5:2.5, the reaction time of 3 h , and the reaction temperature of 200 °C.

**Table C-11** Viscometric data of polymer solutions at concentration of 0.654 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:7.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-5)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	273.7	93.0	47.0	9.32e-10	0.983
	10	269.7	92.6	50.2	9.46e-10	0.969
	10	271.8	90.6	48.5	9.39e-10	0.9765
	10	269.5	90.0	48.6	9.47e-10	0.968
Average	-	271.2	-	-	9.41e-10	0.974
S.D.	-	1.979	-	-	6.98e-12	7.15e-3
75°	7	214.4	87.3	49.0	1.19e-9	0.520
	7	184.9	85.7	51.4	1.38e-9	0.448
	7	216.7	90.6	49.8	1.18e-9	0.525
	7	189.4	90.9	42.1	1.35e-9	0.459
Average	-	201.4	-	-	1.28e-9	0.488
S.D.	-	16.53	-	-	1.05e-10	0.040
90°	5	246.4	88.8	39.2	4.81e-10	0.443
	5	252.7	91.3	47.7	4.43e-10	0.454
	5	242.0	84.1	48.9	4.51e-10	0.435
	5	233.8	84.6	48.8	4.62e-10	0.420
Average	-	243.7	-	-	4.59e-10	0.438
S.D.	-	7.941	-	-	1.65e-11	0.014
105°	3	204.2	91.4	44.4	4.99e-10	0.291
	3	206.2	87.7	53.6	4.66e-10	0.298
	3	201.8	87.0	43.1	4.64e-10	0.279
	3	204.8	92.5	44.9	4.66e-10	0.298
Average	-	204.3	-	-	4.74e-10	0.292
S.D.	-	1.836	-	-	1.69e-11	8.96e-3

**Table C-12** Viscometric data of polymer solutions at concentration of 1.634 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA:TETA = 10:5:7.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-5)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	300.8	91.6	47.6	8.48e-10	0.961
	10	313.5	84.2	46.2	8.14e-10	0.992
	10	308.2	88.4	44.2	8.28e-10	0.988
	10	307.1	92.2	45.4	8.31e-10	0.979
Average	-	307.2	-	-	8.30e-10	0.980
S.D.	-	5.212	-	-	1.40e-11	0.014
75°	7	278.6	92.7	46.5	9.16e-10	0.675
	7	298.1	86.9	44.9	8.56e-10	0.723
	7	299.4	91.5	46.3	8.52e-10	0.726
	7	298.4	91.5	45.8	8.55e-10	0.723
Average	-	293.6	-	-	8.70e-10	0.712
S.D.	-	10.00	-	-	3.09e-11	0.024
90°	5	263.0	92.6	44.6	9.70e-10	0.472
	5	254.0	91.2	44.7	1.00e-9	0.458
	5	247.4	90.6	43.9	1.03e-9	0.444
	5	259.7	84.3	51.9	9.83e-10	0.467
Average	-	256.0	-	-	9.96e-10	0.460
S.D.	-	6.847	-	-	2.59e-11	0.012
105°	3	205.7	94.4	45.3	1.24e-9	0.294
	3	205.2	88.7	46.4	1.24e-9	0.293
	3	207.7	92.1	48.4	1.23e-9	0.296
	3	206.2	88.1	48.4	1.24e-9	0.294
Average	-	206.2	-	-	1.24e-9	0.294
S.D.	-	1.080	-	-	5.00e-12	1.258e-3

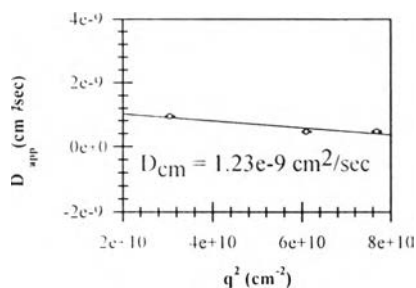


**Table C-13** Viscometric data of polymer solutions at concentration of 2.288 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:7.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-5)

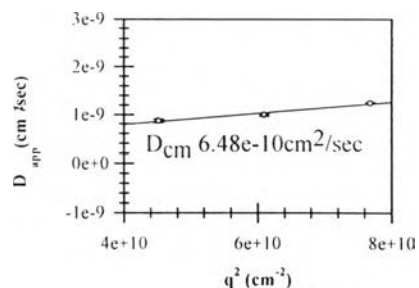
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	312.2	88.9	42.2	8.17e-10	0.991
	10	303.1	88.6	51.4	8.42e-10	0.972
	10	310.1	85.8	51.6	8.23e-10	0.980
	10	311.5	92.1	44.2	8.19e-10	0.986
Average	-	309.2	-	-	8.25e-10	0.982
S.D.	-	4.176	-	-	1.14e-11	8.18e-3
75°	7	404.0	92.9	48.0	6.32e-10	0.979
	7	406.8	89.3	41.2	6.27e-10	0.986
	7	417.5	92.2	41.1	6.11e-10	0.997
	7	404.7	91.7	50.1	6.30e-10	0.981
Average	-	408.3	-	-	6.25e-10	0.986
S.D.	-	6.280	-	-	9.56e-12	8.06e-3
90°	5	284.6	86.1	43.7	8.66e-10	0.535
	5	294.6	85.1	42.1	8.97e-10	0.530
	5	300.0	84.1	41.3	8.51e-10	0.538
	5	294.5	90.9	44.3	8.66e-10	0.539
Average	-	293.4	-	-	8.70e-10	0.535
S.D.	-	6.426	-	-	7.93e-11	4.27e-3
105°	3	224.0	93.5	45.5	1.14e-9	0.320
	3	228.2	85.8	47.7	1.12e-9	0.326
	3	220.6	86.7	46.3	1.16e-9	0.315
	3	215.9	90.3	44.6	1.18e-9	0.308
Average	-	222.2	-	-	1.15e-9	0.317
S.D.	-	5.212	-	-	2.58e-11	7.62e-3

**Table C-14** Viscometric data of polymer solutions at concentration of 2.941 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:7.5 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-5)

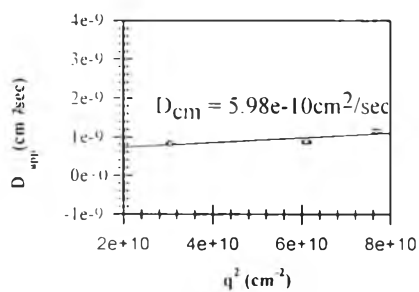
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	294.7	87.1	42.6	8.66e-10	0.998
	10	289.6	86.0	43.0	8.81e-10	0.997
	10	291.0	84.9	46.3	8.77e-10	0.899
	10	273.2	87.9	43.6	9.34e-10	0.982
Average	-	287.1	-	-	8.85e-10	0.969
S.D.	-	9.529	-	-	2.83e-11	0.047
75°	7	291.1	94.5	46.6	8.77e-10	0.706
	7	295.2	94.1	46.6	8.64e-10	0.716
	7	286.3	89.8	48.5	8.91e-10	0.654
	7	289.0	89.7	49.0	8.83e-10	0.700
Average	-	290.4	-	-	8.79e-10	0.704
S.D.	-	3.755	-	-	1.81e-11	9.08e-3
90°	5	246.6	86.5	47.0	1.03e-9	0.443
	5	248.5	94.8	47.2	1.03e-9	0.446
	5	245.0	90.4	48.4	1.04e-9	0.441
	5	247.6	89.2	50.3	1.04e-9	0.439
Average	-	246.9	-	-	1.04e-9	0.443
S.D.	-	1.500	-	-	5.77e-12	2.99e-3
105°	3	229.0	92.9	41.5	1.11e-9	0.327
	3	216.1	92.2	41.0	1.18e-9	0.308
	3	209.0	86.9	42.7	1.22e-9	0.298
	3	219.5	88.6	42.4	1.16e-9	0.317
Average	-	218.4	-	-	1.17e-9	0.312
S.D.	-	8.311	-	-	4.57e-11	0.012



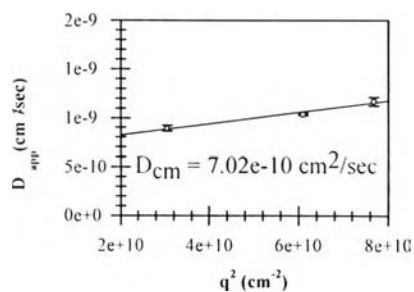
Concentration = 0.654 g/l



Concentration = 1.634 g/l



Concentration = 2.288 g/l

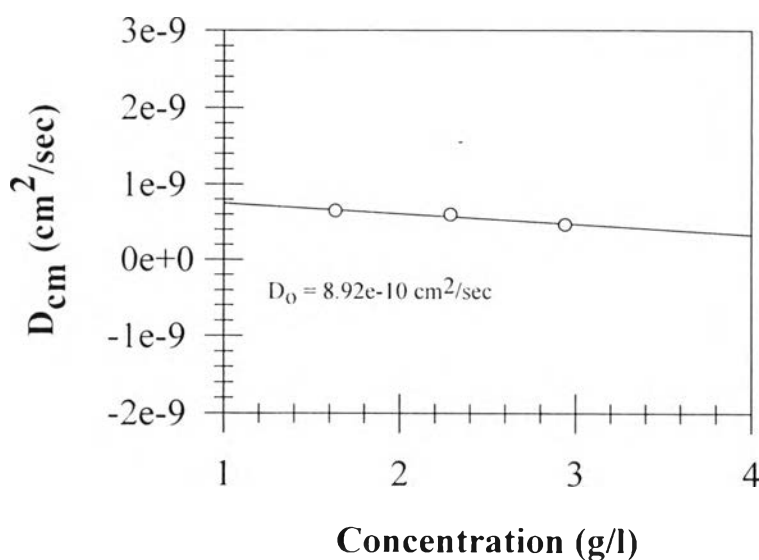


Concentration = 2.941 g/l

**Figure C-5** Angle-dependence of the apparent diffusion coefficient of the alumatrane complex versus  $q^2$  at various concentration, measured at 30 °C using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:7.5, the reaction time of 3 h , and the reaction temperature of 200 °C.

**Table C-15** Center of mass diffusion coefficients of the alumatrane complexes at various concentrations, measured at 30 °C, using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:7.5, the reaction time of 3 h , and the reaction temperature of 200 °C

Concentration (g/l)	$D_{\text{cm}}$ ( $\text{cm}^2/\text{sec}$ )
0.654	1.23e-9
1.634	6.48e-10
2.288	5.98e-10
2.941	7.02e-10



**Figure C-6** Center of mass diffusion coefficients of the alumatrane complexes versus polymer concentration, measured at 30 °C, using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:7.5, the reaction time of 3 h , and the reaction temperature of 200 °C.

**Table C-16** Viscometric data of polymer solutions at concentration of 0.993 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 2:1:10 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-7)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	333.8	86.4	38.2	7.64e-10	0.951
	10	329.5	90.3	48.8	7.74e-10	0.948
	10	317.6	88.2	48.8	8.03e-10	0.936
	10	326.2	87.9	47.4	7.82e-10	0.949
Average	-	326.8	-	-	7.81e-10	0.946
S.D.	-	6.863	-	-	1.66e-11	6.78e-3
75°	7	308.0	91.3	49.4	8.28e-10	0.746
	7	307.4	90.7	39.9	8.30e-10	0.745
	7	297.9	89.3	49.1	8.57e-10	0.722
	7	308.6	85.4	39.4	8.27e-10	0.748
Average	-	305.5	-	-	8.36e-10	0.740
S.D.	-	5.074	-	-	1.44e-11	0.012
90°	5	239.9	89.5	48.7	1.06e-9	0.431
	5	251.5	88.3	49.1	1.01e-9	0.452
	5	249.6	91.3	19.3	1.02e-9	0.448
	5	251.1	88.4	49.3	1.02e-9	0.451
Average	-	248.0	-	-	1.03e-9	0.446
S.D.	-	5.478	-	-	2.22e-11	9.81e-3
105°	3	150.2	85.5	50.3	1.70e-9	0.214
	3	164.2	93.6	47.9	1.55e-9	0.235
	3	181.0	89.6	48.4	1.41e-9	0.258
	3	177.3	88.3	47.5	1.63e-9	0.246
Average	-	168.4	-	-	1.57e-9	0.238
S.D.	-	13.92	-	-	1.24e-10	0.018

**Table C-17** Viscometric data of polymer solutions at concentration of 1.655 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:10 ,at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-7)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	225.5	93.4	46.6	1.13e-9	0.803
	10	223.0	90.7	45.9	1.14e-9	0.762
	10	239.0	88.6	45.2	1.07e-9	0.753
	10	209.6	89.4	46.3	1.22e-9	0.735
Average	-	224.3	-	-	1.14e-9	0.763
S.D.	-	12.04	-	-	6.16e-11	0.029
75°	7	226.4	85.2	45.3	1.13e-9	0.549
	7	205.7	86.7	45.4	1.24e-9	0.539
	7	212.2	88.3	46.0	1.20e-9	0.510
	7	224.4	86.9	46.0	1.14e-9	0.544
Average	-	217.2	-	-	1.18e-9	0.535
S.D.	-	9.895	-	-	5.19e-11	0.017
90°	5	163.1	91.3	44.9	1.56e-9	0.293
	5	175.6	90.8	53.9	1.45e-9	0.316
	5	166.2	89.1	45.8	1.54e-9	0.299
	5	202.3	87.9	52.9	1.55e-9	0.364
Average	-	176.8	-	-	1.52e-9	0.318
S.D.	-	17.81	-	-	5.07e-11	0.032
105°	3	131.7	89.4	43.9	1.94e-9	0.188
	3	133.3	87.6	54.1	1.91e-9	0.201
	3	135.9	90.3	45.0	1.95e-9	0.195
	3	140.8	89.6	50.7	1.97e-9	0.186
Average	-	135.2	-	-	1.94e-9	0.192
S.D.	-	3.979	-	-	2.5e-11	6.86e-3

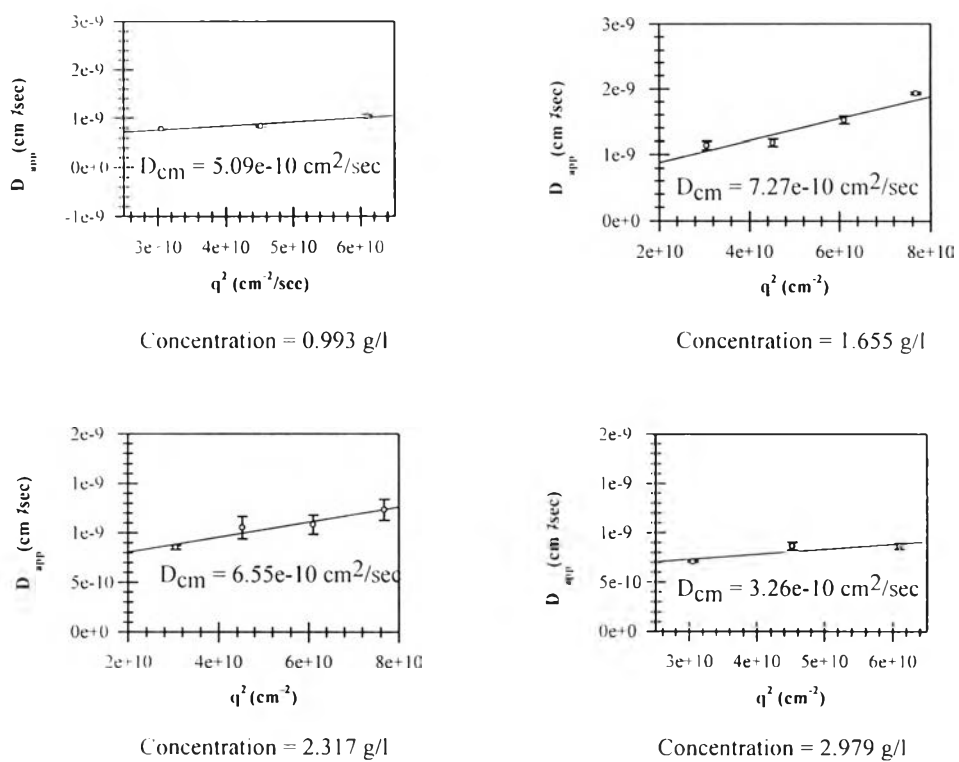
**Table C-18** Viscometric data of polymer solutions at concentration of 2.317 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:10 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-7)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	291.2	93.5	47.2	8.76e-10	0.981
	10	297.5	90.6	48.0	8.57e-10	0.969
	10	299.3	89.9	48.2	8.53e-10	0.974
	10	308.1	91.3	47.2	8.28e-10	0.990
Average	-	299.0	-	-	8.53e-10	0.978
S.D.	-	6.976	-	-	1.97e-11	9.22e-3
75°	7	243.0	89.7	48.5	1.05e-9	0.589
	7	212.4	88.6	48.5	1.20e-9	0.578
	7	244.5	91.8	49.2	1.04e-9	0.592
	7	276.5	87.4	48.7	9.23e-10	0.615
Average	-	244.1	-	-	1.05e-9	0.594
S.D.	-	26.18	-	-	1.13e-10	0.016e-5
90°	5	258.5	86.9	48.5	1.17e-9	0.464
	5	218.0	89.3	49.2	1.16e-9	0.392
	5	219.8	90.4	49.6	9.87e-10	0.395
	5	251.9	84.9	49.4	1.01e-9	0.442
Average	-	237.0	-	-	1.08e-9	0.423
S.D.	-	21.14	-	-	9.67e-11	0.036
105°	3	222.5	87.3	46.9	1.15e-9	0.328
	3	212.0	89.4	48.5	1.20e-9	0.301
	3	198.4	90.3	46.6	1.21e-9	0.256
	3	189.2	90.4	47.6	1.35e-9	0.268
Average	-	205.5	-	-	1.22e-9	0.288
S.D.	-	14.69	-	-	7.63e-11	0.033

**Table C-19** Viscometric data of polymer solutions at concentration of 2.979 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:10 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-7)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	364.9	89.5	44.6	6.99e-10	0.998
	10	364.0	88.4	47.8	7.01e-10	0.986
	10	355.2	90.3	48.2	7.18e-10	0.973
	10	355.3	87.6	47.8	7.18e-10	0.971
Average	-	359.8	-	-	7.09e-10	0.981
S.D.	-	5.324	-	-	1.04e-11	0.016
75°	7	280.8	90.4	37.4	9.09e-10	0.711
	7	305.8	91.6	45.4	8.36e-11	0.746
	7	300.0	89.4	45.9	8.51e-10	0.738
	7	296.1	86.9	43.8	8.40e-10	0.721
Average	-	295.6	-	-	8.59e-10	0.729
S.D.	-	10.54	-	-	3.39e-11	0.016
90°	5	307.0	87.6	46.4	8.31e-10	0.565
	5	284.5	93.6	46.2	8.97e-10	0.521
	5	299.5	85.4	46.4	8.52e-10	0.555
	5	289.3	94.1	47.9	8.82e-10	0.543
Average	-	295.1	-	-	8.66e-10	0.546
S.D.	-	10.12	-	-	2.96e-11	0.019
105°	3	191.4	84.9	45.0	1.33e-9	0.287
	3	211.7	87.2	45.2	1.21e-9	0.299
	3	192.2	88.6	45.8	1.33e-9	0.288
	3	198.0	89.3	45.1	1.29e-9	0.294
Average	-	198.3	-	-	1.29e-9	0.291
S.D.	-	9.389	-	-	5.66e-11	6.66e-3

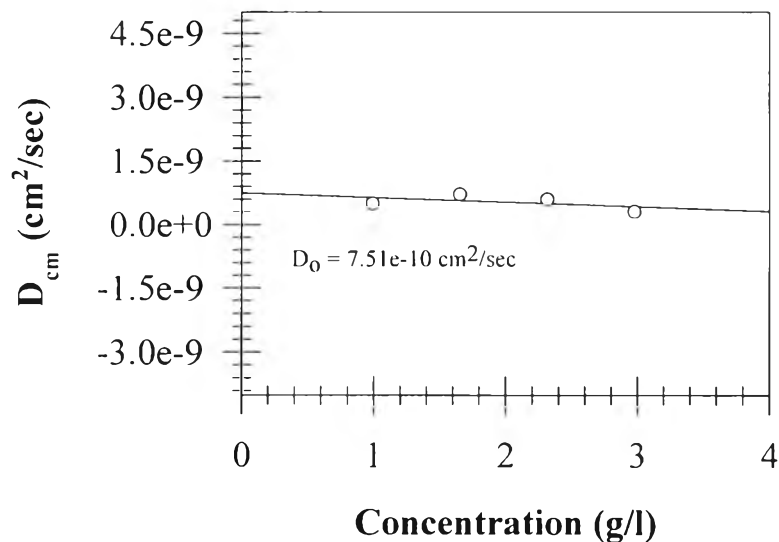




**Figure C-7** Angle-dependence of the apparent diffusion coefficient of the alumatrane complex versus  $q^2$  at various concentration, measured at 30 °C using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:10, the reaction time of 3 h, and the reaction temperature of 200 °C.

**Table C-20** Center of mass diffusion coefficients of the alumatrane complexes at various concentrations, measured at 30 °C, using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:10, the reaction time of 3 h, and the reaction temperature of 200 °C

Concentration (g/l)	$D_{cm}$ (cm <sup>2</sup> /sec)
0.993	5.09e-10
1.655	7.27e-10
2.317	6.55e-10
2.979	3.26e-10



**Figure C-8** Center of mass diffusion coefficients of the alumatrane complexes versus polymer concentration, measured at 30 °C, using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:10, the reaction time of 3 h, and the reaction temperature of 200 °C.

**Table C-21** Viscometric data of polymer solutions at concentration of 1.004 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:15 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-9)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	308.8	85.0	49.0	1.27e-9	0.981
	10	308.3	90.2	44.5	1.27e-9	0.984
	10	303.7	84.1	46.9	1.27e-9	0.962
	10	282.6	85.8	42.6	1.12e-9	0.959
Average	-	300.8	-	-	1.23e-9	0.972
S.D.	-	12.38	-	-	7.50e-11	0.013
75°	7	245.8	93.3	43.9	1.03e-9	0.596
	7	222.3	86.0	43.1	1.43e-9	0.539
	7	235.6	92.1	41.1	9.76e-10	0.571
	7	226.4	94.9	41.3	9.24e-10	0.549
Average	-	232.5	-	-	1.09e-9	0.564
S.D.	-	10.45	-	-	2.31e-10	0.025
90°	5	244.1	93.0	46.8	1.01e-9	0.438
	5	260.4	85.5	46.2	1.09e-9	0.468
	5	255.8	91.1	47.8	1.06e-9	0.459
	5	261.9	89.8	48.6	1.11e-9	0.478
Average	-	255.6	-	-	1.07e-9	0.461
S.D.	-	8.062	-	-	4.35e-11	0.017
105°	3	240.0	88.3	46.3	1.01e-9	0.342
	3	258.9	90.3	44.1	1.07e-9	0.386
	3	247.1	87.6	50.3	1.06e-9	0.352
	3	245.2	88.8	49.7	1.02e-9	0.348
Average	-	247.8	-	-	1.04e-9	0.357
S.D.	-	7.985	-	-	2.94e-11	0.020

**Table C-22** Viscometric data of polymer solutions at concentration of 1.674 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:15 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-9)

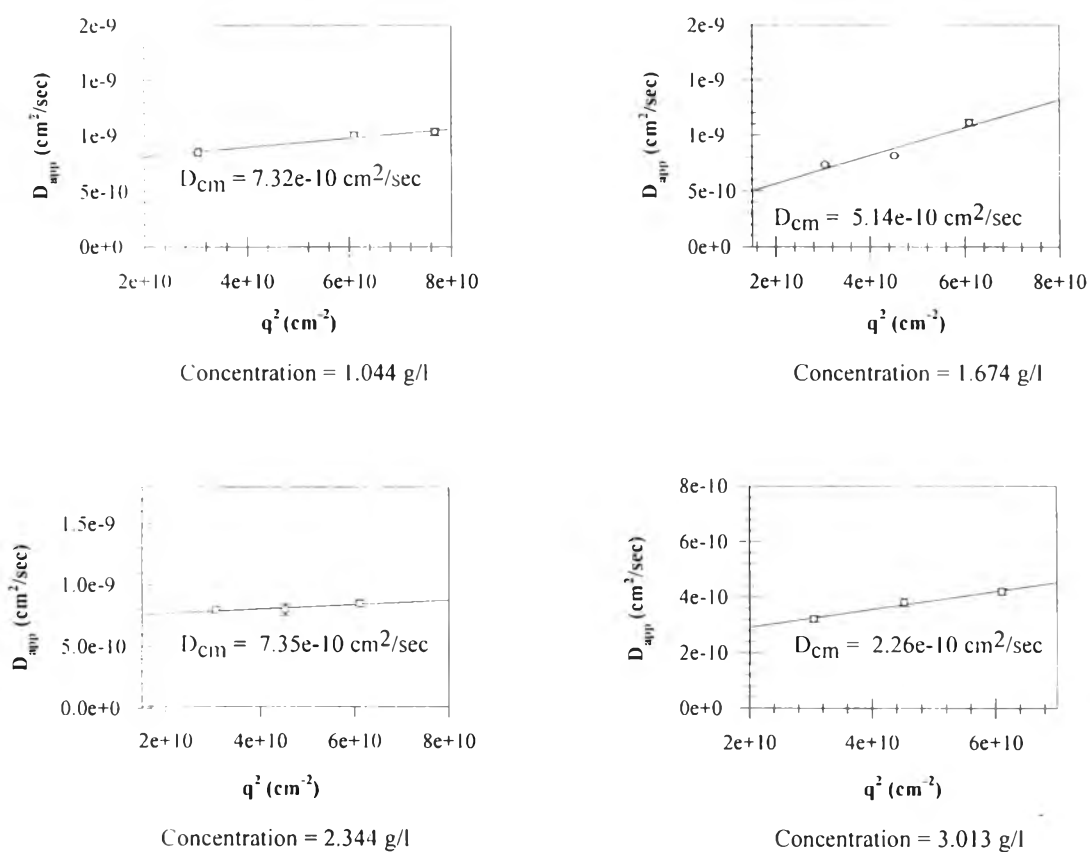
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	351.6	90.3	42.9	1.45e-9	0.998
	10	347.7	87.6	44.6	1.49e-9	0.987
	10	342.7	94.2	49.0	1.45e-9	0.983
	10	353.5	88.4	51.7	1.44e-9	0.997
Average	-	348.9	-	-	1.46e-9	0.991
S.D.	-	4.772	-	-	2.64e-11	7.411
75°	7	314.6	85.1	43.1	1.32e-9	0.762
	7	312.6	87.9	48.8	1.32e-9	0.757
	7	318.4	90.3	46.0	1.32e-9	0.772
	7	314.1	86.2	49.7	1.31e-9	0.761
Average	-	314.9	-	-	1.32e-9	0.762
S.D.	-	2.468	-	-	5.00e-12	6.47e-3
90°	5	237.2	88.9	50.3	9.76e-10	0.426
	5	222.7	87.1	48.4	9.04e-10	0.400
	5	232.2	89.4	47.3	9.57e-10	0.417
	5	227.2	93.6	53.0	9.24e-10	0.409
Average	-	230.0	-	-	9.40e-10	0.413
S.D.	-	6.198	-	-	3.23e-11	0.011
105°	3	143.8	89.7	46.2	5.94e-10	0.205
	3	147.9	88.1	44.8	6.23e-10	0.211
	3	136.7	93.7	45.5	5.62e-10	0.195
	3	160.7	90.5	46.7	6.47e-10	0.229
Average	-	147.3	-	-	6.07e-10	0.210
S.D.	-	10.07	-	-	3.67e-11	0.015

**Table C-23** Viscometric data of polymer solutions at concentration of 2.344 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:15 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-9)

Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	317.3	93.2	47.8	1.32e-9	0.972
	10	316.4	89.4	45.2	1.31e-9	0.969
	10	312.3	88.7	51.9	1.32e-9	0.958
	10	305.2	86.5	49.2	1.27e-9	0.952
Average	-	312.8	-	-	1.64e-9	0.963
S.D.	-	5.514	-	-	1.02e-10	9.36e-3
75°	7	314.2	85.2	44.6	1.31e-9	0.728
	7	295.3	87.6	48.7	1.19e-9	0.704
	7	299.0	88.4	46.9	1.23e-9	0.716
	7	229.4	90.3	48.0	1.18e-9	0.725
Average	-	284.5	-	-	1.23e-9	0.718
S.D.	-	37.62	-	-	5.91e-11	0.011
90°	5	339.5	89.5	49.8	1.44e-9	0.610
	5	296.2	91.3	50.0	1.19e-9	0.532
	5	314.1	88.4	49.1	1.31e-9	0.564
	5	326.2	89.7	47.7	1.40e-9	0.587
Average	-	319.0	-	-	1.34e-9	0.573
S.D.	-	18.40	-	-	1.11e-10	0.033
105°	3	213.2	85.2	46.6	8.69e-10	0.304
	3	199.9	91.4	46.1	8.11e-10	0.285
	3	204.5	86.9	47.9	8.58e-10	0.292
	3	202.2	86.6	45.9	8.39e-10	0.288
Average	-	205.0	-	-	8.44e-10	0.292
S.D.	-	5.812	-	-	2.54e-11	8.26e-3

**Table C-24** Viscometric data of polymer solutions at concentration of 3.013 g/l, measured at 30 °C, that synthesized from Al(OH)<sub>3</sub>:TEA: TETA = 10:5:1 , at various TETA contents at the reaction time of 3 h and the reaction temperature of 200 °C (Figure C-9)

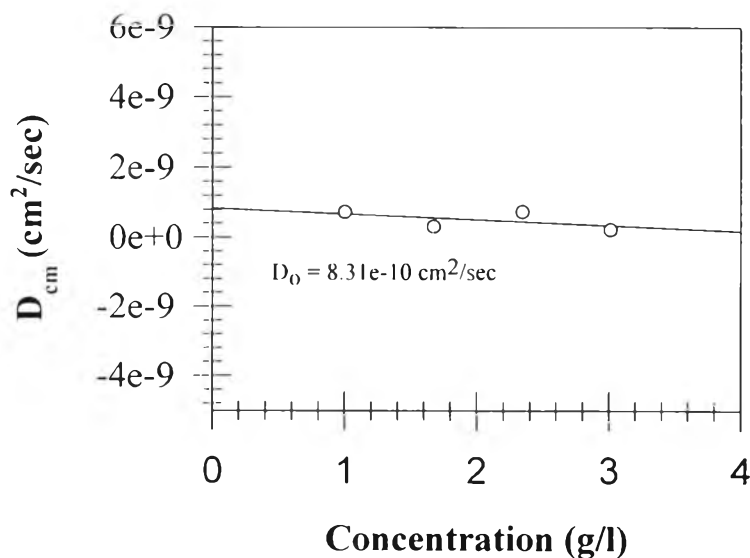
Angle	Sample time (μs)	Mean (nm)	In range	Merit	D <sub>app</sub> (cm <sup>2</sup> /s)	Poly-dispersity
60°	10	399.9	88.8	50.9	1.65e-9	0.999
	10	385.9	89.9	49.2	1.53e-9	0.981
	10	387.3	90.7	48.7	1.59e-9	0.972
	10	417.5	87.9	46.3	1.77e-9	0.999
Average	-	397.6	-	-	1.63e-9	0.988
S.D.	-	14.65	-	-	1.02e-10	0.014
75°	7	347.4	86.5	48.1	1.49e-9	0.842
	7	345.8	85.9	42.7	1.49e-9	0.838
	7	326.1	90.3	44.8	1.40e-9	0.790
	7	322.9	87.4	43.6	1.37e-9	0.783
Average	-	335.6	-	-	1.44e-9	0.823
S.D.	-	12.84	-	-	6.18e-11	0.030
90°	5	310.9	86.4	50.3	1.31e-9	0.558
	5	310.4	85.7	48.1	1.29e-9	0.558
	5	293.1	88.3	49.3	1.19e-9	0.526
	5	301.5	90.4	48.7	1.25e-9	0.542
Average	-	304.0	-	-	1.26e-9	0.546
S.D.	-	8.439	-	-	5.29e-11	0.015
105°	3	204.3	93.5	39.9	8.58e-10	0.292
	3	234.4	89.9	43.1	9.98e-10	0.310
	3	225.1	90.8	41.3	9.24e-10	0.311
	3	191.2	89.9	42.8	8.09e-10	0.303
Average	-	213.8	-	-	8.97e-10	0.307
S.D.	-	19.60	-	-	8.20e-11	0.012



**Figure C-9** Angle-dependence of the apparent diffusion coefficient of the alumatrane complexe versus  $q^2$  at various concentration, measured at 30 °C using  $\text{Al}(\text{OH})_3$ :TEA:TETA = 10:5:15, the reaction time of 3 h , and the reaction temperature of 200 °C.

**Table C-25** Center of mass diffusion coefficients of the alumatrane complexes at various concentration, measured at 30 °C, using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:15, reaction time of 3 h , and reaction temperature of 200 °C

Concentration (g/l)	D <sub>cm</sub> (cm <sup>2</sup> /sec)
1.004	1.35e-9
1.674	2.08e-9
2.344	1.64e-9
3.013	2.12e-9

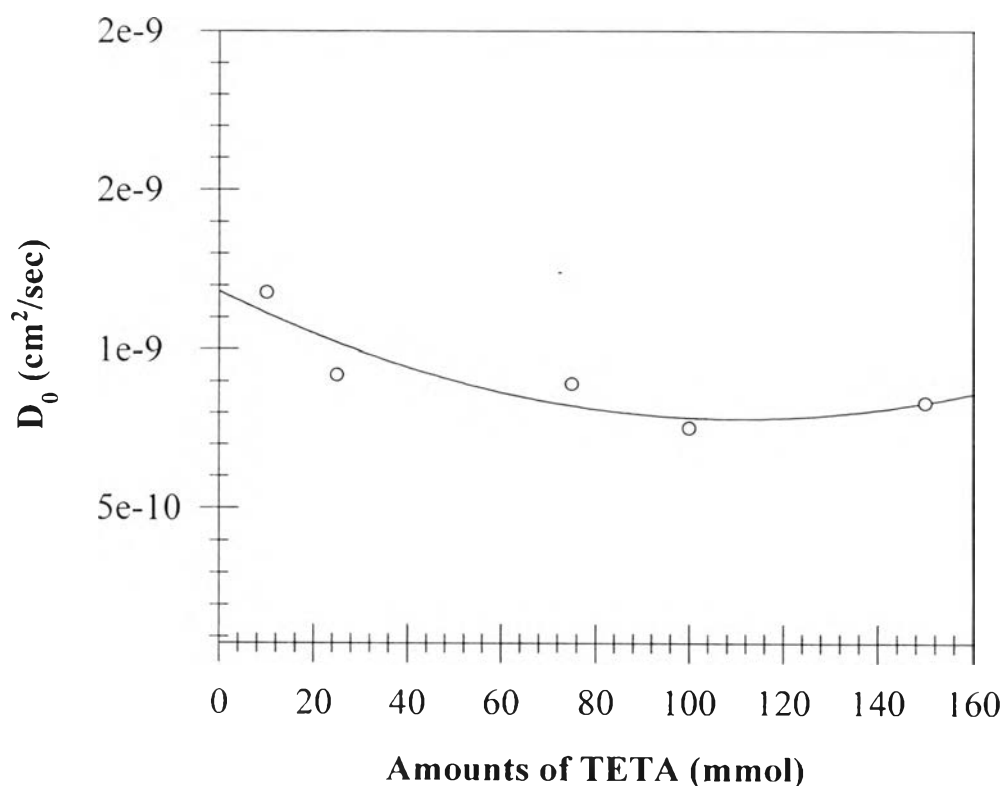


**Figure C-10** Center of mass diffusion coefficients of the alumatrane complexes versus polymer concentration, measured at 30 °C, using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:15, the reaction time of 3 h , and the reaction temperature of 200 °C.



**Table C-26** Diffusion coefficients of the alumatrane complexes at various TETA contents, measured at 30 °C, using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:10, the reaction time of 3 h , and the reaction temperature of 200 °C

Amounts of TETA (mmol)	D <sub>0</sub> (cm <sup>2</sup> /sec)
10	1.18e-9
25	9.17e-10
75	8.92e-10
100	7.51e-10
150	8.31e-10



**Figure C-11** Diffusion coefficients of the alumatrane complexes versus amounts of TETA, measured at 30 °C, using Al(OH)<sub>3</sub>:TEA:TETA = 10:5:x where x = 1:2.5:5:7.5:10:15, reaction time of 3 h , and the reaction temperature of 200 °C.

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