Menghitung Kecepatan Minimum Fluidisasi

Volume Pikno 25 ml

rho air 1 g/cm3

Diketahui: = 0.0012 g/cm3

= 0.181 cp = 1.81E-04 g/cm.s

g = 981 cm/s2

z = 10 cm

Kecepatan minimum fluidisasi =

$$v_{mf} = \frac{\rho_s - \rho_f g \varepsilon_{mf}^3 D_p^2}{150(1-\varepsilon_{mf})}$$

Asam Stearat

variasi	Pikno kosong w1	Pikno+bahan w2	Total berat w3	rhos	rho f	ε 1-rhof/rhos	Dp (cm)		ΔP terhitung	ΔP hasil
1%	21.61	23.71	42.92	0.3627	0.0012	0.9967	0.0219	1.87E+03	11.73	2.75
2%	21.61	23.88	43.4	0.4142	0.0012	0.9971	0.0202	2.09E+03	11.73	2.50
3%	23.08	26.14	44.52	0.4622	0.0012	0.9974	0.0191	2.32E+03	11.74	2.00
4%	21.81	24.1	43.87	0.4379	0.0012	0.9973	0.0192	2.11E+03	11.74	2.05
5%	21.34	24.13	43.57	0.5018	0.0012	0.9976	0.0194	2.82E+03	11.74	2.40

Gama Mercaptosilane

variasi	Pikno kosong w1	Pikno+bahan w2	Total berat w3	rhos	rho f	ε 1-rhof/rhos	Dp (cm)		ΔP terhitung	ΔP hasil
1%	21.24	22.91	43.97	0.4239	0.0012	0.9972	0.0180	1.73E+03	11.73	2.45
2%	21.61	23.88	43.4	0.4142	0.0012	0.9971	0.0179	1.63E+03	11.73	2.40
3%	21.24	22.7	44.06	0.4011	0.0012	0.9970	0.0183	1.61E+03	11.73	2.20
4%	21.81	24.1	43.87	0.4379	0.0012	0.9973	0.0183	1.91E+03	11.74	2.35
5%	20.65	22.25	42.26	0.3206	0.0012	0.9963	0.0179	9.78E+02	11.72	2.30

ANALISIS SCREENING

1. Interpolasi dari Fig 16 Brown untuk mencari nilai n (actual surface)
   Dari Fig 16 Brown diambil nilai x sebagai fungsi Davg (microns) dan nilai y sebagai fungsi Act Surface (cm^2/gr) :

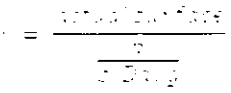
x (Davg)	y (act surf)	ct.surface perhit. (cm2/gram)
50	780	778.0725
90	440	461.1344
140	300	311.2070
280	175	167.9317
500	95	100.2352

2. Didapatkan pers : $y = 25299x^{-089}$
   Dengan y dicari sebagai fungsi actual surface, dan x diketahui sbgai fungsi Davg penelitian

x Davg (cm)	x Davg (mikron)	y Act Surf Perhit
0.0542	542	93.29
0.0519	519	96.96
0.0351	351	137.33
0.0166	166	267.43
0.0124	124	346.70

3. ASAM STEARAT

3.a. Menghitung n (ratio spesific surface)



Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	$\rho_{s\ stearat}$ (1%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.3627	3.02E-05	0.3057
30+32	0.0519	96.96	0.3627	2.65E-05	0.3042
32+65	0.0351	137.33	0.3627	8.21E-06	0.2914
65+115	0.0166	267.43	0.3627	8.68E-07	0.2684
-115	0.0124	346.70	0.3627	3.62E-07	0.2599

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	$\rho_{s\ stearat}$ (2%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4142	3.45E-05	0.3491
30+32	0.0519	96.96	0.4142	3.03E-05	0.3474
32+65	0.0351	137.33	0.4142	9.37E-06	0.3328
65+115	0.0166	267.43	0.4142	9.92E-07	0.3065
-115	0.0124	346.70	0.4142	4.13E-07	0.2968

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ρs stearat (3%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4622	3.85E-05	0.3895
30+32	0.0519	96.96	0.4622	3.38E-05	0.3877
32+65	0.0351	137.33	0.4622	1.05E-05	0.3714
65+115	0.0166	267.43	0.4622	1.11E-06	0.3420
-115	0.0124	346.70	0.4622	4.61E-07	0.3312

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ρs stearat (4%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4379	3.65E-05	0.3690
30+32	0.0519	96.96	0.4379	3.20E-05	0.3672
32+65	0.0351	137.33	0.4379	9.91E-06	0.3518
65+115	0.0166	267.43	0.4379	1.05E-06	0.3240
-115	0.0124	346.70	0.4379	4.37E-07	0.3137

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ρs stearat (5%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.5018	4.18E-05	0.4229
30+32	0.0519	96.96	0.5018	3.67E-05	0.4209
32+65	0.0351	137.33	0.5018	1.14E-05	0.4031
65+115	0.0166	267.43	0.5018	1.20E-06	0.3713
-115	0.0124	346.70	0.5018	5.01E-07	0.3595

b. Menghitung Luas permukaan total

$$Total\ surface\ area = \frac{6}{\rho} \sum \frac{n_i . m_i}{Davg_i}$$

Dengan = Perbandingan spesifik permukaan (n) = 0.3057
massa partikel (m) asumsi partikel berbentuk bola = 3.02E-05 gram
Diameter partikel rerata (Davgi) = 0.0542 cm
Densitas partikel PCC + Asam stearat 1%w = 0.3627 g/cm3

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ρs as.stearat (1%)	Massa m=(ρ.π.D3/6)	luas permukaan total (At)
30	0.0542	0.3057	0.3627	3.02E-05	0.0028
30+32	0.0519	0.3042	0.3627	2.65E-05	0.0026
32+65	0.0351	0.2914	0.3627	8.21E-06	0.0011
65+115	0.0166	0.2684	0.3627	8.68E-07	0.0002
-115	0.0124	0.2599	0.3627	3.62E-07	0.0001

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ρs as.stearat (2%)	Massa m=(ρ.π.D3/6)	luas permukaan total (At)
30	0.0542	0.3491	0.4142	3.45E-05	0.0032
30+32	0.0519	0.3474	0.4142	3.03E-05	0.0029
32+65	0.0351	0.3328	0.4142	9.37E-06	0.0013
65+115	0.0166	0.3065	0.4142	9.92E-07	0.0003
-115	0.0124	0.2968	0.4142	4.13E-07	0.0001

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ρs as.stearat (3%)	Massa m=(ρ.π.D3/6)	luas permukaan total (At)
30	0.0542	0.3895	0.4622	3.85E-05	0.0036
30+32	0.0519	0.3877	0.4622	3.38E-05	0.0033
32+65	0.0351	0.3714	0.4622	1.05E-05	0.0014
65+115	0.0166	0.3420	0.4622	1.11E-06	0.0003
-115	0.0124	0.3312	0.4622	4.61E-07	0.0002

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ρs as.stearat (4%)	Massa m=(ρ.π.D3/6)	luas permukaan total (At)
30	0.0542	0.3690	0.4379	3.65E-05	0.0034
30+32	0.0519	0.3672	0.4379	3.20E-05	0.0031
32+65	0.0351	0.3518	0.4379	9.91E-06	0.0014
65+115	0.0166	0.3240	0.4379	1.05E-06	0.0003
-115	0.0124	0.3137	0.4379	4.37E-07	0.0002

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ρs as.stearat (5%)	Massa m=(ρ.π.D3/6)	luas permukaan total (At)
30	0.0542	0.4229	0.5018	4.18E-05	0.0039
30+32	0.0519	0.4209	0.5018	3.67E-05	0.0036
32+65	0.0351	0.4031	0.5018	1.14E-05	0.0016
65+115	0.0166	0.3713	0.5018	1.20E-06	0.0003
-115	0.0124	0.3595	0.5018	5.01E-07	0.0002

Tyler Screen (mesh)	Davg (cm)	At, cm2				
		1%	2%	3%	4%	5%
30	0.0542	0.0028	0.0032	0.0036	0.0034	0.0039
30+32	0.0519	0.0026	0.0029	0.0033	0.0031	0.0036
32+65	0.0351	0.0011	0.0013	0.0014	0.0014	0.0016
65+115	0.0166	0.0002	0.0003	0.0003	0.0003	0.0003
-115	0.0124	0.0001	0.0001	0.0002	0.0002	0.0002

Konsentrasi	AT tot
1%	0.0069
2%	0.0079
3%	0.0088
4%	0.0083
5%	0.0095

ANALISIS SCREENING

1. Interpolasi dari Fig 16 Brown untuk mencari nilai n (actual surface)
   Dari Fig 16 Brown diambil nilai x sebagai fungsi Davg (microns) dan nilai y sebagai fungsi Act Surface (cm^2/gr) :

x (Davg)	y (act surf)	act.surface perhit. (cm2/gram)
50	780	778.0725
90	440	461.1344
140	300	311.2070
280	175	167.9317
500	95	100.2352

2. Didapatkan pers : $y = 25299x^{-089}$
   Dengan y dicari sebagai fungsi actual surface, dan x diketahui sbgai fungsi Davg penelitian

x Davg (cm)	x Davg (mikron)	y Act Surf Perhit
0.0542	542	93.29
0.0519	519	96.96
0.0351	351	137.33
0.0166	166	267.43
0.0124	124	346.70

3. GAMA MERCAPTOSILANE

3.a. Menghitung n (ratio spesific surface)

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ρs γ-mercaptosilane (1%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4239	3.53E-05	0.3572
30+32	0.0519	96.96	0.4239	3.10E-05	0.3555
32+65	0.0351	137.33	0.4239	9.59E-06	0.3405
65+115	0.0166	267.43	0.4239	1.01E-06	0.3136
-115	0.0124	346.70	0.4239	4.23E-07	0.3037

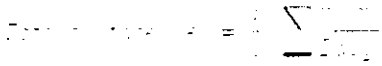
Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ρs γ-mercaptosilane (2%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4142	3.45E-05	0.3491
30+32	0.0519	96.96	0.4142	3.03E-05	0.3474
32+65	0.0351	137.33	0.4142	9.37E-06	0.3328
65+115	0.0166	267.43	0.4142	9.92E-07	0.3065
-115	0.0124	346.70	0.4142	4.13E-07	0.2968

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ps γ-mercaptosilane (3%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4011	3.34E-05	0.3380
30+32	0.0519	96.96	0.4011	2.93E-05	0.3364
32+65	0.0351	137.33	0.4011	9.08E-06	0.3222
65+115	0.0166	267.43	0.4011	9.60E-07	0.2968
-115	0.0124	346.70	0.4011	4.00E-07	0.2874

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ps γ-mercaptosilane (4%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.4379	3.65E-05	0.3690
30+32	0.0519	96.96	0.4379	3.20E-05	0.3672
32+65	0.0351	137.33	0.4379	9.91E-06	0.3518
65+115	0.0166	267.43	0.4379	1.05E-06	0.3240
-115	0.0124	346.70	0.4379	4.37E-07	0.3137

Tyler Screen (mesh)	Davg cm	Actual surface (cm2/gram)	ps γ-mercaptosilane (5%)	Massa m=(ρ.π.D3/6)	rasio specific surface (n)
30	0.0542	93.29	0.3206	2.67E-05	0.2702
30+32	0.0519	96.96	0.3206	2.35E-05	0.2689
32+65	0.0351	137.33	0.3206	7.26E-06	0.2576
65+115	0.0166	267.43	0.3206	7.68E-07	0.2372
-115	0.0124	346.70	0.3206	3.20E-07	0.2297

b. Menghitung Luas permukaan total



Dengan = Perbandingan spesifik permukaan (n) = 0.3057
massa partikel (m) asumsi partikel berbentuk bola = 3.02E-05 gram
Diameter partikel rerata (Davgi) = 0.0542 cm
Densitas partikel PCC + Asam stearat 1%w = 0.3627 g/cm3

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ps γ-mercaptosilane (1%)	Massa m=(ρ.π.D3/6)	uas permukaan total (At)
30	0.0542	0.3572	0.4239	3.53E-05	0.0033
30+32	0.0519	0.3555	0.4239	3.10E-05	0.0030
32+65	0.0351	0.3405	0.4239	9.59E-06	0.0013
65+115	0.0166	0.3136	0.4239	1.01E-06	0.0003
-115	0.0124	0.3037	0.4239	4.23E-07	0.0001

Tyler Screen (mesh)	Davg (cm)	rasio spesifik permukaan (n)	ps γ-mercaptosilane (2%)	Massa m=(ρ.π.D3/6)	uas permukaan total (At)
30	0.0542	0.3491	0.4142	3.45E-05	0.0032
30+32	0.0519	0.3474	0.4142	3.03E-05	0.0029

Oneway 1%

Descriptives

Fraksi Massa

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
PCC NON COATING AGENTS	5	.200040	.2773186	.1240206	-.144296	.544376	.0203	.6893
PCC Dengan Penambahan Coating Agents Asam Stearat	5	.200020	.1889385	.0844959	-.034578	.434618	.0178	.4995
PCC Dengan Penambahan Coating Agents Gama Mercaptosilane	5	.200040	.2623888	.1173438	-.125759	.525839	.0039	.5652
Total	15	.200033	.2276910	.0587896	.073942	.326124	.0039	.6893

Test of Homogeneity of Variances

Fraksi Massa

Levene Statistic	df1	df2	Sig.
.707	2	12	.512

ANOVA

Fraksi Massa

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.000	2	.000	.000	1.000
Within Groups	.726	12	.060		
Total	.726	14			

Homogeneous Subsets

Fraksi Massa

	Kelompok	N	Subset for alpha = 0.05
			1
Tukey HSD[a]	PCC Dengan Penambahan Coating Agents Asam Stearat	5	.200020
	PCC NON COATING AGENTS	5	.200040
	PCC Dengan Penambahan Coating Agents Gama Mercaptosilane	5	.200040
	Sig.		1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5.000.