

APPENDIX C
VISCOSITY MEASUREMENT DATA

Table C-1. Raw Viscosity Data at different Spindle Rotation Rate for Three-Phase Fluidized Bed with Uniform Distributor (Superficial Liquid Velocity = 2.037 cm/sec, Superficial Gas Velocity = 3.364 cm/sec, Particles Diameter of 0.08 mm)

Instantaneous Viscosity (cp) at Spindle Rotation Rates of					
<u>n = 2 rpm</u>	<u>n = 4 rpm</u>	<u>n = 6 rpm</u>	<u>n = 10 rpm</u>	<u>n = 12 rpm</u>	<u>n = 20 rpm</u>
1167.0	598.5	199.0	156.0	201.0	123.6
603.0	582.0	474.0	271.2	339.0	87.0
1050.0	388.5	627.0	349.2	475.0	152.7
2130.0	342.0	761.0	133.8	469.5	145.5
1284.0	576.0	475.0	198.6	276.5	159.9
2238.0	643.5	331.0	347.4	350.0	181.2
2043.0	213.0	218.0	117.0	232.5	247.5
1803.0	540.0	226.0	578.4	366.0	255.0
1386.0	444.0	369.0	355.8	412.5	163.2
2622.0	670.5	102.0	355.2	303.5	81.9
1947.0	663.0	178.0	156.0	241.5	144.9
2421.0	297.0	335.0	274.8	293.0	237.9
783.0	312.0	288.0	378.0	399.0	59.1
1359.0	478.5	365.0	165.6	148.0	192.6
1650.0	354.0	259.0	163.2	119.0	153.6
1320.0	183.0	364.0	571.2	273.5	103.2

Table C-1 (Continue)

Instantaneous Viscosity (cp) at Spindle Rotation Rates of					
<u>n = 2 rpm</u>	<u>n = 4 rpm</u>	<u>n = 6 rpm</u>	<u>n = 10 rpm</u>	<u>n = 12 rpm</u>	<u>n = 20 rpm</u>
1134.0	193.0	364.0	120.0	354.0	192.3
1818.0	763.5	474.0	378.6	267.0	112.2
2328.0	513.0	368.0	292.8	197.0	245.5
1755.0	574.5	584.0	457.2	147.5	271.5
2385.0	829.5	759.0	371.4	244.5	273.6
2547.0	670.5	706.0	465.6	266.5	292.8
2022.0	298.5	883.0	373.8	166.0	173.1
1509.0	331.5	587.0	166.2	73.0	249.6
1413.0	550.5	452.0	186.0	139.0	233.4
699.0	996.0	283.0	92.4		90.9
489.0	604.5	132.0	192.0		192.9
618.0	415.5	172.0	311.4		48.0
567.0	744.0	211.0	501.6		257.1
627.0	1199.0	149.0	578.4		235.0
1431.0	1154.0	358.0			92.4
591.0	1373.0	636.0			190.2

Table C-1 (Continue)

Instantaneous Viscosity (cp) at Spindle Rotation Rates of					
<u>n = 2 rpm</u>	<u>n = 4 rpm</u>	<u>n = 6 rpm</u>	<u>n = 10 rpm</u>	<u>n = 12 rpm</u>	<u>n = 20 rpm</u>
1173.0	1116.0	250.0			175.2
1815.0	937.5	174.0			
1848.0	1077.0	283.0			
1056.0	955.5	405.0			
801.0	706.5	316.0			
1029.0	229.5	346.0			
1443.0	646.5	595.0			
1110.0	478.5	182.0			
600.0	324.0				
1482.0	354.0				
1176.0	390.0				
1608.0	373.5				
	880.5				
	994.5				
	957.0				
	844.5				
	640.5				

Table C-1 (Continue)

Instantaneous Viscosity (cp) at Spindle Rotation Rates of					
<u>n = 2 rpm</u>	<u>n = 4 rpm</u>	<u>n = 6 rpm</u>	<u>n = 10 rpm</u>	<u>n = 12 rpm</u>	<u>n = 20 rpm</u>
	463.5				
	757.5				
	574.5				

Table C-2. Raw Viscosity Data at Spindle Rotation Rate of 6 rpm for Three-Phase Fluidized Bed with Central Jet Distributor at different Inlet Liquid Velocities (Inlet Gas Velocity at Right Inlet = 131.0 cm/sec, Inlet Gas Velocity at Left Inlet = 135.0 cm/sec, Particles Diameter = 1.0 mm)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
703.0	679.0
524.0	460.0
826.0	547.0
697.0	468.0
469.0	1000.0
712.0	985.0
611.0	432.0
881.0	909.0
928.0	851.0
647.0	922.0
991.0	920.0
646.0	589.0
888.0	667.0
525.0	608.0
495.0	367.0

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
503.0	461.0
657.0	738.0
748.0	845.0
113.0	575.0
622.0	492.0
885.0	399.0
997.0	678.0
697.0	887.0
231.0	903.0
546.0	795.0
570.0	865.0
701.0	963.0
325.0	947.0
750.0	958.0
902.0	610.0
720.0	974.0
638.0	641.0

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
90.0	525.0
201.0	709.0
496.0	586.0
969.0	851.0
665.0	712.0
135.0	885.0
284.0	748.0
263.0	419.0
83.0	741.0
317.0	905.0
206.0	589.0
550.0	873.0
890.0	980.0
900.0	841.0
717.0	466.0
970.0	735.0
931.0	842.0

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
783.0	964.0
782.0	737.0
542.0	789.0
543.0	711.0
171.0	963.0
397.0	860.0
509.0	766.0
552.0	467.0
627.0	437.0
604.0	402.0
693.0	407.0
303.0	416.0
549.0	547.0
377.0	768.0
330.0	988.0
346.0	963.0
527.0	790.0

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
937.0	634.0
974.0	798.0
576.0	767.0
226.0	493.0
848.0	831.0
884.0	776.0
761.0	419.0
684.0	119.0
207.0	479.0
214.0	678.0
674.0	551.0
972.0	244.0
721.0	581.0
466.0	595.0
434.0	751.0
529.0	658.0
787.0	822.0

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
750.0	889.0
571.0	760.0
798.0	608.0
733.0	404.0
606.0	322.0
301.0	516.0
323.0	557.0
274.0	876.0
284.0	515.0
809.0	451.0
812.0	832.0
609.0	879.0
525.0	
795.0	
981.0	
365.0	
385.0	

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
734.0	
384.0	
200.0	
263.0	
805.0	
873.0	
636.0	
609.0	
659.0	
385.0	
107.0	
318.0	
164.0	
737.0	
629.0	
814.0	
826.0	

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
909.0	
952.0	
881.0	
454.0	
648.0	
395.0	
942.0	
794.0	
146.0	
176.0	
441.0	
556.0	
967.0	
832.0	
697.0	
685.0	
985.0	

Table C-2 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>232.4 cm/sec</u>	<u>154.9 cm/sec</u>
430.0	
721.0	
814.0	
947.0	
725.0	
259.0	
179.0	
673.0	
545.0	
383.0	
392.0	
975.0	

Table C-3. Raw Viscosity Data at Spindle Angular Velocity of 6 rpm for Liquid-Solid Fluidized Bed with Central Jet Distributor (Particles Diameter = 1.0 mm)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>322.4 cm/sec</u>	<u>154.9 cm/sec</u>
913.0	119.0
599.0	104.0
295.0	103.0
628.0	110.0
904.0	100.0
529.0	116.0
219.0	198.0
670.0	176.0
347.0	123.0
269.0	145.0
467.0	121.0
630.0	175.0
746.0	187.0
229.0	101.0
174.0	202.0

Table C-3 (Continue)

Instantaneous Viscosity (cp) Inlet Liquid Velocity of	
<u>322.4 cm/sec</u>	<u>154.9 cm/sec</u>
180.0	
205.0	
150.0	
117.0	
278.0	
702.0	
873.0	
486.0	
411.0	
346.0	
711.0	
