



HARVARD SCHOOL OF PUBLIC HEALTH

Department of Environmental Science and Physiology
Respiratory Biology Program

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PARTICLE SIZE DISTRIBUTIONS FROM SEVERAL MDI'S WITH A MICROSPACER OR A MICROCHAMBER

A report prepared for Respiratory Delivery Systems, Inc.
Walter J. Makiej, Jr., President

by James D. Blanchard, Ph.D.
Harvard School of Public Health

1. PURPOSE

To determine whether two new spacer devices appreciably alter the mass of respirable particles delivered from several metered dose inhalers (MDI).

2. METHODS

2.1. Tested spacer devices: a Microspacer with a large screen and a Microchamber equipped with the Microspacer, both manufactured by Respiratory Delivery Systems, Inc., Lowell, MA.

2.2. Drugs delivered from MDI's: albuterol, beclomethasone, cromolyn sodium, and flunisolide.

2.3. Aerosol Detection System: Aerosizer (AP8000-1, Malvern Instruments, Inc., Southborough, MA). This instrument measures the time-of-flight of single particles accelerating between two laser beams. Aerodynamic diameter is computed directly from the time-of-flight and the particle density.

The MDI was actuated into a large plenum (a 1.1 L cylindrical inlet leading into a 21.4 L box) which provided volume for the aerosol jet from the MDI to slow without appreciable particle losses as well as time for the Freon to evaporate before the particles are drawn into the Aerosizer. A heater between the plenum and the Aerosizer completely evaporated any residual Freon before sizing. The sampling flow rate was 2 L/min and the aerosol was measured for 10 seconds.

2.4. Protocol:

Immediately before each run, the MDI was actuated into the room to prime the valve and then vigorously shaken. The MDI, with or without spacer, was placed in a rubber gasket at the plenum inlet and then actuated in a consistent fashion. Five seconds after actuation the Aerosizer measurement program was started. In comparison to the MDI alone, the spacer devices tended to slow the aerosol and thus it took longer for these particles to travel through the plenum to the Aerosizer inlet. The five-second delay allowed enough time for the particles to reach the inlet before the measurement started and thus prevented under-sampling of the particle mass from the MDI's with spacers. After the completion of each measurement, the plenum was purged twice with filtered air for 1 minute each time. At the start of the succeeding measurement, the background particle count rate was less than 1% of the measurement count rate.

2.5. Data Analysis:

Aerosol particles from MDI's consist of primary drug particles, which may be coated with nonvolatile additives, and particle agglomerates. The primary particles are commonly ball-milled to a uniform size under $5\ \mu\text{m}$; the agglomerates may be any larger size. Since agglomeration is a stochastic phenomenon, agglomerates formed over short time periods have little actuation-to-actuation reproducibility. We defined a respirable particle as being less than $5\ \mu\text{m}$ in aerodynamic diameter which encompasses particles that penetrate into the lungs with high efficiency. Larger particles tend to deposit mostly in the mouth, oropharynx, and larynx, especially when traveling at the high velocities associated with an MDI burst. Thus, our determination of whether the spacers had a detrimental effect upon the respirable mass from a MDI was based on characterizing the size distribution of particles less than $5\ \mu\text{m}$ in diameter, which essentially consisted of all primary particles.

Particle size distributions are conventionally expressed as a frequency distribution of particle number, volume, or mass as a function of aerodynamic diameter. The number distribution gives the number of primary particles and agglomerates; the mass distribution is most important for calculating respirable dose. However, direct plots of particle mass are not possible with the current Aerosizer software. Since particle mass is equal to particle volume times particle density, we circumvented this problem by assuming drug particle density was always 1.0. To the extent this assumption was accurate, the particle volume distribution equaled the particle mass distribution. Particle mass distributions were parameterized in terms of the respirable aerodynamic mass median diameter ($d_{\text{resp},50}$), which was the particle size with 50% of the respirable mass contained in smaller particles and 50% in larger particles up to $5\ \mu\text{m}$, and by the particle size with 95% of the respirable mass within smaller sizes ($d_{\text{resp},95}$). Total respirable mass was computed from the area under the curve of particle volume versus aerodynamic diameter.

3. RESULTS AND DISCUSSION

3.1. Albuterol: Figure 1 compares the total particle number versus aerodynamic size for the MDI actuator alone and with the Microspacer or Microchamber based on a single actuation in each case. It is evident that all the aerosolized albuterol after propellant evaporation consisted of respirable primary particles; there was no evidence of agglomerates. Individual plots and tables for each condition are in Appendix 1. Figure 2 shows that the distributions of respirable particle volume (mass) versus aerodynamic size were similar. The addition of either spacer failed to cause any physiologically meaningful change in $d_{\text{resp},50}$, $d_{\text{resp},95}$ (Table 1), or the total respirable mass (Table 2). Appendices 2 and 3 contain the full data tables for the data shown in Tables 1 and 2.

3.2. Beclomethasone: With beclomethasone there were large numbers of agglomerates in addition to the primary particles (Figure 3). Agglomerates were found with the MDI alone and with the Microspacer, but not with the Microchamber, possibly because this device slowed them sufficiently so that they deposited in this device or the plenum before reaching the Aerosizer inlet. Neither spacer affected $d_{\text{resp},50}$ or $d_{\text{resp},95}$ (Table 1), but there was a 19% decrease in respirable mass with the Microchamber (Figure 4 and Table 2). The 29% increase in respirable mass with the Microspacer could be related to the burst-to-burst variability of the MDI canister used.

3.3. Cromolyn sodium: Cromolyn sodium also formed large numbers of agglomerates; the spacers reduced the agglomerates by about half (Figure 5). The primary particles from the canister alone were unusual in that the distribution had two distinct modes (Figure 6). Neither spacer altered $d_{resp,50}$ or $d_{resp,95}$ (Table 1), but the Microspacer reduced the respirable mass by 31% and the Microchamber reduced the mass by 20% (Figure 6 and Table 2). Part of this reduction was because each spacer eliminated the second primary particle mode.

3.4. Flunisolide: Flunisolide formed aggregates that the Microchamber was more effective at removing than the Microspacer (Figure 7). As with the other drugs, the spacers had no effect upon the respirable size distribution (Figure 8 and Table 1). Furthermore, the spacers had no appreciable effect upon the respirable mass (Table 2).

4. CONCLUSIONS

These data indicate that the Microspacer and the Microchamber have little or no effect upon the size distribution of respirable particles. With albuterol and flunisolide these spacers also had caused no decrease in the respirable mass. The largest decreases in respirable mass were with cromolyn sodium (up to 31%) and beclomethasone (up to 19%). Since these data are based on single measurements, these changes in respirable mass are more qualitative than quantitative. Nonetheless there is no evidence of pronounced drug loss with either the Microspacer or Microchamber.

API AEROSIZER MACH2 U5.01

DIRECT MODE

Wed Sep 18 , 1991

14:21:20

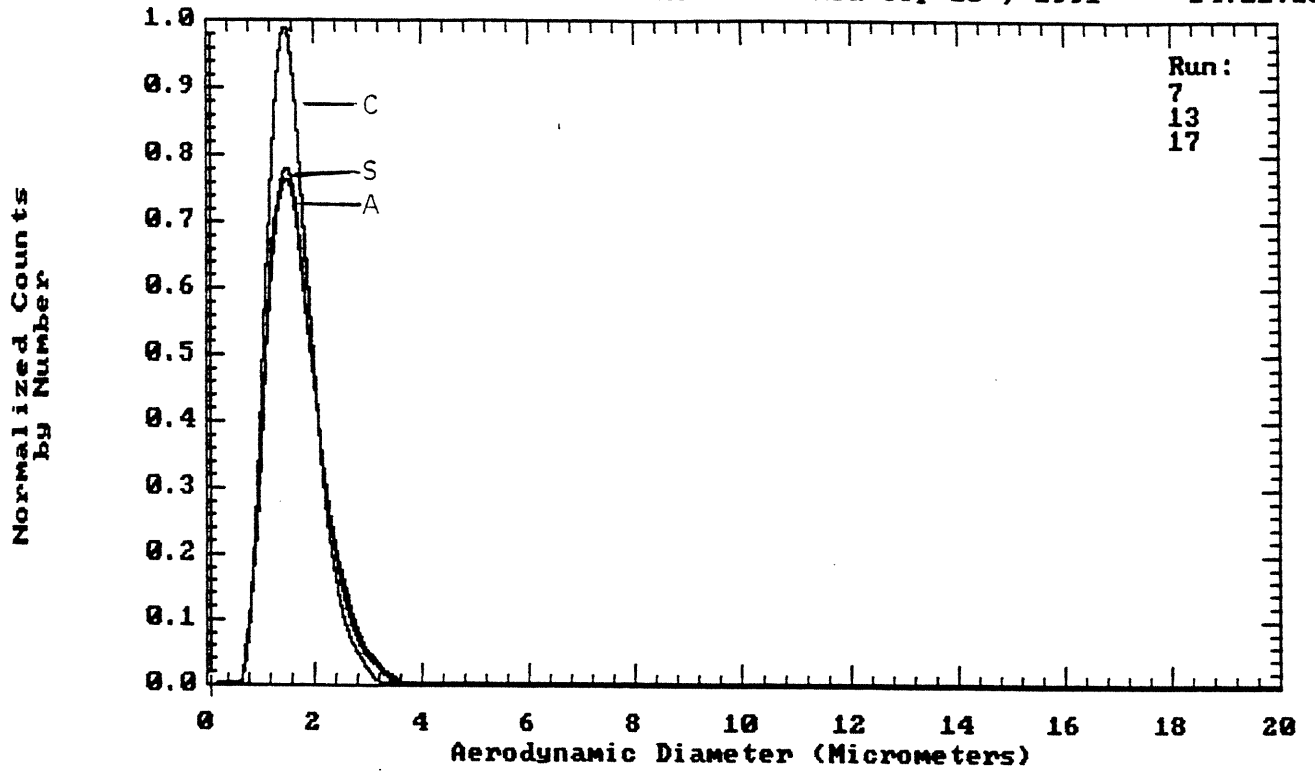


Figure 1. Particle number distribution for albuterol. A = actuator alone, S = Microspacer, C = Microchamber. Plot is normalized relative to the highest count, in this case the Microchamber data.

API AEROSIZER MACH2 U5.01 DIRECT MODE Wed Sep 18 , 1991 14:21:20

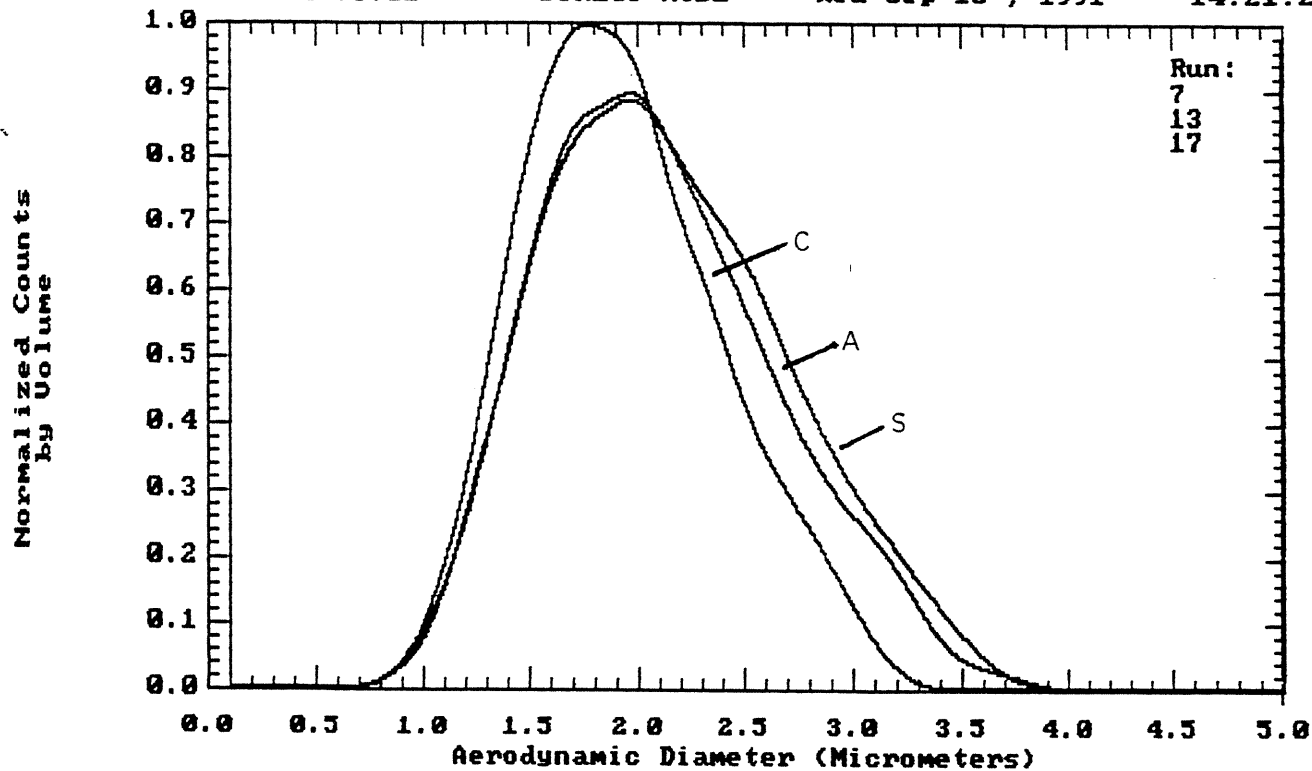


Figure 2. Volume distribution for respirable albuterol particles. This plot also represents the mass distribution when particle density is assumed to be 1.0.

TABLE 1
SIZE DISTRIBUTION FOR RESPIRABLE PARTICLES

	Actuator Alone	$d_{resp,50}$ (μm) Microspacer	Microchamber
Albuterol	2.02	2.05	1.87
Beclomethasone	2.97	2.97	2.80
Cromolyn sodium	2.97	2.81	2.80
Flunisolide	2.78	2.72	2.69

	Actuator Alone	$d_{resp,95}$ (μm) Microspacer	Microchamber
Albuterol	3.01	3.07	2.74
Beclomethasone	3.71	3.69	3.57
Cromolyn sodium	3.86	3.60	3.56
Flunisolide	3.60	3.55	3.51

$d_{resp,50}$ is the particle size with 50% of the respirable mass contained in smaller particles and 50% in larger particles up to 5 μm ; $d_{resp,95}$ is the particle size with 95% of the respirable mass within smaller sizes.

TABLE 2
INFLUENCE OF SPACERS ON RESPIRABLE MASS

Percent Change in Respirable Mass
from Actuator Alone

	Microspacer	Microchamber
Albuterol	+ 2%	+13%
Beclomethasone	+29%	-19%
Cromolyn sodium	-31%	-20%
Flunisolide	- 4%	+19%

API AEROSIZER MACH2 U5.01 DIRECT MODE Wed Sep 18 , 1991 14:48:40

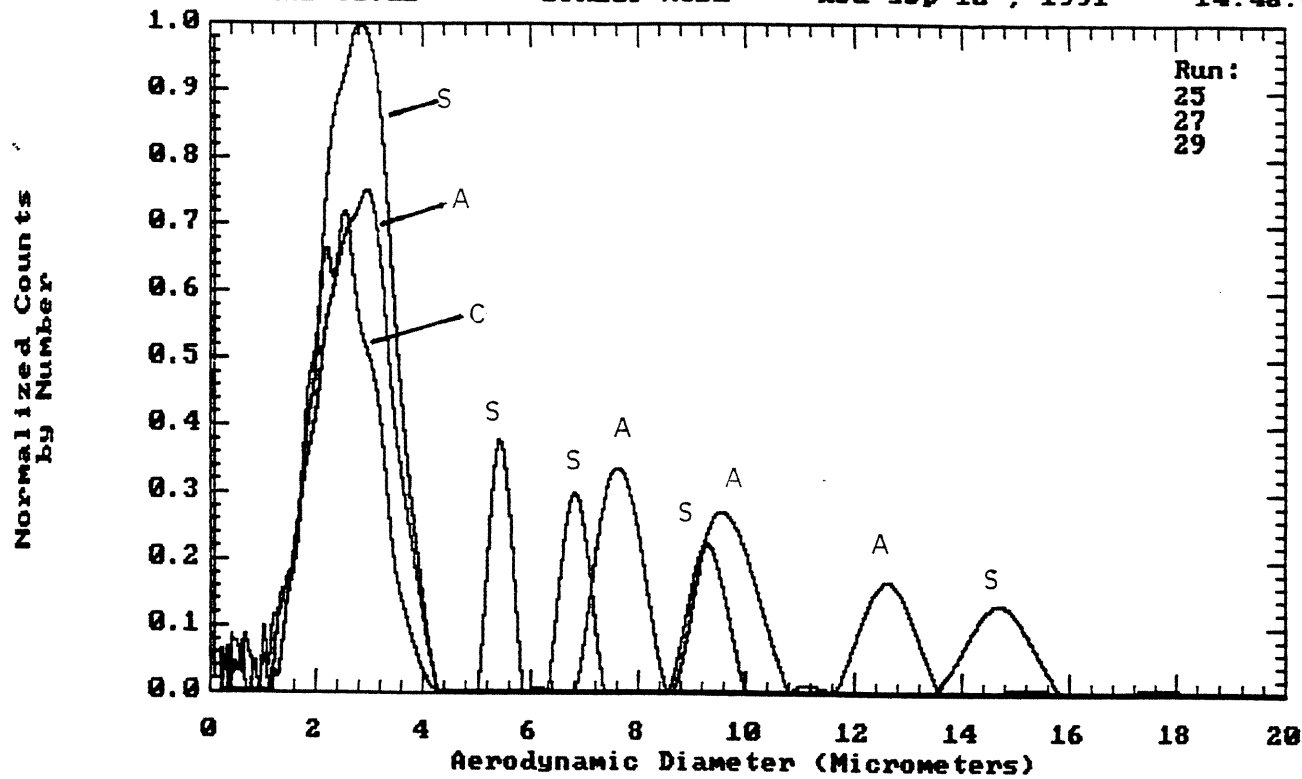


Figure 3. Particle number distribution for beclomethasone. A large number of agglomerates were generated by the actuator that past through the Microspacer, but not the Microchamber.

API AEROSIZER MACH2 U5.01 DIRECT MODE Wed Sep 18 , 1991 14:48:40

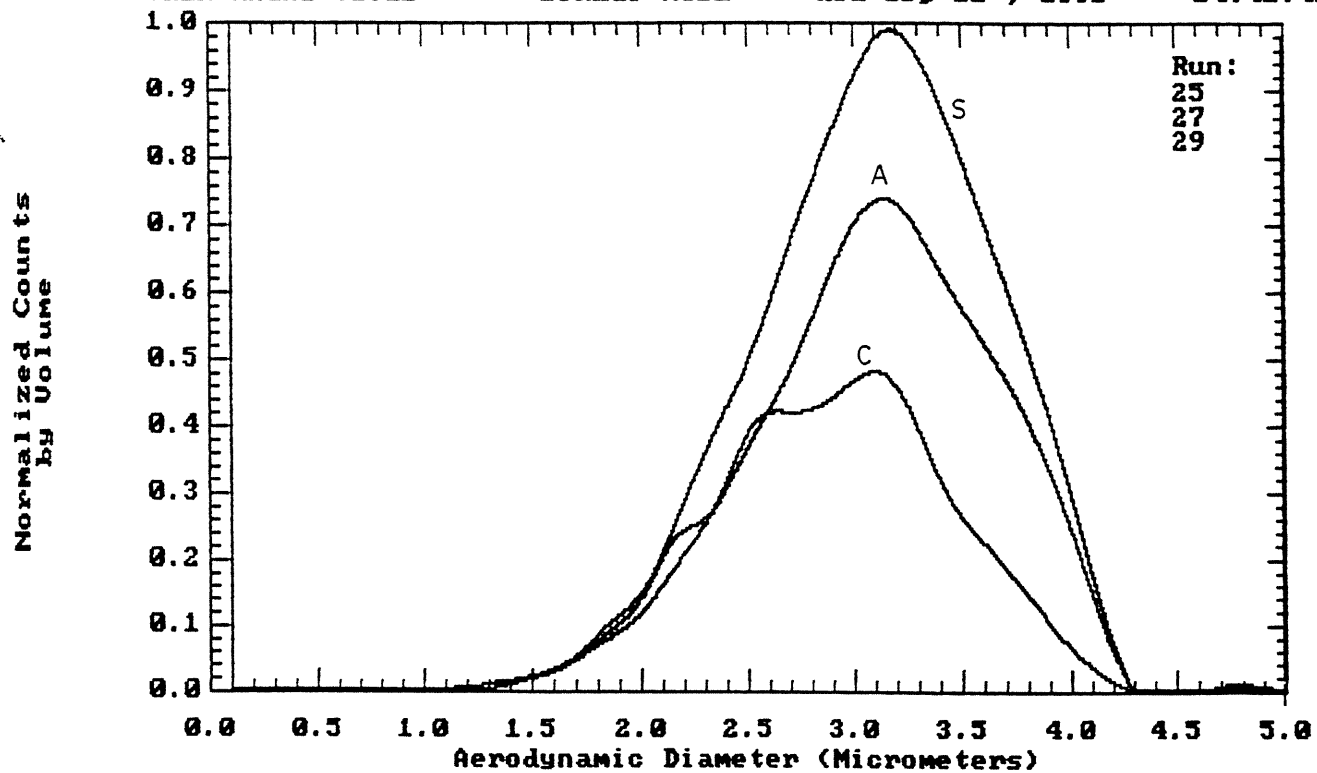


Figure 4. Volume (mass) distribution for respirable beclomethasone particles.

API AEROSIZER MACH2 U5.01

DIRECT MODE

Wed Sep 18 , 1991

14:33:40

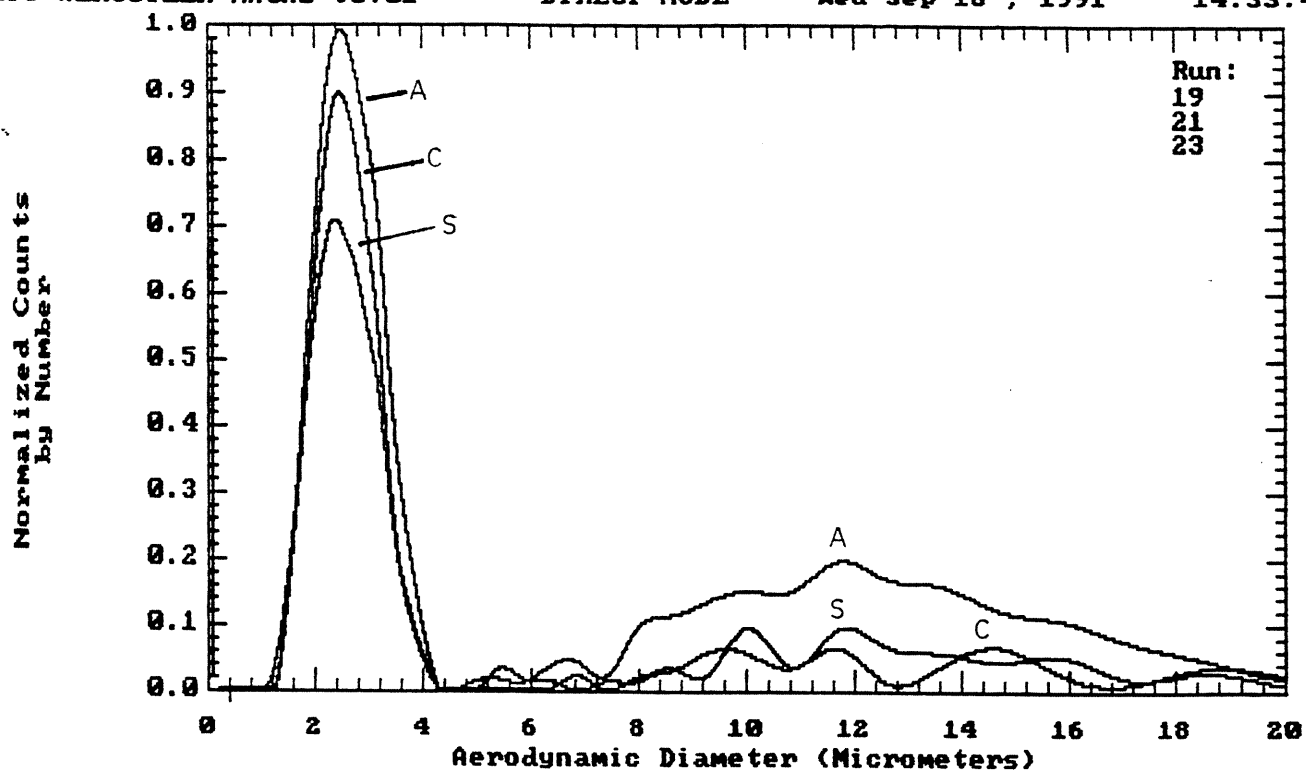


Figure 5. Particle number distribution for cromolyn sodium. The actuator alone produced a large number of agglomerates. The spacers reduced the agglomerate number by about half.

API AEROSIZER MACH2 U5.01 DIRECT MODE Wed Sep 18 , 1991 14:33:40

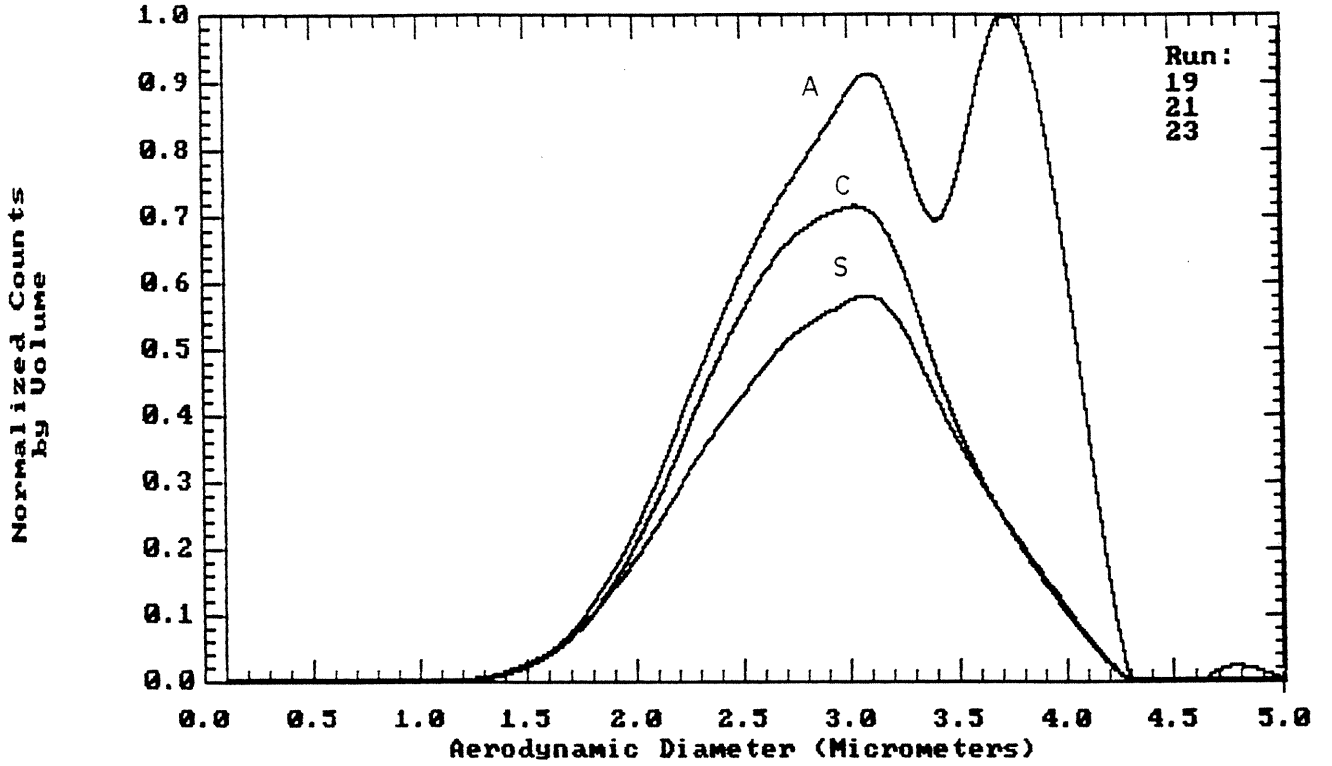


Figure 6. Volume (mass) distribution for respirable cromolyn sodium particles. The actuator produced a pronounced bimodal distribution, but this was eliminated by both spacers.

API AEROSIZER MACH2 U5.01 DIRECT MODE Wed Sep 18 , 1991 15:09:09

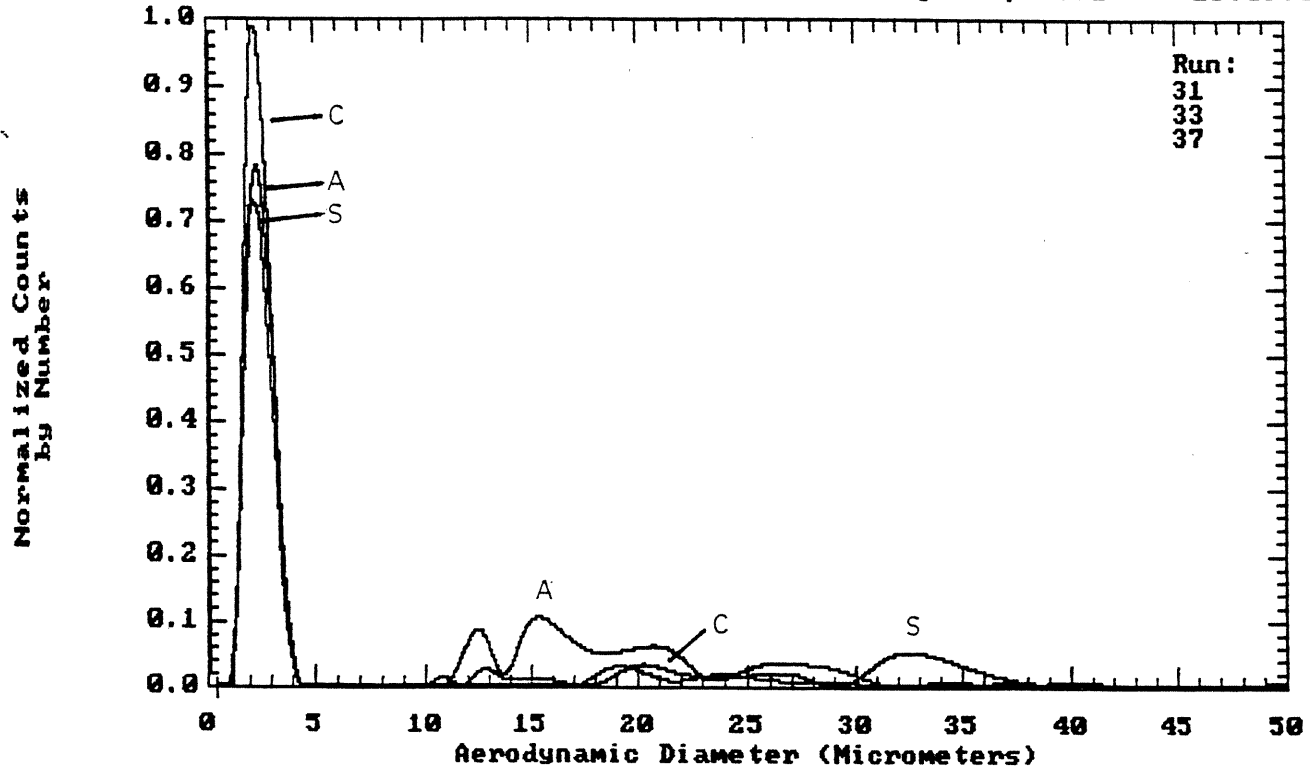


Figure 7. Particle number distribution for flunisolide.

API AEROSIZER MACH2 U5.01

DIRECT MODE

Wed Sep 18 , 1991

15:09:09

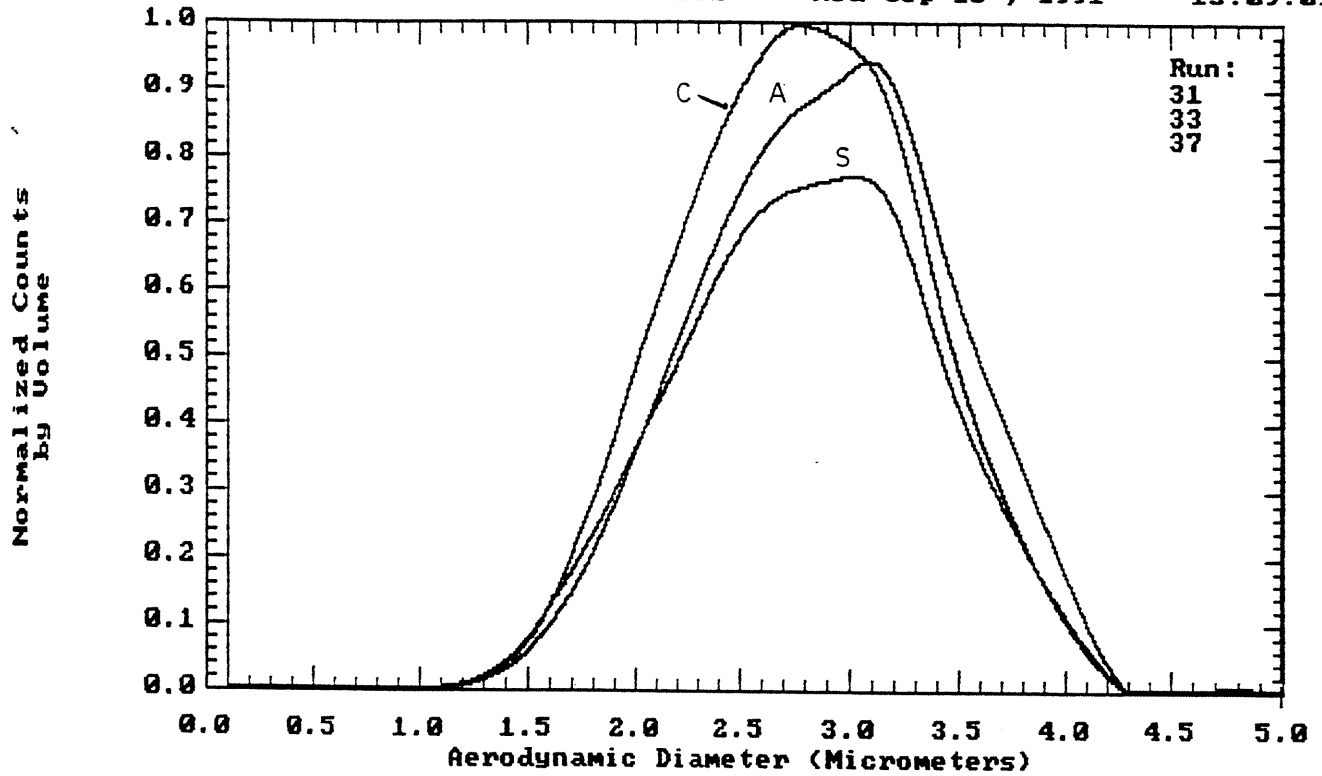
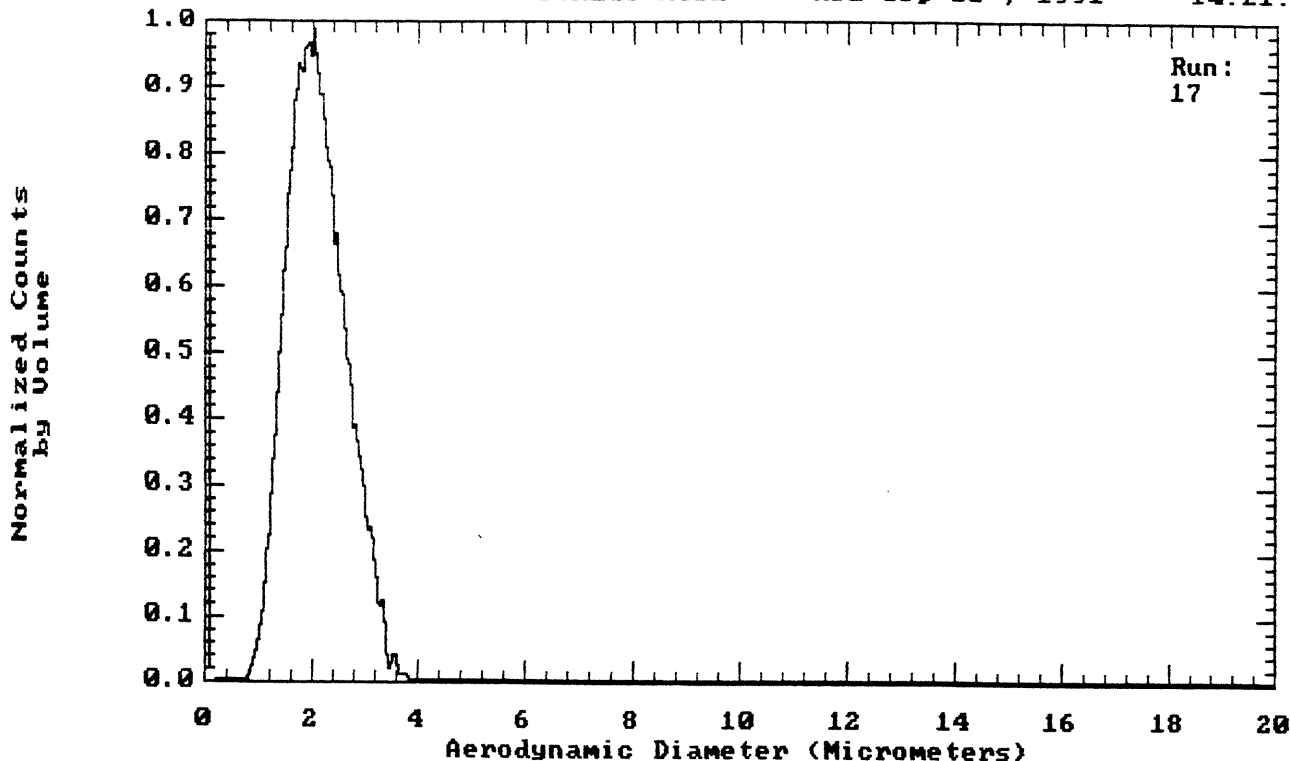


Figure 8. Volume (mass) distribution for respirable flunisolide particles.

APPENDIX 1

PARTICLE VOLUME (MASS) DISTRIBUTIONS
FROM INDIVIDUAL MEASUREMENTS

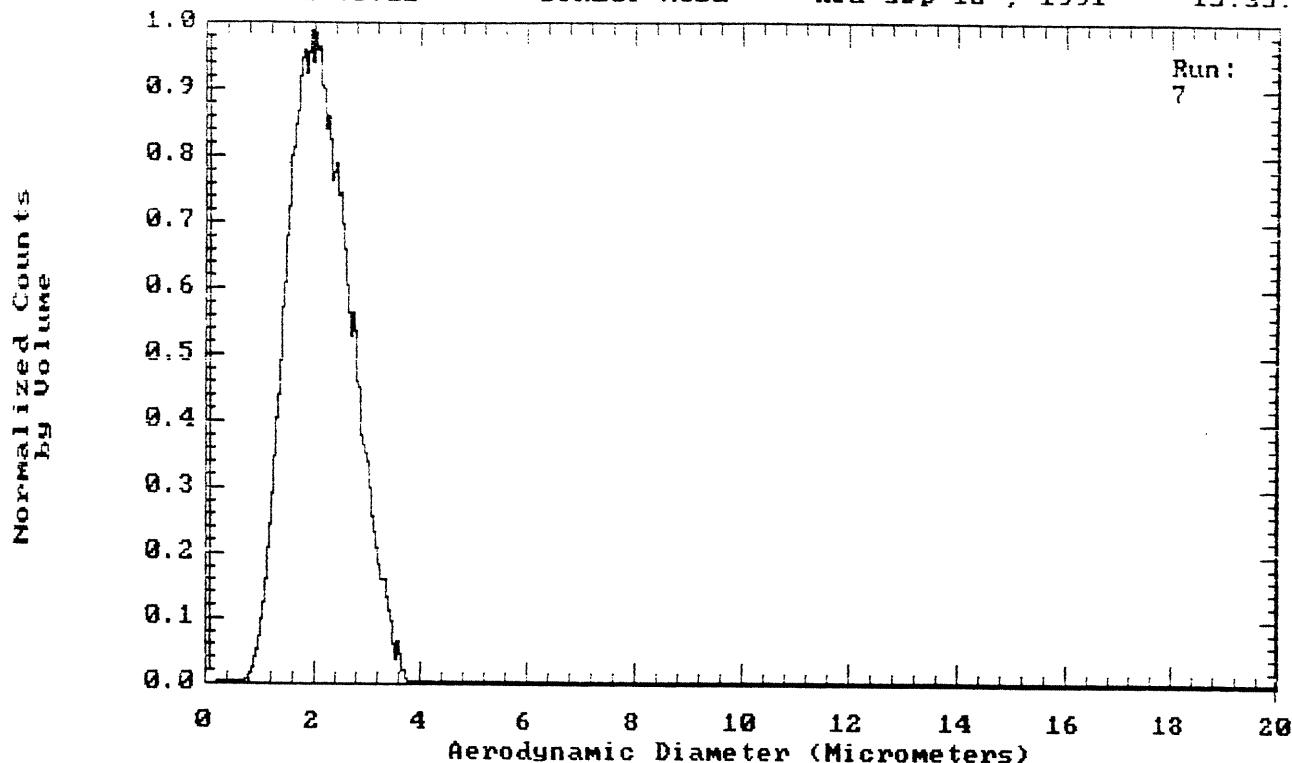
GRAPHS AND TABLES



Directory: c:\micro91891 Run 17 taken on Wed Sep 18 14:21:20 1991 AERODYNAMIC VOLUME DISTRIBUTION
 albuterol without Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.26	55%	2.09
Density	: 1.00	Heater	: ON	10%	1.40	60%	2.16
Run Length (sec)	: 9.8	Purge	: ON	15%	1.50	65%	2.24
PMT Voltage (volts)	: 1100.0			20%	1.59	70%	2.32
Laser Intensity	: 19			25%	1.67	75%	2.42
Clock Freq (MHz)	: 40.0			30%	1.74	80%	2.52
Sum of channels	: 78070			35%	1.81	85%	2.65
Lower Size Limit	: 0.10			40%	1.88	90%	2.80
Upper Size Limit	: 50.00			45%	1.95	95%	3.01
Mean Size	: 2.02	SCANS 17 AND 18 COMBINED		50%	2.02		
Standard Deviation	: 1.30	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.08	D(3,2)	: 1.94	Spec surf area: 3.10 sq meter/cc			

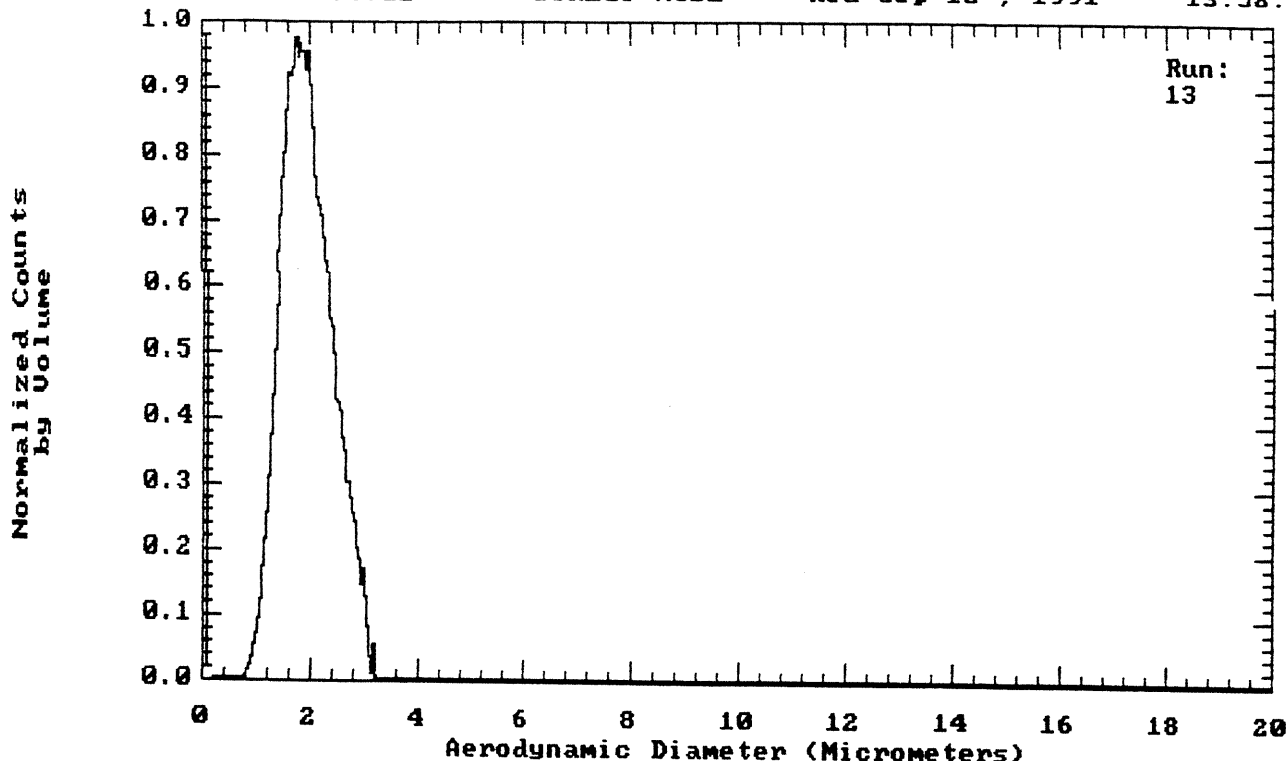
UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.57	0.86	0.16
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.14	0.74	0.02
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.02	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.60	3.40	99.40	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	6.77	2.90	92.63	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	13.68	2.50	78.95	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	16.36	2.20	62.58	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	28.25	1.80	34.33	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	13.71	1.60	20.62	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	10.75	1.40	9.87	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	6.40	1.20	3.47	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	2.74	1.00	0.72	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 7 taken on Wed Sep 18 15:35:17 1991 AERODYNAMIC VOLUME DISTRIBUTION
 albuterol with microspacer and larger screen Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.26	55%	2.13
Density	: 1.00	Heater	: ON	10%	1.41	60%	2.21
Run Length (sec)	: 9.9	Purge	: ON	15%	1.51	65%	2.29
PMT Voltage (volts)	: 1100.0			20%	1.60	70%	2.39
Laser Intensity	: 19			25%	1.69	75%	2.48
Clock Freq (MHz)	: 40.0			30%	1.76	80%	2.58
Sum of channels	: 79599			35%	1.84	85%	2.71
Lower Size Limit	: 0.10			40%	1.91	90%	2.86
Upper Size Limit	: 19.96			45%	1.98	95%	3.07
Mean Size	: 2.06	SCANS 7 AND 8 COMBINED		50%	2.05		
Standard Deviation	: 1.31	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.11	D(3,2)	: 1.96	Spec surf area:	3.06 sq meter/cc		

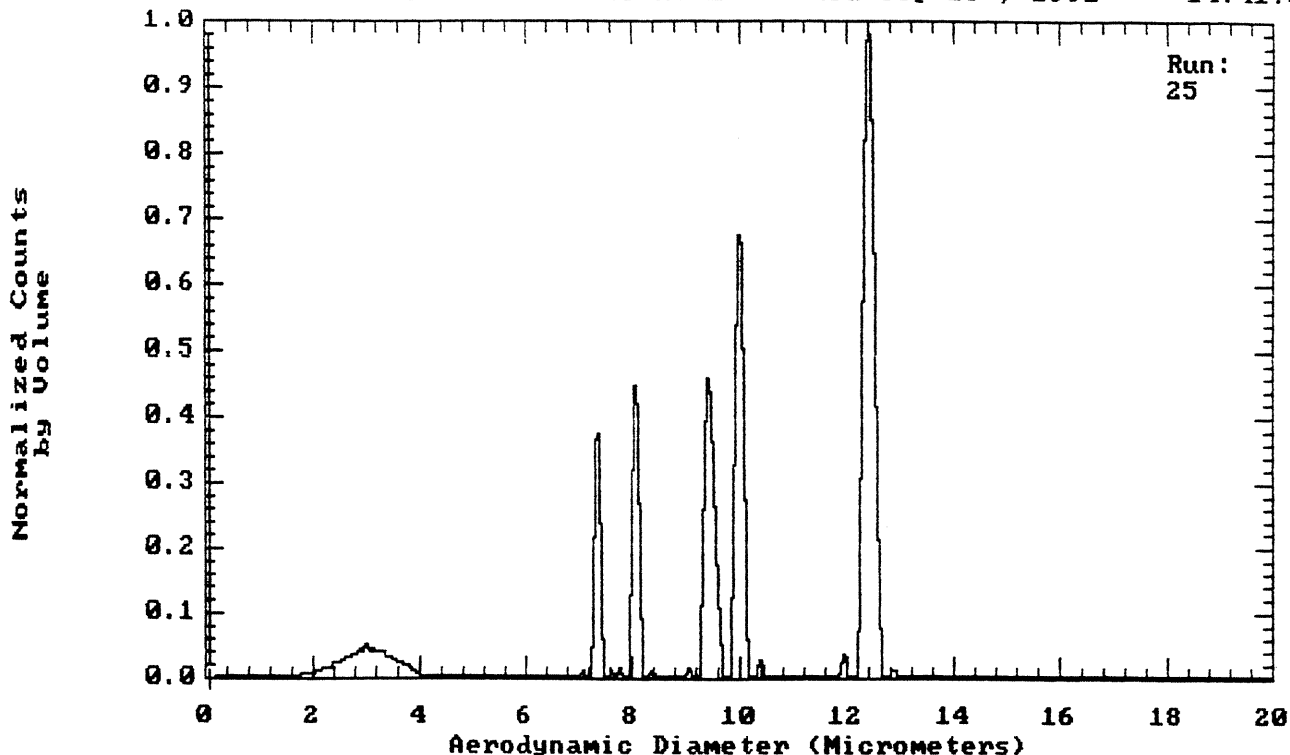
UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.61	0.86	0.17
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.15	0.74	0.03
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.02	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.93	3.40	99.07	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	7.89	2.90	91.18	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	15.13	2.50	76.05	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	16.68	2.20	59.36	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	26.72	1.80	32.64	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	12.83	1.60	19.81	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	10.14	1.40	9.68	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	6.19	1.20	3.49	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	2.71	1.00	0.78	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 13 taken on Wed Sep 18 13:58:55 1991
 albuterol with microchamber and larger screen
 AERODYNAMIC VOLUME DISTRIBUTION
 Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.22	55%	1.93
Density	: 1.00	Heater	: ON	10%	1.34	60%	1.99
Run Length (sec)	: 9.9	Purge	: ON	15%	1.43	65%	2.06
PMT Voltage (volts)	: 1100.0			20%	1.51	70%	2.14
Laser Intensity	: 19			25%	1.57	75%	2.22
Clock Freq (MHz)	: 40.0			30%	1.64	80%	2.31
Sum of channels	: 88155			35%	1.70	85%	2.42
Lower Size Limit	: 0.10			40%	1.75	90%	2.55
Upper Size Limit	: 50.00			45%	1.81	95%	2.74
Mean Size	: 1.88	SCANS 13 AND 14 COMBINED		50%	1.87		
Standard Deviation	: 1.28	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 1.92	D(3,2)	: 1.81	Spec surf area:	3.31 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.74	0.86	0.17
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.16	0.74	0.02
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.02	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.00	3.40	100.00	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	1.97	2.90	98.03	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	9.85	2.50	88.17	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	14.14	2.20	74.04	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	30.08	1.80	43.95	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	16.81	1.60	27.14	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	14.09	1.40	13.05	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	8.58	1.20	4.47	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	3.56	1.00	0.91	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 25 taken on Wed Sep 18 14:41:03 1991 AERODYNAMIC VOLUME DISTRIBUTION
 beclomethasone without Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	3.05	55%	9.93
Density	: 1.00	Heater	: ON	10%	7.26	60%	9.98
Run Length (sec)	: 9.9	Purge	: ON	15%	7.33	65%	12.22
PMT Voltage (volts)	: 1100.0			20%	7.99	70%	12.25
Laser Intensity	: 19			25%	8.05	75%	12.28
Clock Freq (MHz)	: 40.0			30%	9.30	80%	12.31
Sum of channels	: 7634			35%	9.37	85%	12.34
Lower Size Limit	: 0.10			40%	9.47	90%	12.37
Upper Size Limit	: 99.80			45%	9.84	95%	12.43
Mean Size	: 9.27	SCANS 25 AND 26 COMBINED		50%	9.89		
Standard Deviation	: 1.49	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 9.79	D(3,2)	: 8.26	Spec surf area:	0.73 sq meter/cc		

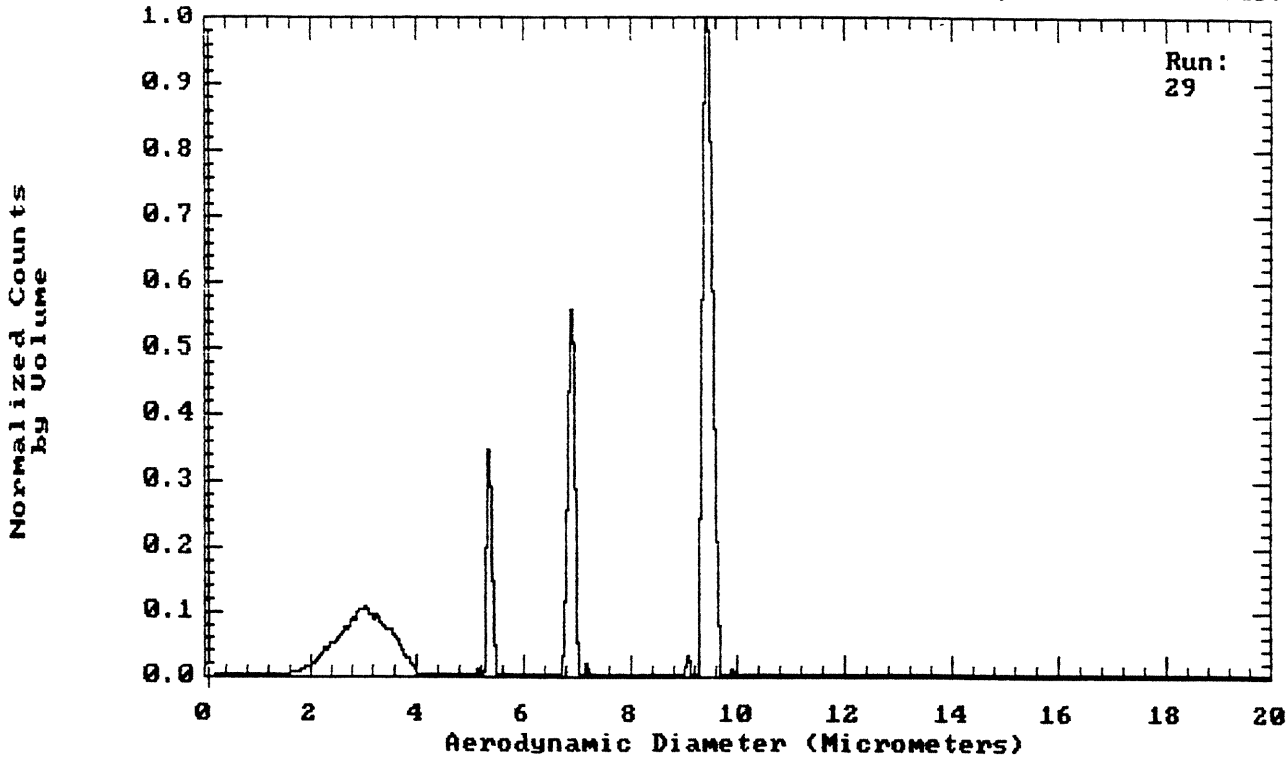
UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	35.81	8.60	26.85	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	10.33	7.40	16.52	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	7.66	6.30	8.86	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	8.86	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	8.86	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	8.86	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	1.66	3.40	7.20	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	3.31	2.90	3.89	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	2.18	2.50	1.71	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	0.96	2.20	0.75	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	0.57	1.80	0.19	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	0.11	1.60	0.08	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.05	1.40	0.03	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	37.34	12.00	62.66	1.40	0.02	1.20	0.01	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	62.66	1.20	0.01	1.00	0.00	0.12	0.00	0.10	0.00

API AEROSIZER MACH2 U5.01

DIRECT MODE

Wed Sep 18 , 1991

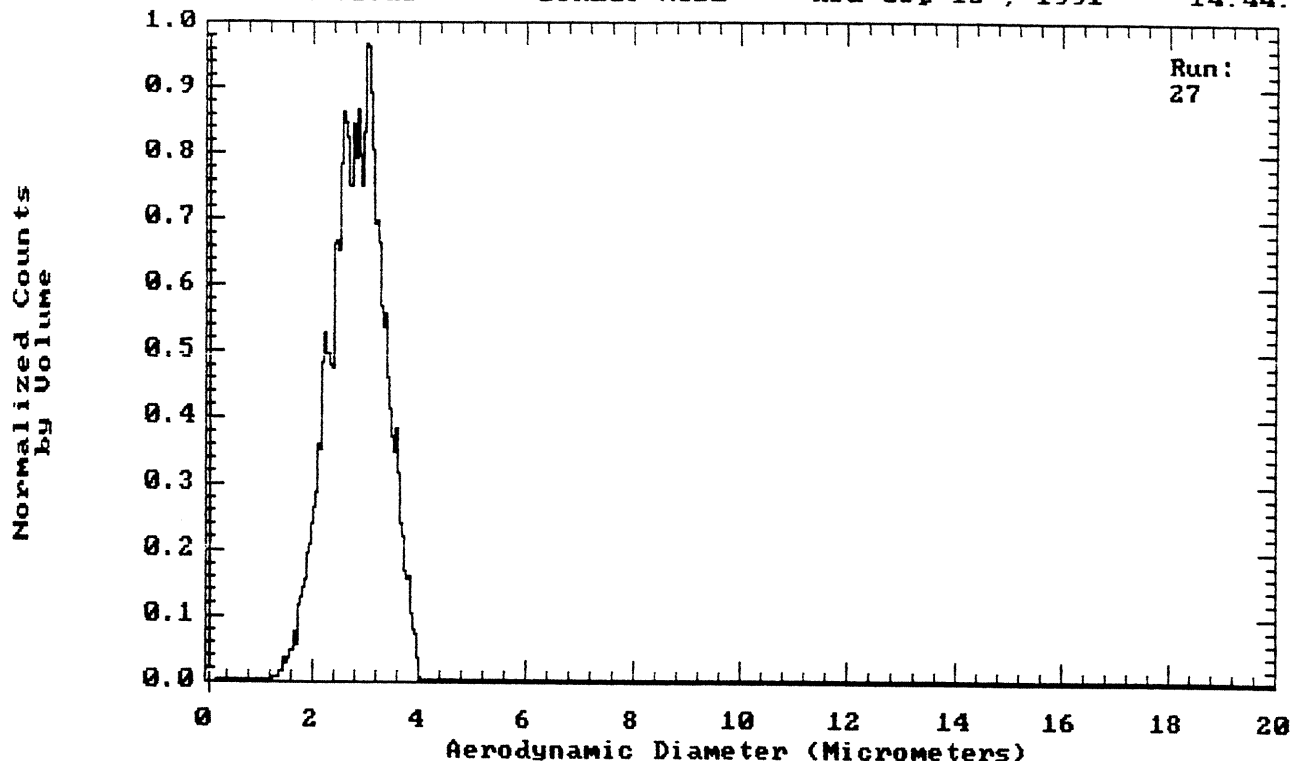
14:48:40



Directory: c:\micro91891 Run 29 taken on Wed Sep 18 14:48:40 1991 AERODYNAMIC VOLUME DISTRIBUTION
 beclomethasone with microspacer Smoothing Level: Fine
 with larger screen

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	2.49	55%	9.27
Density	: 1.00	Heater	: ON	10%	2.81	60%	9.29
Run Length (sec)	: 9.9	Purge	: ON	15%	3.04	65%	9.32
PMT Voltage (volts)	: 1100.0			20%	3.30	70%	9.34
Laser Intensity	: 19			25%	3.64	75%	9.36
Clock Freq (MHz)	: 40.0			30%	5.29	80%	9.39
Sum of channels	: 9150			35%	5.40	85%	9.42
Lower Size Limit	: 0.10			40%	6.80	90%	9.46
Upper Size Limit	: 99.80			45%	6.85	95%	9.51
Mean Size	: 6.26	SCANS 29 AND 30 COMBINED		50%	6.89		
Standard Deviation	: 1.65	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 6.90	D(3,2)	: 5.41	Spec surf area:	1.11 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	46.70	8.60	53.30	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	53.30	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	18.03	6.30	35.27	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.36	5.40	34.91	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	8.12	4.60	26.79	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	26.79	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	5.10	3.40	21.69	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	9.88	2.90	11.80	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	6.74	2.50	5.07	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	2.97	2.20	2.10	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	1.66	1.80	0.44	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	0.28	1.60	0.16	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.10	1.40	0.06	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.05	1.20	0.01	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.00	1.00	0.01	0.12	0.00	0.10	0.00

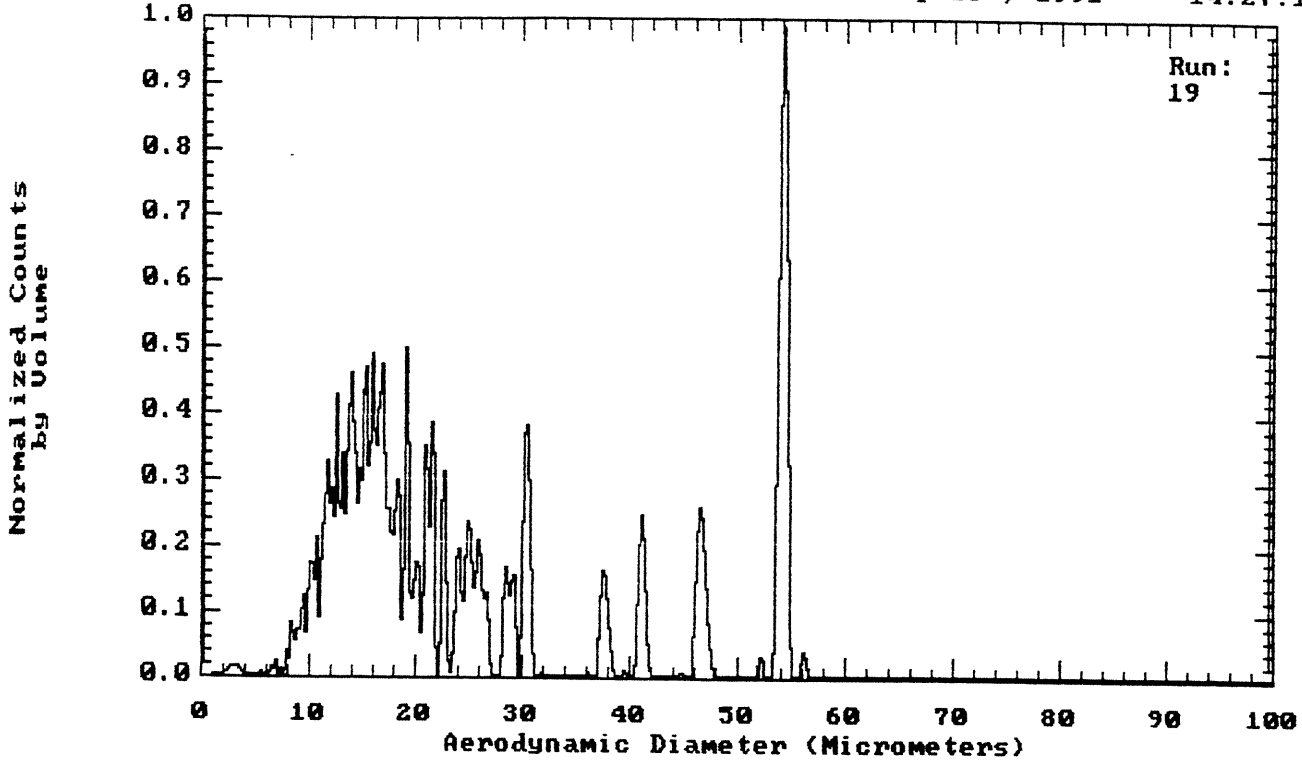


Directory: c:\micro91891 Run 27 taken on Wed Sep 18 14:44:27 1991
 beclomethasone with microchamber

AERODYNAMIC VOLUME DISTRIBUTION
 Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.95	55%	2.87
Density	: 1.00	Heater	: ON	10%	2.13	60%	2.94
Run Length (sec)	: 9.9	Purge	: ON	15%	2.24	65%	3.00
PMT Voltage (volts)	: 1100.0			20%	2.36	70%	3.06
Laser Intensity	: 19			25%	2.45	75%	3.13
Clock Freq (MHz)	: 40.0			30%	2.52	80%	3.21
Sum of channels	: 5101			35%	2.59	85%	3.31
Lower Size Limit	: 0.10			40%	2.66	90%	3.42
Upper Size Limit	: 99.80			45%	2.73	95%	3.57
Mean Size	: 2.78	SCANS 27 AND 28 COMBINED					
Standard Deviation	: 1.20	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.80	D(3,2)	: 2.71	50%	2.80		
				Spec surf area: 2.22 sq meter/cc			

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	10.82	3.40	89.18	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	32.00	2.90	57.18	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	28.83	2.50	28.35	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	15.21	2.20	13.14	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	10.62	1.80	2.51	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	1.72	1.60	0.80	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.64	1.40	0.15	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.13	1.20	0.02	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.02	1.00	0.00	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 19 taken on Wed Sep 18 14:27:13 1991 AERODYNAMIC VOLUME DISTRIBUTION
 cromolyn sodium without Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	10.49	55%	21.12
Density	: 1.00	Heater	: ON	10%	11.84	60%	22.87
Run Length (sec)	: 9.6	Purge	: ON	15%	12.87	65%	25.10
PMT Voltage (volts)	: 1100.0			20%	13.75	70%	28.40
Laser Intensity	: 19			25%	14.66	75%	30.30
Clock Freq (MHz)	: 40.0			30%	15.46	80%	40.66
Sum of channels	: 603818			35%	16.24	85%	46.44
Lower Size Limit	: 0.10			40%	16.99	90%	53.50
Upper Size Limit	: 99.80			45%	18.21	95%	53.81
Mean Size	: 22.11	SCANS 19 AND 20 COMBINED		50%	19.49		
Standard Deviation	: 1.71	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 25.45	D(3,2)	: 19.08			Spec surf area:	0.31 sq meter/cc

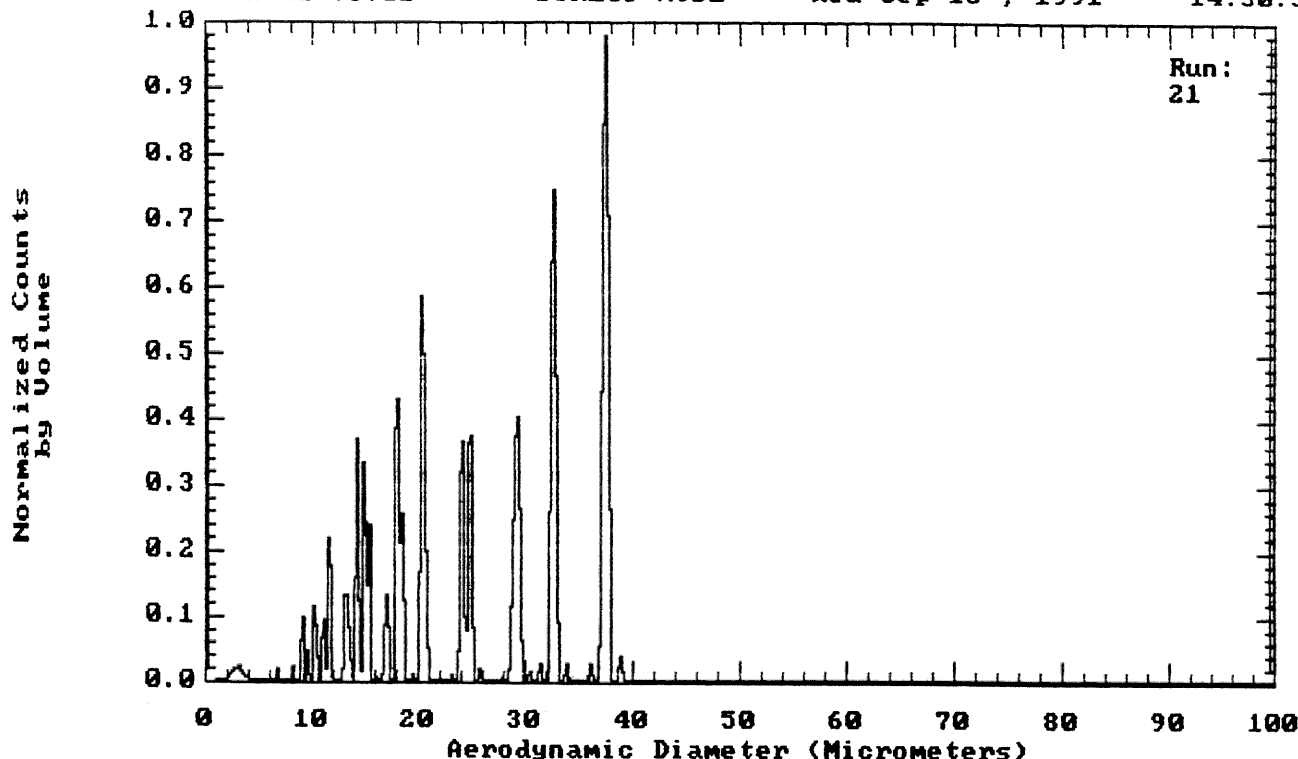
UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
		100.00	0.00	86.00	100.00	10.00	2.25	8.60	1.42	1.00	0.00	0.86	0.00		
		86.00	0.00	74.00	100.00	8.60	0.85	7.40	0.57	0.86	0.00	0.74	0.00		
		74.00	0.00	63.00	100.00	7.40	0.18	6.30	0.39	0.74	0.00	0.63	0.00		
		63.00	1.88	54.00	98.12	6.30	0.05	5.40	0.34	0.63	0.00	0.54	0.00		
		54.00	14.86	46.00	83.26	5.40	0.02	4.60	0.32	0.54	0.00	0.46	0.00		
		46.00	4.18	40.00	79.07	4.60	0.00	4.00	0.32	0.46	0.00	0.40	0.00		
		40.00	2.29	34.00	76.78	4.00	0.05	3.40	0.27	0.40	0.00	0.34	0.00		
		34.00	5.52	29.00	71.26	3.40	0.10	2.90	0.16	0.34	0.00	0.29	0.00		
		29.00	6.59	25.00	64.67	2.90	0.09	2.50	0.08	0.29	0.00	0.25	0.00		
		25.00	7.05	22.00	57.62	2.50	0.04	2.20	0.03	0.25	0.00	0.22	0.00		
220.00	0.00	180.00	100.00	22.00	13.63	18.00	44.00	2.20	0.03	1.80	0.01	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	10.44	16.00	33.56	1.80	0.00	1.60	0.00	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	11.87	14.00	21.69	1.60	0.00	1.40	0.00	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	10.94	12.00	10.75	1.40	0.00	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	7.08	10.00	3.67	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00

API AEROSIZER MACH2 U5.01

DIRECT MODE

Wed Sep 18 , 1991

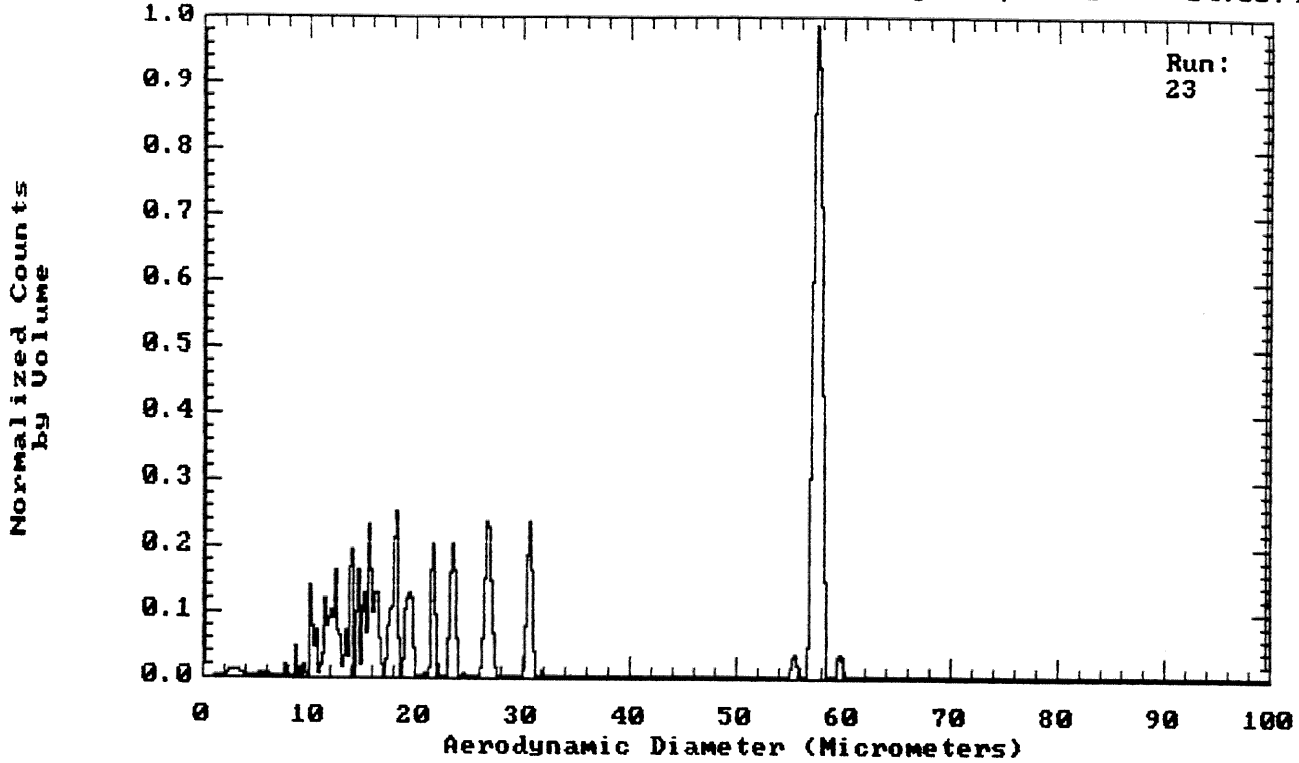
14:30:36



Directory: c:\micro91891 Run 21 taken on Wed Sep 18 14:30:36 1991 AERODYNAMIC VOLUME DISTRIBUTION
 cromolyn sodium with microchamber Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	10.87	55%	24.70
Density	: 1.00	Heater	: ON	10%	13.14	60%	28.90
Run Length (sec)	: 9.7	Purge	: ON	15%	14.23	65%	29.26
PMT Voltage (volts)	: 1100.0			20%	15.06	70%	32.28
Laser Intensity	: 19			25%	17.68	75%	32.47
Clock Freq (MHz)	: 40.0			30%	18.01	80%	36.81
Sum of channels	: 283710			35%	20.00	85%	37.01
Lower Size Limit	: 0.10			40%	20.23	90%	37.15
Upper Size Limit	: 99.80			45%	23.67	95%	37.30
Mean Size	: 23.03	SCANS 21 AND 22 COMBINED					
Standard Deviation	: 1.57	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 24.91	D(3,2)	: 20.14	Spec surf area:	0.30 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	2.07	8.60	1.24	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.21	7.40	1.04	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.12	6.30	0.92	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	0.92	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	0.92	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	0.92	0.46	0.00	0.40	0.00
				40.00	20.82	34.00	79.18	4.00	0.11	3.40	0.81	0.40	0.00	0.34	0.00
				34.00	17.78	29.00	61.39	3.40	0.29	2.90	0.52	0.34	0.00	0.29	0.00
				29.00	5.84	25.00	55.55	2.90	0.27	2.50	0.25	0.29	0.00	0.25	0.00
				25.00	11.48	22.00	44.07	2.50	0.14	2.20	0.11	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	14.19	18.00	29.88	2.20	0.09	1.80	0.02	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	7.34	16.00	22.55	1.80	0.01	1.60	0.01	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	10.37	14.00	12.18	1.60	0.00	1.40	0.00	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	3.75	12.00	8.43	1.40	0.00	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	5.11	10.00	3.32	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00

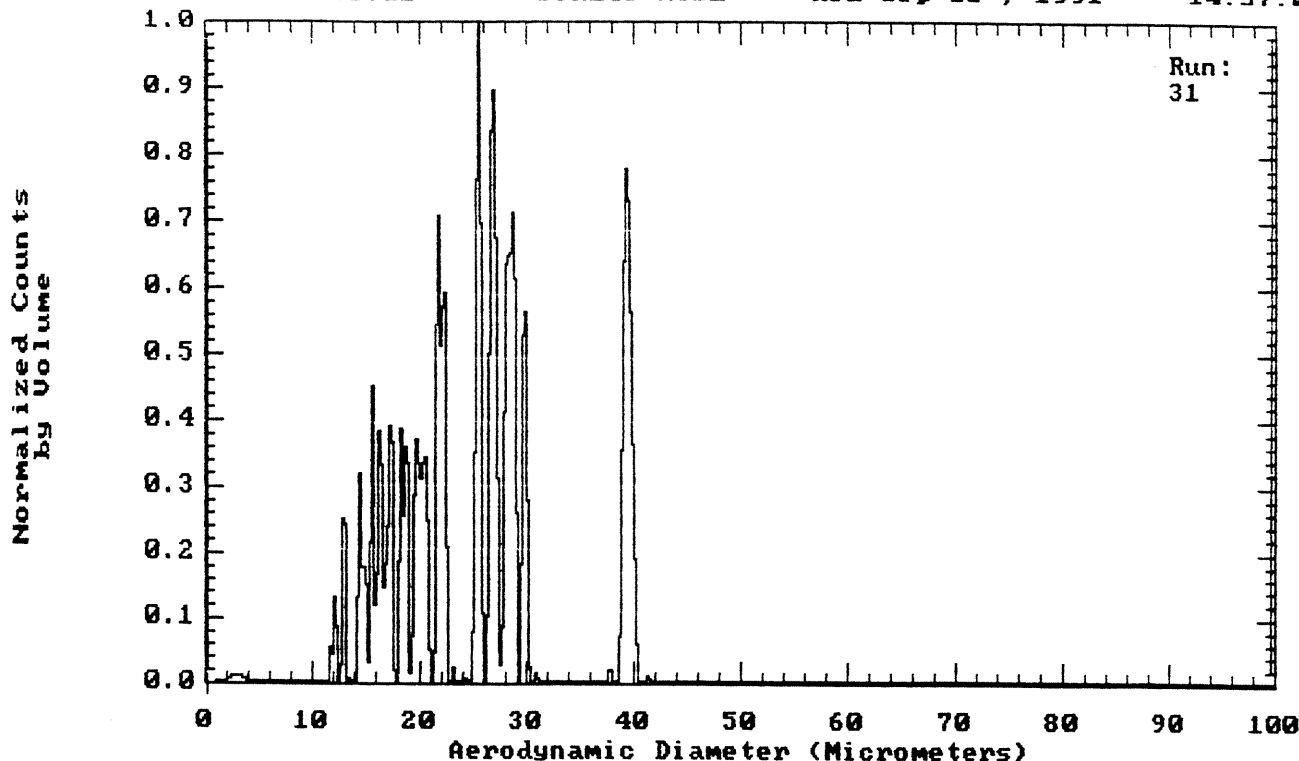


Directory: c:\micro91891 Run 23 taken on Wed Sep 18 14:33:40 1991
 cromolyn sodium with microspacer
 with larger screen

AERODYNAMIC VOLUME DISTRIBUTION
 Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	11.20	55%	26.91
Density	: 1.00	Heater	: ON	10%	12.35	60%	30.49
Run Length (sec)	: 9.8	Purge	: ON	15%	13.91	65%	56.74
PMT Voltage (volts)	: 1100.0			20%	15.12	70%	56.86
Laser Intensity	: 19			25%	15.99	75%	56.98
Clock Freq (MHz)	: 40.0			30%	17.68	80%	57.09
Sum of channels	: 261965			35%	18.80	85%	57.21
Lower Size Limit	: 0.10			40%	21.30	90%	57.33
Upper Size Limit	: 99.80			45%	23.15	95%	57.45
Mean Size	: 28.01	SCANS 23 AND 24 COMBINED		50%	26.33		
Standard Deviation	: 1.91	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 33.66	D(3,2)	: 22.30	Spec surf area:	0.27 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	1.37	8.60	1.29	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.46	7.40	0.83	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.01	6.30	0.82	0.74	0.00	0.63	0.00
				63.00	38.19	54.00	61.81	6.30	0.12	5.40	0.70	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	61.81	5.40	0.03	4.60	0.67	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	61.81	4.60	0.00	4.00	0.67	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	61.81	4.00	0.08	3.40	0.59	0.40	0.00	0.34	0.00
				34.00	5.73	29.00	56.09	3.40	0.21	2.90	0.38	0.34	0.00	0.29	0.00
				29.00	7.66	25.00	48.43	2.90	0.19	2.50	0.19	0.29	0.00	0.25	0.00
				25.00	5.16	22.00	43.27	2.50	0.10	2.20	0.09	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	10.96	18.00	32.31	2.20	0.07	1.80	0.02	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	7.26	16.00	25.05	1.80	0.01	1.60	0.01	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	9.26	14.00	15.79	1.60	0.01	1.40	0.00	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	7.58	12.00	8.21	1.40	0.00	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	5.54	10.00	2.67	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 31 taken on Wed Sep 18 14:57:08 1991 AERODYNAMIC VOLUME DISTRIBUTION
 flunisolide without Smoothing Level: Fine

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	14.43	55%	26.23
Density	: 1.00	Heater	: ON	10%	15.89	60%	26.59
Run Length (sec)	: 9.8	Purge	: ON	15%	16.95	65%	27.00
PMT Voltage (volts)	: 1100.0			20%	18.21	70%	27.89
Laser Intensity	: 19			25%	19.42	75%	28.32
Clock Freq (MHz)	: 40.0			30%	20.22	80%	28.75
Sum of channels	: 301207			35%	21.45	85%	29.64
Lower Size Limit	: 0.10			40%	21.93	90%	38.84
Upper Size Limit	: 99.80			45%	24.93	95%	39.19
Mean Size	: 24.12	SCANS 31 AND 32 COMBINED		50%	25.30		
Standard Deviation	: 1.37	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 25.06	D(3,2)	: 22.56	Spec surf area:	0.27 sq meter/cc		

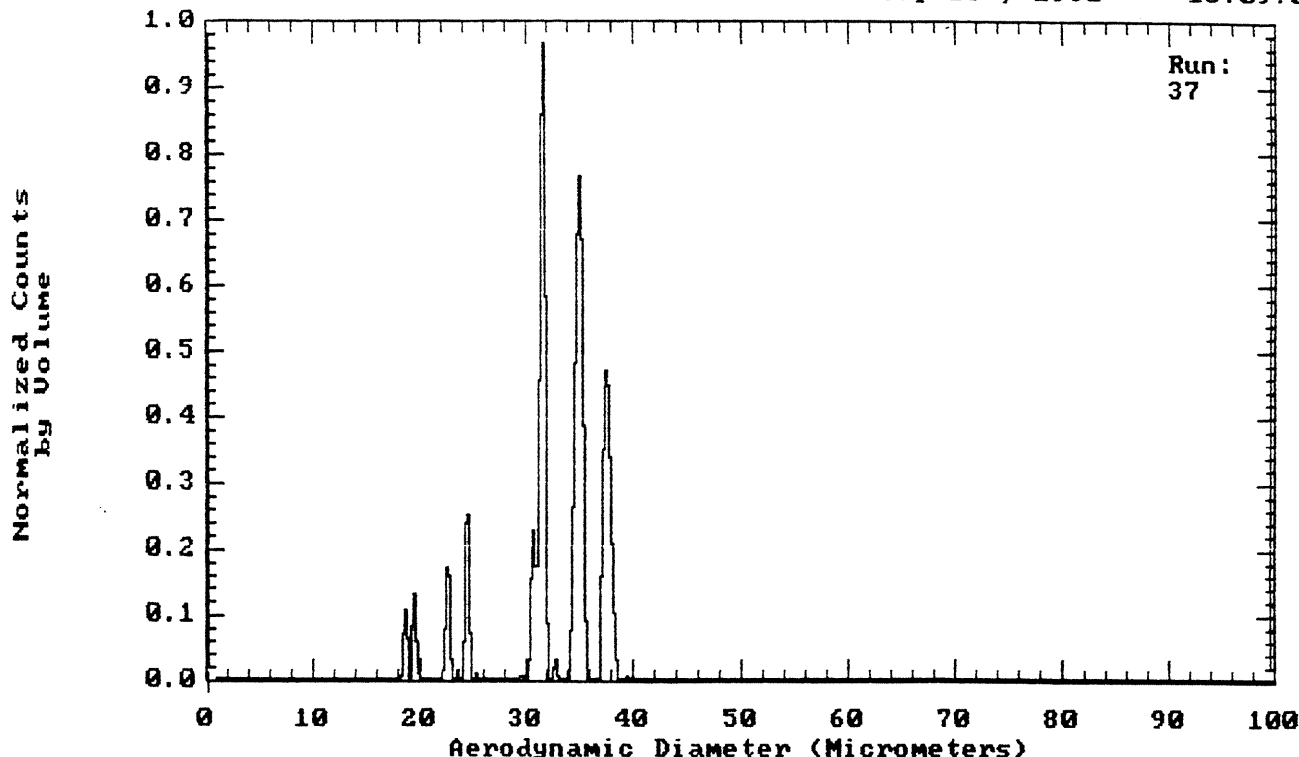
UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	0.28	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	0.28	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	0.28	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	0.28	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	0.28	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	0.28	0.46	0.00	0.40	0.00
				40.00	13.21	34.00	86.79	4.00	0.03	3.40	0.25	0.40	0.00	0.34	0.00
				34.00	5.70	29.00	81.09	3.40	0.09	2.90	0.16	0.34	0.00	0.29	0.00
				29.00	35.50	25.00	45.60	2.90	0.08	2.50	0.09	0.29	0.00	0.25	0.00
				25.00	4.83	22.00	40.77	2.50	0.04	2.20	0.04	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	22.25	18.00	18.52	2.20	0.03	1.80	0.01	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	8.00	16.00	10.52	1.80	0.01	1.60	0.00	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	7.27	14.00	3.25	1.60	0.00	1.40	0.00	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	2.23	12.00	1.02	1.40	0.00	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.74	10.00	0.28	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00

API AEROSIZER MACH2 U5.01

DIRECT MODE

Wed Sep 18 , 1991

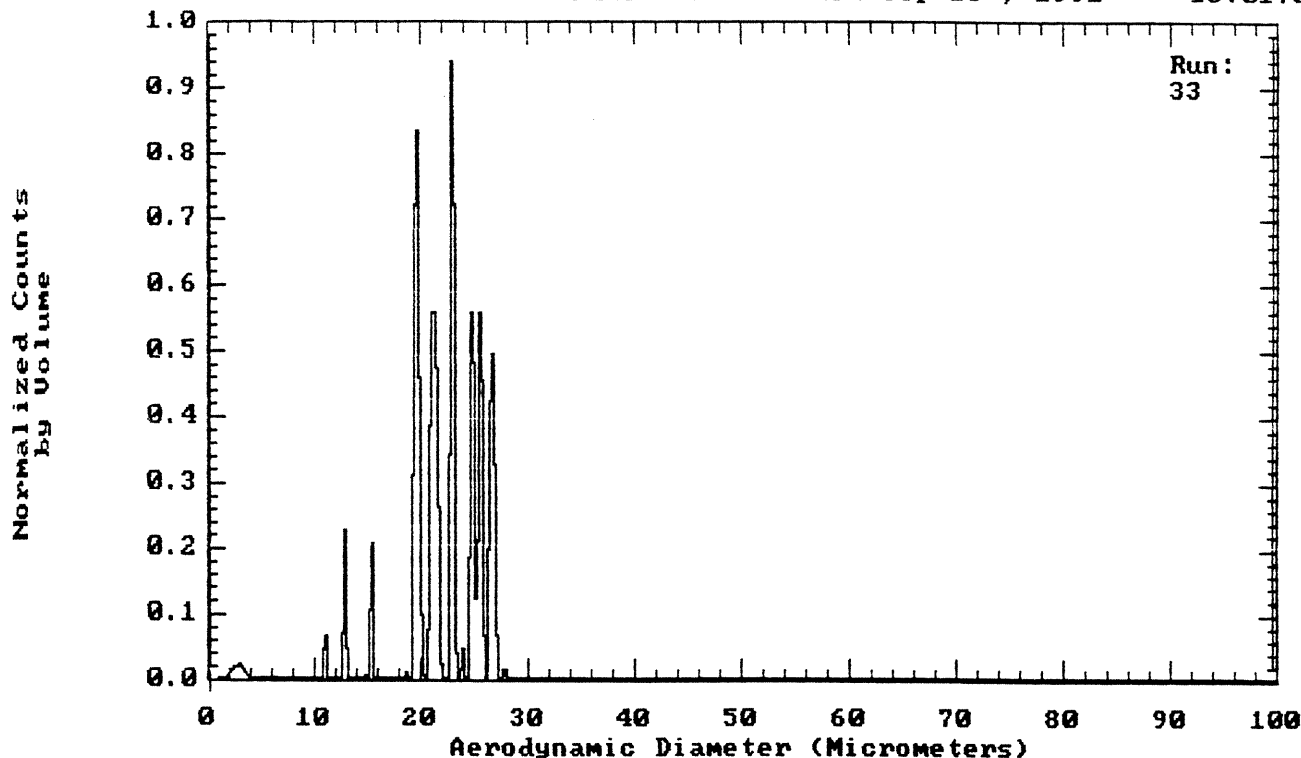
15:09:09



Directory: c:\micro91891 Run 37 taken on Wed Sep 18 15:09:09 1991 AERODYNAMIC VOLUME DISTRIBUTION
 flunisolide with microspacer Smoothing Level: Fine
 with larger screen

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	19.52	55%	34.40
Density	: 1.00	Heater	: ON	10%	24.01	60%	34.61
Run Length (sec)	: 9.7	Purge	: ON	15%	30.22	65%	34.77
PMT Voltage (volts)	: 1100.0			20%	30.67	70%	34.92
Laser Intensity	: 19			25%	31.09	75%	35.06
Clock Freq (MHz)	: 40.0			30%	31.23	80%	35.20
Sum of channels	: 215995			35%	31.33	85%	37.08
Lower Size Limit	: 0.10			40%	31.44	90%	37.30
Upper Size Limit	: 99.80			45%	31.54	95%	37.60
Mean Size	: 31.97	SCANS 37 AND 38 COMBINED		50%	34.19		
Standard Deviation	: 1.24	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 32.31	D(3,2)	: 30.51	Spec surf area:	0.20 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	0.26	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	0.26	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	0.26	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	0.26	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	0.26	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	0.26	0.46	0.00	0.40	0.00
				40.00	51.09	34.00	48.91	4.00	0.02	3.40	0.24	0.40	0.00	0.34	0.00
				34.00	34.10	29.00	14.81	3.40	0.07	2.90	0.17	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	14.81	2.90	0.07	2.50	0.09	0.29	0.00	0.25	0.00
				25.00	9.08	22.00	5.72	2.50	0.04	2.20	0.05	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	5.46	18.00	0.26	2.20	0.04	1.80	0.01	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	0.26	1.80	0.01	1.60	0.01	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	0.26	1.60	0.00	1.40	0.00	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	0.26	1.40	0.00	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	0.26	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 33 taken on Wed Sep 18 15:01:02 1991 AERODYNAMIC VOLUME DISTRIBUTION
 flunisolide with microchamber Smoothing Level: Fine

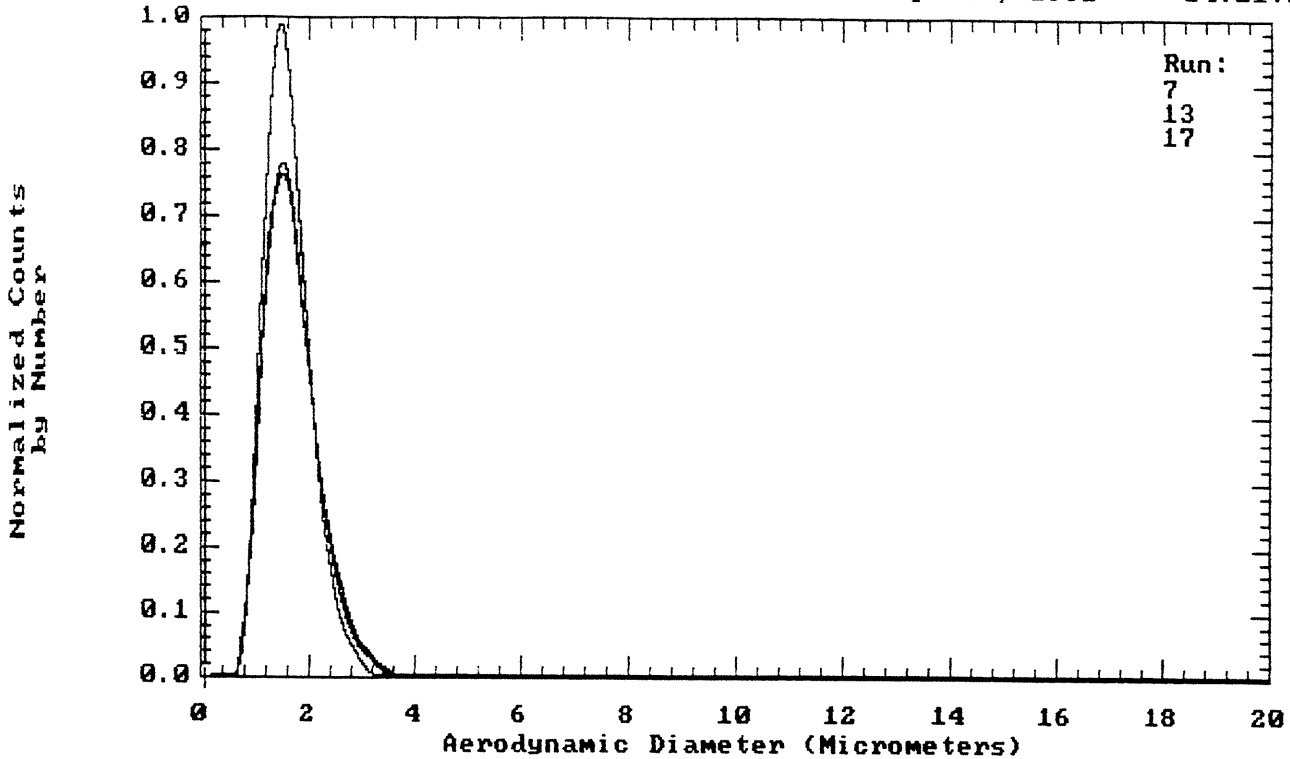
PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	12.96	55%	22.68
Density	: 1.00	Heater	: ON	10%	19.15	60%	22.79
Run Length (sec)	: 9.7	Purge	: ON	15%	19.36	65%	23.99
PMT Voltage (volts)	: 1100.0			20%	19.49	70%	24.53
Laser Intensity	: 19			25%	19.63	75%	24.72
Clock Freq (MHz)	: 40.0			30%	20.65	80%	25.24
Sum of channels	: 252728			35%	20.90	85%	25.43
Lower Size Limit	: 0.10			40%	21.10	90%	26.17
Upper Size Limit	: 99.80			45%	21.35	95%	26.47
Mean Size	: 21.54	SCANS 33 AND 34 COMBINED		50%	22.56		
Standard Deviation	: 1.33	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 21.99	D(3,2)	: 19.81			Spec surf area:	0.30 sq meter/cc

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	1.23	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	1.23	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	1.23	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	1.23	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	1.23	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	1.23	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.10	3.40	1.14	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	0.34	2.90	0.80	0.34	0.00	0.29	0.00
				29.00	23.58	25.00	76.42	2.90	0.35	2.50	0.45	0.29	0.00	0.25	0.00
				25.00	28.07	22.00	48.35	2.50	0.22	2.20	0.23	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	40.76	18.00	7.59	2.20	0.18	1.80	0.06	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	7.59	1.80	0.04	1.60	0.02	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	2.53	14.00	5.06	1.60	0.01	1.40	0.00	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	2.92	12.00	2.14	1.40	0.00	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.91	10.00	1.23	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00

APPENDIX 2

TOTAL PARTICLE NUMBER DISTRIBUTIONS
FOR EACH DRUG

COMPOSITE GRAPHS AND TABLES



Directory: c:\micro91891 Run 7 taken on Wed Sep 18 15:35:17 1991 AERODYNAMIC NUMBER DISTRIBUTION
 albuterol with microspacer and larger screen Smoothing Level: Coarse

PARAMETERS				DISPERSER CONTROL				%UNDER	SIZE	%UNDER	SIZE
Material	:	Freon		Dispenser Type	:	AeroSampler	5%	0.97	55%	1.65	
Density	:	1.00		Heater	:	ON	10%	1.08	60%	1.71	
Run Length (sec)	:	9.9		Purge	:	ON	15%	1.16	65%	1.78	
PMT Voltage (volts)	:	1100.0					20%	1.23	70%	1.86	
Laser Intensity	:	19					25%	1.29	75%	1.94	
Clock Freq (MHz)	:	40.0					30%	1.36	80%	2.04	
Sum of channels	:	79604					35%	1.41	85%	2.17	
Lower Size Limit	:	0.10					40%	1.47	90%	2.33	
Upper Size Limit	:	99.80					45%	1.53	95%	2.58	
Mean Size	:	1.61		SCANS 7 AND 8 COMBINED			50%	1.59			
Standard Deviation	:	1.34		BETWEEN 3.0 & 4.0 MICRONS							

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	7.96E4	10.0	2.63E1	8.6	7.96E4	1.00	3.37E3	0.86	1.64E3
				86	0.00E0	74	7.96E4	8.6	0.00E0	7.4	7.96E4	0.86	1.29E3	0.74	3.48E2
				74	0.00E0	63	7.96E4	7.4	0.00E0	6.3	7.96E4	0.74	3.18E2	0.63	3.00E1
				63	0.00E0	54	7.96E4	6.3	0.00E0	5.4	7.96E4	0.63	3.00E1	0.54	0.00E0
				54	0.00E0	46	7.96E4	5.4	0.00E0	4.6	7.96E4	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	7.96E4	4.6	0.00E0	4.0	7.96E4	0.46	0.00E0	0.40	0.00E0
				40	0.00E0	34	7.96E4	4.0	1.01E2	3.4	7.95E4	0.40	0.00E0	0.34	0.00E0
				34	0.00E0	29	7.96E4	3.4	1.24E3	2.9	7.83E4	0.34	3.00E0	0.29	0.00E0
				29	0.00E0	25	7.96E4	2.9	3.67E3	2.5	7.46E4	0.29	0.00E0	0.25	0.00E0
				25	0.00E0	22	7.96E4	2.5	6.02E3	2.2	6.86E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	7.96E4	22	1.00E0	18	7.96E4	2.2	1.58E4	1.8	5.28E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	7.96E4	18	0.00E0	16	7.96E4	1.8	1.21E4	1.6	4.07E4	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	7.96E4	16	3.66E2	14	7.96E4	1.6	1.38E4	1.4	2.69E4	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	7.96E4	14	1.96E0	12	7.96E4	1.4	1.28E4	1.2	1.41E4	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	7.96E4	12	1.74E0	10	7.96E4	1.2	9.09E3	1.0	5.01E3	0.12	0.00E0	0.10	0.00E0

Directory: c:\micro91891 Run 17 taken on Wed Sep 18 14:21:20 1991 AERODYNAMIC NUMBER DISTRIBUTION
 albuterol without Smoothing Level: Coarse

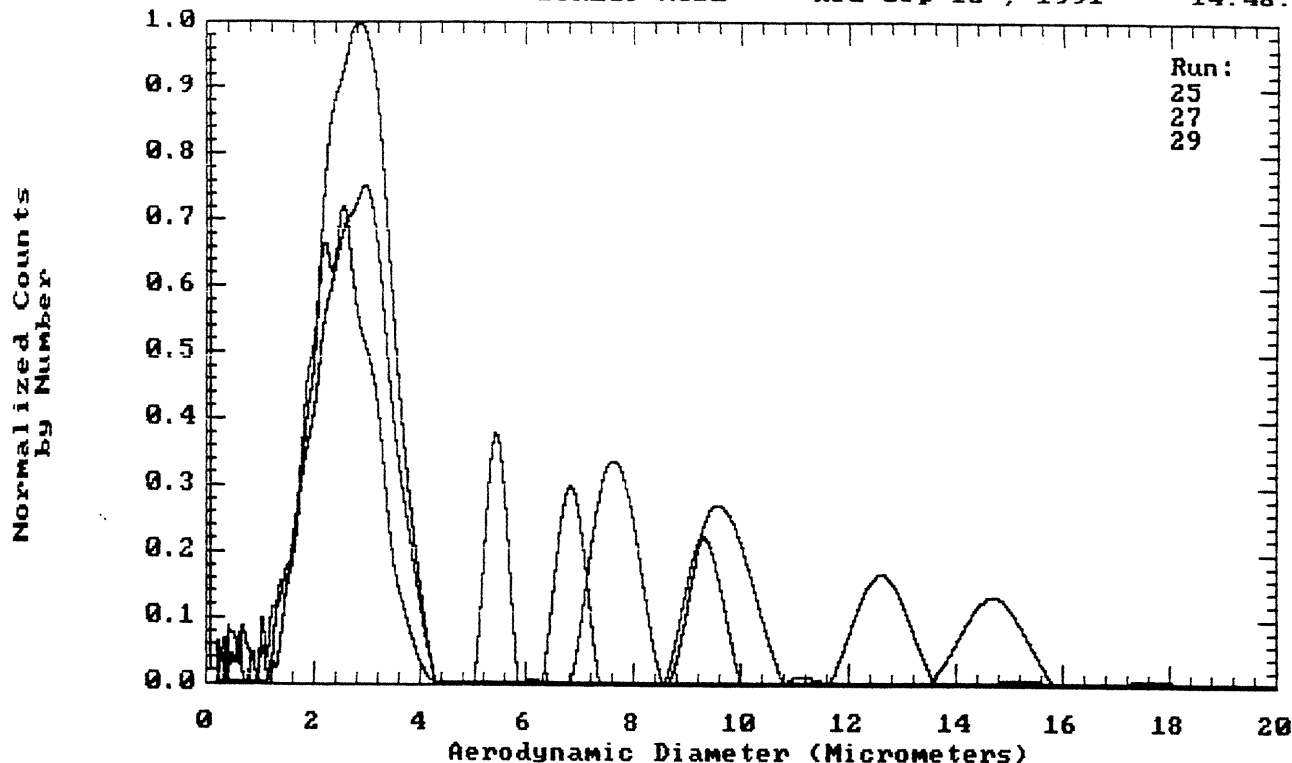
PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	0.98	55%	1.65
Density	: 1.00	Heater	: ON	10%	1.10	60%	1.71
Run Length (sec)	: 9.8	Purge	: ON	15%	1.18	65%	1.77
PMT Voltage (volts)	: 1100.0			20%	1.24	70%	1.85
Laser Intensity	: 19			25%	1.31	75%	1.93
Clock Freq (MHz)	: 40.0			30%	1.36	80%	2.02
Sum of channels	: 78074			35%	1.42	85%	2.14
Lower Size Limit	: 0.10			40%	1.48	90%	2.29
Upper Size Limit	: 99.80			45%	1.53	95%	2.53
Mean Size	: 1.61	SCANS 17 AND 18 COMBINED		50%	1.59		
Standard Deviation	: 1.33	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	7.81E4	10.0	0.00E0	8.6	7.81E4	1.00	3.02E3	0.86	1.35E3
				86	0.00E0	74	7.81E4	8.6	2.00E0	7.4	7.81E4	0.86	1.13E3	0.74	2.13E2
				74	0.00E0	63	7.81E4	7.4	0.00E0	6.3	7.81E4	0.74	2.13E2	0.63	0.00E0
				63	0.00E0	54	7.81E4	6.3	0.00E0	5.4	7.81E4	0.63	0.00E0	0.54	0.00E0
				54	0.00E0	46	7.81E4	5.4	0.00E0	4.6	7.81E4	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	7.81E4	4.6	0.00E0	4.0	7.81E4	0.46	0.00E0	0.40	0.00E0
				40	0.00E0	34	7.81E4	4.0	5.92E1	3.4	7.80E4	0.40	0.00E0	0.34	0.00E0
				34	0.00E0	29	7.81E4	3.4	1.03E3	2.9	7.70E4	0.34	0.00E0	0.29	0.00E0
				29	0.00E0	25	7.81E4	2.9	3.18E3	2.5	7.38E4	0.29	0.00E0	0.25	0.00E0
				25	0.00E0	22	7.81E4	2.5	5.67E3	2.2	6.81E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	7.81E4	22	7.78E1	18	7.81E4	2.2	1.60E4	1.8	5.22E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	7.81E4	18	2.22E1	16	7.81E4	1.8	1.24E4	1.6	3.98E4	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	7.81E4	16	8.88E2	14	7.81E4	1.6	1.40E4	1.4	2.58E4	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	7.81E4	14	9.11E1	12	7.81E4	1.4	1.27E4	1.2	1.31E4	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	7.81E4	12	0.00E0	10	7.81E4	1.2	8.76E3	1.0	4.37E3	0.12	0.00E0	0.10	0.00E0

Directory: c:\micro91891 Run 13 taken on Wed Sep 18 13:58:55 1991 AERODYNAMIC NUMBER DISTRIBUTION
 albuterol with microchamber Smoothing Level: Coarse
 and larger screen

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	0.98	55%	1.58
Density	: 1.00	Heater	: ON	10%	1.08	60%	1.64
Run Length (sec)	: 9.9	Purge	: ON	15%	1.16	65%	1.70
PMT Voltage (volts)	: 1100.0			20%	1.22	70%	1.76
Laser Intensity	: 19			25%	1.28	75%	1.83
Clock Freq (MHz)	: 40.0			30%	1.33	80%	1.91
Sum of channels	: 88191			35%	1.38	85%	2.01
Lower Size Limit	: 0.10			40%	1.43	90%	2.14
Upper Size Limit	: 99.80			45%	1.48	95%	2.35
Mean Size	: 1.55	SCANS 13 AND 14 COMBINED		50%	1.53		
Standard Deviation	: 1.30	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	8.82E4	10.0	0.00E0	8.6	8.82E4	1.00	3.74E3	0.86	1.43E3
				86	0.00E0	74	8.82E4	8.6	0.00E0	7.4	8.82E4	0.86	1.23E3	0.74	1.97E2
				74	0.00E0	63	8.82E4	7.4	0.00E0	6.3	8.82E4	0.74	1.97E2	0.63	0.00E0
				63	0.00E0	54	8.82E4	6.3	0.00E0	5.4	8.82E4	0.63	0.00E0	0.54	0.00E0
				54	0.00E0	46	8.82E4	5.4	0.00E0	4.6	8.82E4	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	8.82E4	4.6	0.00E0	4.0	8.82E4	0.46	0.00E0	0.40	0.00E0
				40	0.00E0	34	8.82E4	4.0	0.00E0	3.4	8.82E4	0.40	0.00E0	0.34	0.00E0
				34	0.00E0	29	8.82E4	3.4	3.49E2	2.9	8.78E4	0.34	0.00E0	0.29	0.00E0
				29	0.00E0	25	8.82E4	2.9	2.20E3	2.5	8.56E4	0.29	0.00E0	0.25	0.00E0
				25	0.00E0	22	8.82E4	2.5	4.73E3	2.2	8.09E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	8.82E4	22	0.00E0	18	8.82E4	2.2	1.65E4	1.8	6.44E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	8.82E4	18	0.00E0	16	8.82E4	1.8	1.45E4	1.6	4.99E4	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	8.82E4	16	0.00E0	14	8.82E4	1.6	1.76E4	1.4	3.23E4	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	8.82E4	14	0.00E0	12	8.82E4	1.4	1.62E4	1.2	1.61E4	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	8.82E4	12	0.00E0	10	8.82E4	1.2	1.09E4	1.0	5.17E3	0.12	0.00E0	0.10	0.00E0



Directory: c:\micro91891 Run 25 taken on Wed Sep 18 14:41:03 1991 AERODYNAMIC NUMBER DISTRIBUTION
 beclomethasone without Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.35	55%	2.87
Density	: 1.00	Heater	: ON	10%	1.72	60%	2.97
Run Length (sec)	: 9.9	Purge	: ON	15%	1.93	65%	3.07
PMT Voltage (volts)	: 1100.0			20%	2.10	70%	3.20
Laser Intensity	: 19			25%	2.23	75%	3.36
Clock Freq (MHz)	: 40.0			30%	2.35	80%	3.64
Sum of channels	: 7646			35%	2.46	85%	7.33
Lower Size Limit	: 0.10			40%	2.57	90%	9.30
Upper Size Limit	: 99.80			45%	2.67	95%	9.93
Mean Size	: 3.06	SCANS 25 AND 26 COMBINED		50%	2.77		
Standard Deviation	: 1.90	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	7.65E3	10.0	5.44E2	8.6	6.83E3	1.00	2.19E1	0.86	1.82E2
				86	0.00E0	74	7.65E3	8.6	2.75E2	7.4	6.56E3	0.86	3.51E1	0.74	1.47E2
				74	0.00E0	63	7.65E3	7.4	2.69E2	6.3	6.29E3	0.74	3.61E1	0.63	1.11E2
				63	0.00E0	54	7.65E3	6.3	0.00E0	5.4	6.29E3	0.63	1.96E1	0.54	9.12E1
				54	0.00E0	46	7.65E3	5.4	0.00E0	4.6	6.29E3	0.54	1.19E1	0.46	7.93E1
				46	0.00E0	40	7.65E3	4.6	0.00E0	4.0	6.29E3	0.46	1.45E1	0.40	6.48E1
				40	0.00E0	34	7.65E3	4.0	4.85E2	3.4	5.80E3	0.40	4.09E1	0.34	6.44E1
				34	0.00E0	29	7.65E3	3.4	1.48E3	2.9	4.32E3	0.34	1.38E1	0.29	5.06E1
				29	0.00E0	25	7.65E3	2.9	1.50E3	2.5	2.82E3	0.29	7.79E0	0.25	4.28E1
				25	0.00E0	22	7.65E3	2.5	9.94E2	2.2	1.83E3	0.25	4.94E0	0.22	3.79E1
220	0.00E0	180	7.65E3	22	0.00E0	18	7.65E3	2.2	9.29E2	1.8	8.99E2	0.22	1.28E1	0.18	2.51E1
180	0.00E0	160	7.65E3	18	0.00E0	16	7.65E3	1.8	2.90E2	1.6	6.10E2	0.18	2.68E0	0.16	2.24E1
160	0.00E0	140	7.65E3	16	0.00E0	14	7.65E3	1.6	1.96E2	1.4	4.14E2	0.16	6.75E0	0.14	1.57E1
140	0.00E0	120	7.65E3	14	2.72E2	12	7.37E3	1.4	1.28E2	1.2	2.85E2	0.14	1.10E1	0.12	4.63E0
120	0.00E0	100	7.65E3	12	0.00E0	10	7.37E3	1.2	8.15E1	1.0	2.04E2	0.12	4.63E0	0.10	0.00E0

Directory: c:\micro91891 Run 29 taken on Wed Sep 18 14:48:40 1991 AERODYNAMIC NUMBER DISTRIBUTION
 beclomethasone with microspacer Smoothing Level: Coarse
 with larger screen

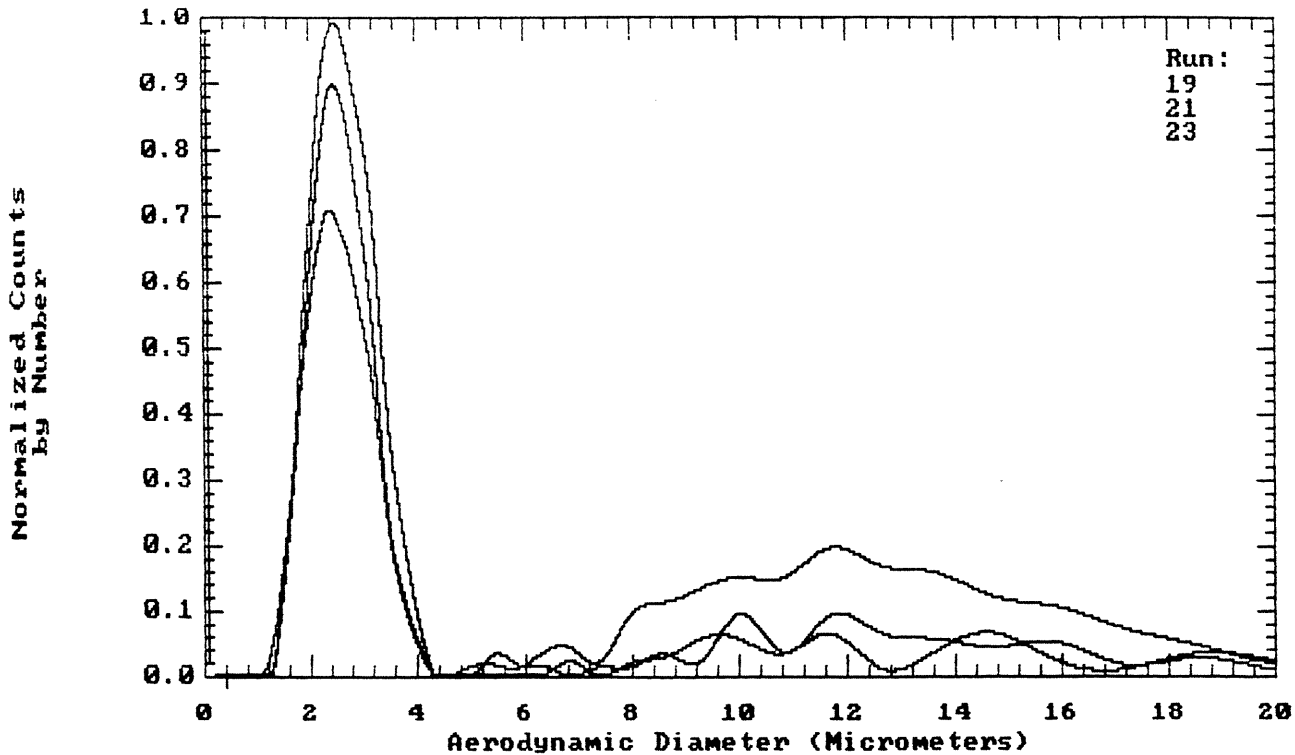
PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.59	55%	2.85
Density	: 1.00	Heater	: ON	10%	1.85	60%	2.94
Run Length (sec)	: 9.9	Purge	: ON	15%	2.03	65%	3.03
PMT Voltage (volts)	: 1100.0			20%	2.16	70%	3.14
Laser Intensity	: 19			25%	2.27	75%	3.28
Clock Freq (MHz)	: 40.0			30%	2.38	80%	3.46
Sum of channels	: 9493			35%	2.48	85%	3.82
Lower Size Limit	: 0.10			40%	2.58	90%	6.79
Upper Size Limit	: 99.80			45%	2.67	95%	9.40
Mean Size	: 2.99	SCANS 29 AND 30 COMBINED		50%	2.76		
Standard Deviation	: 1.73	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	9.49E3	10.0	3.43E2	8.6	8.81E3	1.00	2.35E1	0.86	1.36E2
				86	0.00E0	74	9.49E3	8.6	0.00E0	7.4	8.81E3	0.86	1.85E1	0.74	1.17E2
				74	0.00E0	63	9.49E3	7.4	3.43E2	6.3	8.46E3	0.74	0.00E0	0.63	1.17E2
				63	0.00E0	54	9.49E3	6.3	1.40E1	5.4	8.45E3	0.63	2.50E1	0.54	9.23E1
				54	0.00E0	46	9.49E3	5.4	3.29E2	4.6	8.12E3	0.54	2.89E1	0.46	6.34E1
				46	0.00E0	40	9.49E3	4.6	0.00E0	4.0	8.12E3	0.46	2.12E1	0.40	4.22E1
				40	0.00E0	34	9.49E3	4.0	6.70E2	3.4	7.45E3	0.40	1.77E1	0.34	2.46E1
				34	0.00E0	29	9.49E3	3.4	1.97E3	2.9	5.48E3	0.34	1.26E0	0.29	2.33E1
				29	0.00E0	25	9.49E3	2.9	2.06E3	2.5	3.42E3	0.29	6.51E0	0.25	1.68E1
				25	0.00E0	22	9.49E3	2.5	1.38E3	2.2	2.04E3	0.25	5.64E0	0.22	1.12E1
220	0.00E0	180	9.49E3	22	0.00E0	18	9.49E3	2.2	1.21E3	1.8	8.36E2	0.22	2.08E0	0.18	9.08E0
180	0.00E0	160	9.49E3	18	0.00E0	16	9.49E3	1.8	3.42E2	1.6	4.94E2	0.18	0.00E0	0.16	9.08E0
160	0.00E0	140	9.49E3	16	3.43E2	14	9.15E3	1.6	1.78E2	1.4	3.15E2	0.16	0.00E0	0.14	9.08E0
140	0.00E0	120	9.49E3	14	0.00E0	12	9.15E3	1.4	1.34E2	1.2	1.82E2	0.14	0.00E0	0.12	9.08E0
120	0.00E0	100	9.49E3	12	0.00E0	10	9.15E3	1.2	2.23E1	1.0	1.59E2	0.12	9.08E0	0.10	0.00E0

Directory: c:\micro91891 Run 27 taken on Wed Sep 18 14:44:27 1991 AERODYNAMIC NUMBER DISTRIBUTION
 beclomethasone with microchamber Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.63	55%	2.54
Density	: 1.00	Heater	: ON	10%	1.79	60%	2.60
Run Length (sec)	: 9.9	Purge	: ON	15%	1.91	65%	2.68
PMT Voltage (volts)	: 1100.0			20%	2.01	70%	2.76
Laser Intensity	: 19			25%	2.10	75%	2.85
Clock Freq (MHz)	: 40.0			30%	2.17	80%	2.95
Sum of channels	: 5101			35%	2.24	85%	3.04
Lower Size Limit	: 0.10			40%	2.32	90%	3.16
Upper Size Limit	: 99.80			45%	2.40	95%	3.35
Mean Size	: 2.45	SCANS 27 AND 28 COMBINED		50%	2.47		
Standard Deviation	: 1.25	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	5.10E3	10.0	0.00E0	8.6	5.10E3	1.00	0.00E0	0.86	0.00E0
				86	0.00E0	74	5.10E3	8.6	0.00E0	7.4	5.10E3	0.86	0.00E0	0.74	0.00E0
				74	0.00E0	63	5.10E3	7.4	0.00E0	6.3	5.10E3	0.74	0.00E0	0.63	0.00E0
				63	0.00E0	54	5.10E3	6.3	0.00E0	5.4	5.10E3	0.63	0.00E0	0.54	0.00E0
				54	0.00E0	46	5.10E3	5.4	0.00E0	4.6	5.10E3	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	5.10E3	4.6	0.00E0	4.0	5.10E3	0.46	0.00E0	0.40	0.00E0
				40	0.00E0	34	5.10E3	4.0	2.07E2	3.4	4.89E3	0.40	0.00E0	0.34	0.00E0
				34	0.00E0	29	5.10E3	3.4	9.34E2	2.9	3.96E3	0.34	0.00E0	0.29	0.00E0
				29	0.00E0	25	5.10E3	2.9	1.30E3	2.5	2.66E3	0.29	0.00E0	0.25	0.00E0
				25	0.00E0	22	5.10E3	2.5	1.02E3	2.2	1.64E3	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	5.10E3	22	0.00E0	18	5.10E3	2.2	1.11E3	1.8	5.25E2	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	5.10E3	18	0.00E0	16	5.10E3	1.8	2.99E2	1.6	2.27E2	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	5.10E3	16	0.00E0	14	5.10E3	1.6	1.65E2	1.4	6.19E1	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	5.10E3	14	0.00E0	12	5.10E3	1.4	4.82E1	1.2	1.37E1	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	5.10E3	12	0.00E0	10	5.10E3	1.2	1.37E1	1.0	0.00E0	0.12	0.00E0	0.10	0.00E0



Directory: c:\micro91891
 cromolyn sodium without

Run 19 taken on Wed Sep 18 14:27:13 1991

AERODYNAMIC NUMBER DISTRIBUTION
 Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.90	55%	10.16
Density	: 1.00	Heater	: ON	10%	2.14	60%	11.12
Run Length (sec)	: 9.6	Purge	: ON	15%	2.33	65%	11.80
PMT Voltage (volts)	: 1100.0			20%	2.51	70%	12.55
Laser Intensity	: 19			25%	2.69	75%	13.50
Clock Freq (MHz)	: 40.0			30%	2.89	80%	14.44
Sum of channels	: 608304			35%	3.13	85%	15.62
Lower Size Limit	: 0.10			40%	3.60	90%	16.97
Upper Size Limit	: 99.80			45%	8.10	95%	20.74
Mean Size	: 6.69	SCANS 19 AND 20 COMBINED		50%	9.25		
Standard Deviation	: 2.40	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	6.41E2	86	6.08E5	10.0	3.99E4	8.6	2.87E5	1.00	0.00E0	0.86	0.00E0
				86	6.41E2	74	6.07E5	8.6	2.31E4	7.4	2.64E5	0.86	0.00E0	0.74	0.00E0
				74	6.41E2	63	6.06E5	7.4	8.57E3	6.3	2.56E5	0.74	0.00E0	0.63	0.00E0
				63	1.78E2	54	6.06E5	6.3	3.34E3	5.4	2.52E5	0.63	0.00E0	0.54	0.00E0
				54	2.21E3	46	6.04E5	5.4	2.19E3	4.6	2.50E5	0.54	0.00E0	0.46	0.00E0
				46	8.19E2	40	6.03E5	4.6	0.00E0	4.0	2.50E5	0.46	0.00E0	0.40	0.00E0
				40	1.92E3	34	6.01E5	4.0	1.55E4	3.4	2.35E5	0.40	0.00E0	0.34	0.00E0
				34	3.62E3	29	5.98E5	3.4	5.06E4	2.9	1.84E5	0.34	0.00E0	0.29	0.00E0
				29	5.10E3	25	5.93E5	2.9	6.37E4	2.5	1.20E5	0.29	0.00E0	0.25	0.00E0
				25	7.89E3	22	5.85E5	2.5	4.96E4	2.2	7.07E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	6.08E5	22	2.59E4	18	5.59E5	2.2	5.00E4	1.8	2.07E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	6.08E5	18	3.19E4	16	5.27E5	1.8	1.32E4	1.6	7.54E3	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	6.08E5	16	5.12E4	14	4.76E5	1.6	6.34E3	1.4	1.20E3	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	6.08E5	14	7.24E4	12	4.03E5	1.4	1.20E3	1.2	0.00E0	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	6.08E5	12	7.60E4	10	3.27E5	1.2	0.00E0	1.0	0.00E0	0.12	0.00E0	0.10	0.00E0

Directory: c:\micro91891 Run 23 taken on Wed Sep 18 14:33:40 1991 AERODYNAMIC NUMBER DISTRIBUTION
 cromolyn sodium with microspacer Smoothing Level: Coarse
 with larger screen

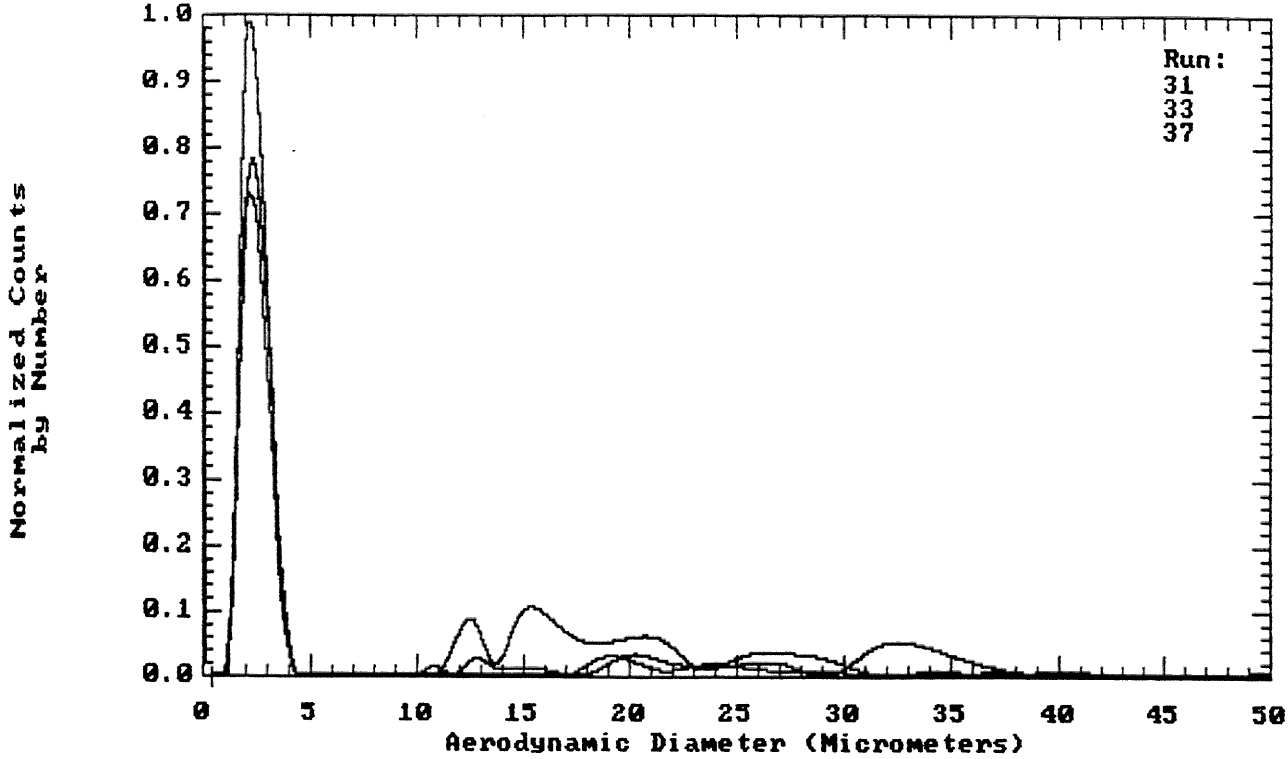
PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.67	55%	2.96
Density	: 1.00	Heater	: ON	10%	1.86	60%	3.13
Run Length (sec)	: 9.8	Purge	: ON	15%	2.00	65%	3.41
PMT Voltage (volts)	: 1100.0			20%	2.13	70%	7.70
Laser Intensity	: 19			25%	2.24	75%	10.26
Clock Freq (MHz)	: 40.0			30%	2.35	80%	11.87
Sum of channels	: 266663			35%	2.47	85%	13.70
Lower Size Limit	: 0.10			40%	2.58	90%	15.58
Upper Size Limit	: 99.80			45%	2.70	95%	19.30
Mean Size	: 4.29	SCANS 23 AND 24 COMBINED		50%	2.82		
Standard Deviation	: 2.43	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	2.67E5	10.0	7.09E3	8.6	1.89E5	1.00	0.00E0	0.86	0.00E0
				86	0.00E0	74	2.67E5	8.6	3.99E3	7.4	1.85E5	0.86	0.00E0	0.74	0.00E0
				74	9.40E2	63	2.66E5	7.4	1.80E2	6.3	1.85E5	0.74	0.00E0	0.63	0.00E0
				63	9.40E2	54	2.65E5	6.3	2.64E3	5.4	1.82E5	0.63	0.00E0	0.54	0.00E0
				54	1.88E3	46	2.63E5	5.4	9.40E2	4.6	1.81E5	0.54	0.00E0	0.46	0.00E0
				46	9.40E2	40	2.62E5	4.6	0.00E0	4.0	1.81E5	0.46	0.00E0	0.40	0.00E0
				40	9.40E2	34	2.61E5	4.0	8.04E3	3.4	1.73E5	0.40	0.00E0	0.34	0.00E0
				34	9.40E2	29	2.60E5	3.4	3.23E4	2.9	1.41E5	0.34	0.00E0	0.29	0.00E0
				29	1.88E3	25	2.58E5	2.9	4.36E4	2.5	9.73E4	0.29	0.00E0	0.25	0.00E0
				25	1.88E3	22	2.56E5	2.5	3.58E4	2.2	6.15E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	2.67E5	22	6.67E3	18	2.50E5	2.2	3.95E4	1.8	2.20E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	2.67E5	18	6.70E3	16	2.43E5	1.8	1.23E4	1.6	9.70E3	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	2.67E5	16	1.23E4	14	2.31E5	1.6	6.84E3	1.4	2.87E3	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	2.67E5	14	1.58E4	12	2.15E5	1.4	2.55E3	1.2	3.17E2	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	2.67E5	12	1.89E4	10	1.96E5	1.2	3.17E2	1.0	0.00E0	0.12	0.00E0	0.10	0.00E0

Directory: c:\micro91891 Run 21 taken on Wed Sep 18 14:30:36 1991 AERODYNAMIC NUMBER DISTRIBUTION
 cromolyn sodium with microchamber Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.74	55%	2.85
Density	: 1.00	Heater	: ON	10%	1.92	60%	2.97
Run Length (sec)	: 9.7	Purge	: ON	15%	2.05	65%	3.11
PMT Voltage (volts)	: 1100.0			20%	2.16	70%	3.33
Laser Intensity	: 19			25%	2.26	75%	7.84
Clock Freq (MHz)	: 40.0			30%	2.36	80%	10.13
Sum of channels	: 285375			35%	2.45	85%	12.85
Lower Size Limit	: 0.10			40%	2.54	90%	14.82
Upper Size Limit	: 99.80			45%	2.64	95%	18.32
Mean Size	: 3.89	SCANS 21 AND 22 COMBINED		50%	2.74		
Standard Deviation	: 2.23	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	2.85E5	10.0	1.08E4	8.6	2.15E5	1.00	0.00E0	0.86	0.00E0
				86	0.00E0	74	2.85E5	8.6	1.71E3	7.4	2.14E5	0.86	0.00E0	0.74	0.00E0
				74	0.00E0	63	2.85E5	7.4	1.66E3	6.3	2.12E5	0.74	0.00E0	0.63	0.00E0
				63	0.00E0	54	2.85E5	6.3	0.00E0	5.4	2.12E5	0.63	0.00E0	0.54	0.00E0
				54	0.00E0	46	2.85E5	5.4	0.00E0	4.6	2.12E5	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	2.85E5	4.6	0.00E0	4.0	2.12E5	0.46	0.00E0	0.40	0.00E0
				40	1.66E3	34	2.84E5	4.0	9.61E3	3.4	2.03E5	0.40	0.00E0	0.34	0.00E0
				34	2.33E3	29	2.81E5	3.4	3.91E4	2.9	1.63E5	0.34	0.00E0	0.29	0.00E0
				29	1.00E3	25	2.80E5	2.9	5.57E4	2.5	1.08E5	0.29	0.00E0	0.25	0.00E0
				25	3.33E3	22	2.77E5	2.5	4.50E4	2.2	6.27E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	2.85E5	22	7.76E3	18	2.69E5	2.2	4.43E4	1.8	1.83E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	2.85E5	18	7.22E3	16	2.62E5	1.8	1.18E4	1.6	6.59E3	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	2.85E5	16	1.35E4	14	2.49E5	1.6	5.51E3	1.4	1.07E3	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	2.85E5	14	6.51E3	12	2.42E5	1.4	1.07E3	1.2	0.00E0	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	2.85E5	12	1.58E4	10	2.26E5	1.2	0.00E0	1.0	0.00E0	0.12	0.00E0	0.10	0.00E0



Directory: c:\micro91891 Run 31 taken on Wed Sep 18 14:57:08 1991 AERODYNAMIC NUMBER DISTRIBUTION
 flunisolide without Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.64	55%	3.23
Density	: 1.00	Heater	: ON	10%	1.84	60%	11.69
Run Length (sec)	: 9.8	Purge	: ON	15%	1.99	65%	13.45
PMT Voltage (volts)	: 1100.0			20%	2.13	70%	15.37
Laser Intensity	: 19			25%	2.26	75%	16.49
Clock Freq (MHz)	: 40.0			30%	2.39	80%	18.43
Sum of channels	: 312940			35%	2.52	85%	20.57
Lower Size Limit	: 0.10			40%	2.66	90%	24.99
Upper Size Limit	: 99.80			45%	2.81	95%	28.12
Mean Size	: 5.59	SCANS 31 AND 32 COMBINED		50%	2.99		
Standard Deviation	: 2.94	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	3.13E5	10.0	0.00E0	8.6	1.86E5	1.00	0.00E0	0.86	0.00E0
				86	0.00E0	74	3.13E5	8.6	0.00E0	7.4	1.86E5	0.86	0.00E0	0.74	0.00E0
				74	0.00E0	63	3.13E5	7.4	0.00E0	6.3	1.86E5	0.74	0.00E0	0.63	0.00E0
				63	2.35E3	54	3.11E5	6.3	0.00E0	5.4	1.86E5	0.63	0.00E0	0.54	0.00E0
				54	2.35E3	46	3.08E5	5.4	0.00E0	4.6	1.86E5	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	3.08E5	4.6	0.00E0	4.0	1.86E5	0.46	0.00E0	0.40	0.00E0
				40	2.35E3	34	3.06E5	4.0	7.45E3	3.4	1.79E5	0.40	0.00E0	0.34	0.00E0
				34	4.69E3	29	3.01E5	3.4	3.01E4	2.9	1.49E5	0.34	0.00E0	0.29	0.00E0
				29	1.95E4	25	2.82E5	2.9	4.13E4	2.5	1.07E5	0.29	0.00E0	0.25	0.00E0
				25	6.42E3	22	2.75E5	2.5	3.60E4	2.2	7.14E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	3.13E5	22	2.94E4	18	2.46E5	2.2	4.35E4	1.8	2.79E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	3.13E5	18	1.80E4	16	2.28E5	1.8	1.50E4	1.6	1.29E4	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	3.13E5	16	2.29E4	14	2.05E5	1.6	8.59E3	1.4	4.32E3	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	3.13E5	14	1.40E4	12	1.91E5	1.4	3.49E3	1.2	8.34E2	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	3.13E5	12	4.78E3	10	1.86E5	1.2	8.34E2	1.0	0.00E0	0.12	0.00E0	0.10	0.00E0

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.50	55%	2.60
Density	: 1.00	Heater	: ON	10%	1.65	60%	2.72
Run Length (sec)	: 9.7	Purge	: ON	15%	1.78	65%	2.85
PMT Voltage (volts)	: 1100.0			20%	1.89	70%	3.00
Laser Intensity	: 19			25%	1.99	75%	3.21
Clock Freq (MHz)	: 40.0			30%	2.09	80%	18.21
Sum of channels	: 223461			35%	2.19	85%	23.79
Lower Size Limit	: 0.10			40%	2.29	90%	31.14
Upper Size Limit	: 99.80			45%	2.39	95%	34.15
Mean Size	: 3.78	SCANS 37 AND 38 COMBINED		50%	2.49		
Standard Deviation	: 2.83	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	2.23E5	10.0	0.00E0	8.6	1.79E5	1.00	5.14E6	0.86	0.00E0
				86	0.00E0	74	2.23E5	8.6	0.00E0	7.4	1.79E5	0.86	0.00E0	0.74	0.00E0
				74	0.00E0	63	2.23E5	7.4	0.00E0	6.3	1.79E5	0.74	0.00E0	0.63	0.00E0
				63	0.00E0	54	2.23E5	6.3	0.00E0	5.4	1.79E5	0.63	0.00E0	0.54	0.00E0
				54	0.00E0	46	2.23E5	5.4	0.00E0	4.6	1.79E5	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	2.23E5	4.6	0.00E0	4.0	1.79E5	0.46	0.00E0	0.40	0.00E0
				40	1.12E4	34	2.12E5	4.0	5.26E3	3.4	1.73E5	0.40	0.00E0	0.34	0.00E0
				34	1.49E4	29	1.97E5	3.4	2.42E4	2.9	1.49E5	0.34	0.00E0	0.29	0.00E0
				29	3.73E3	25	1.94E5	2.9	3.63E4	2.5	1.13E5	0.29	0.00E0	0.25	0.00E0
				25	7.11E3	22	1.86E5	2.5	3.31E4	2.2	7.98E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	2.23E5	22	7.82E3	18	1.79E5	2.2	4.40E4	1.8	3.58E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	2.23E5	18	0.00E0	16	1.79E5	1.8	1.80E4	1.6	1.79E4	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	2.23E5	16	0.00E0	14	1.79E5	1.6	1.14E4	1.4	6.43E3	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	2.23E5	14	0.00E0	12	1.79E5	1.4	4.95E3	1.2	1.48E3	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	2.23E5	12	0.00E0	10	1.79E5	1.2	1.48E3	1.0	5.14E6	0.12	0.00E0	0.10	0.00E0

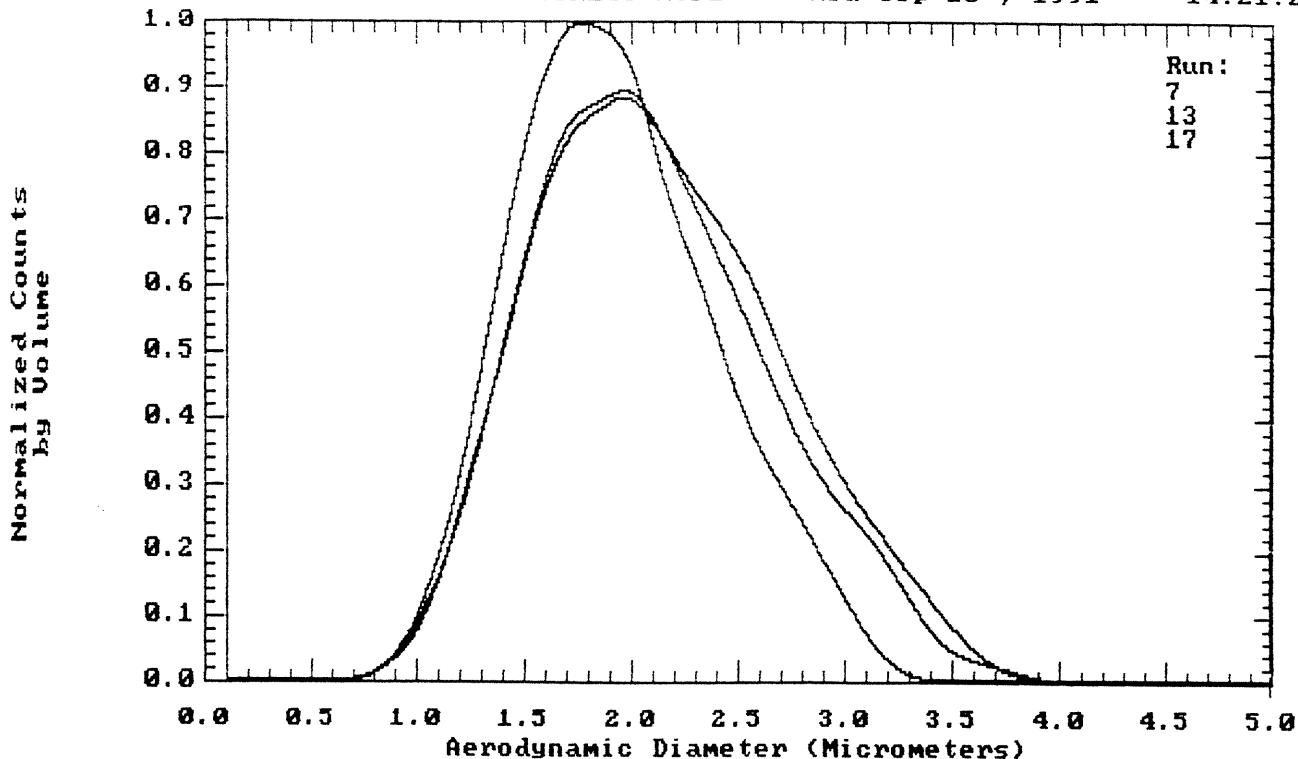
PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.57	55%	2.55
Density	: 1.00	Heater	: ON	10%	1.72	60%	2.65
Run Length (sec)	: 9.7	Purge	: ON	15%	1.83	65%	2.76
PMT Voltage (volts)	: 1100.0			20%	1.93	70%	2.88
Laser Intensity	: 19			25%	2.02	75%	3.03
Clock Freq (MHz)	: 40.0			30%	2.10	80%	3.27
Sum of channels	: 264153			35%	2.19	85%	12.59
Lower Size Limit	: 0.10			40%	2.28	90%	19.29
Upper Size Limit	: 99.80			45%	2.36	95%	22.73
Mean Size	: 3.28	SCANS 33 AND 34 COMBINED		50%	2.45		
Standard Deviation	: 2.31	BETWEEN 3.0 & 4.0 MICRONS					

UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER	UPPER SIZE	# IN	LOWER SIZE	# UNDER
				100	0.00E0	86	2.64E5	10.0	0.00E0	8.6	2.22E5	1.00	0.00E0	0.86	0.00E0
				86	0.00E0	74	2.64E5	8.6	0.00E0	7.4	2.22E5	0.86	0.00E0	0.74	0.00E0
				74	0.00E0	63	2.64E5	7.4	0.00E0	6.3	2.22E5	0.74	0.00E0	0.63	0.00E0
				63	0.00E0	54	2.64E5	6.3	0.00E0	5.4	2.22E5	0.63	0.00E0	0.54	0.00E0
				54	1.90E3	46	2.62E5	5.4	0.00E0	4.6	2.22E5	0.54	0.00E0	0.46	0.00E0
				46	0.00E0	40	2.62E5	4.6	0.00E0	4.0	2.22E5	0.46	0.00E0	0.40	0.00E0
				40	1.90E3	34	2.60E5	4.0	5.83E3	3.4	2.16E5	0.40	0.00E0	0.34	0.00E0
				34	1.90E3	29	2.58E5	3.4	3.01E4	2.9	1.86E5	0.34	0.00E0	0.29	0.00E0
				29	3.65E3	25	2.55E5	2.9	4.79E4	2.5	1.38E5	0.29	0.00E0	0.25	0.00E0
				25	5.87E3	22	2.49E5	2.5	4.44E4	2.2	9.41E4	0.25	0.00E0	0.22	0.00E0
220	0.00E0	180	2.64E5	22	1.33E4	18	2.36E5	2.2	5.78E4	1.8	3.62E4	0.22	0.00E0	0.18	0.00E0
180	0.00E0	160	2.64E5	18	1.90E3	16	2.34E5	1.8	2.07E4	1.6	1.55E4	0.18	0.00E0	0.16	0.00E0
160	0.00E0	140	2.64E5	16	3.81E3	14	2.30E5	1.6	1.10E4	1.4	4.53E3	0.16	0.00E0	0.14	0.00E0
140	0.00E0	120	2.64E5	14	5.71E3	12	2.24E5	1.4	4.16E3	1.2	3.71E2	0.14	0.00E0	0.12	0.00E0
120	0.00E0	100	2.64E5	12	1.90E3	10	2.22E5	1.2	3.71E2	1.0	0.00E0	0.12	0.00E0	0.10	0.00E0

APPENDIX 3

RESPIRABLE PARTICLE VOLUME (MASS)
DISTRIBUTIONS FOR EACH DRUG

COMPOSITE GRAPHS AND TABLES



Directory: c:\micro91891 Run 7 taken on Wed Sep 18 15:35:17 1991 AERODYNAMIC VOLUME DISTRIBUTION
 albuterol with microspacer and larger screen Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.26	55%	2.13
Density	: 1.00	Heater	: ON	10%	1.41	60%	2.21
Run Length (sec)	: 9.9	Purge	: ON	15%	1.51	65%	2.29
PMT Voltage (volts)	: 1100.0			20%	1.60	70%	2.39
Laser Intensity	: 19			25%	1.69	75%	2.48
Clock Freq (MHz)	: 40.0			30%	1.76	80%	2.58
Sum of channels	: 79599			35%	1.84	85%	2.71
Lower Size Limit	: 0.10			40%	1.91	90%	2.86
Upper Size Limit	: 4.99			45%	1.98	95%	3.07
Mean Size	: 2.06	SCANS 7 AND 8 COMBINED		50%	2.05		
Standard Deviation	: 1.31	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.11	D(3,2)	: 1.96	Spec surf area:	3.06 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.61	0.86	0.17
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.15	0.74	0.03
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.02	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.93	3.40	99.07	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	7.89	2.90	91.18	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	15.13	2.50	76.05	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	16.68	2.20	59.36	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	26.72	1.80	32.64	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	12.83	1.60	19.81	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	10.14	1.40	9.68	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	6.19	1.20	3.49	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	2.71	1.00	0.78	0.12	0.00	0.10	0.00

Directory: c:\micro91891 Run 17 taken on Wed Sep 18 14:21:20 1991 AERODYNAMIC VOLUME DISTRIBUTION
 albuterol without Smoothing Level: Coarse

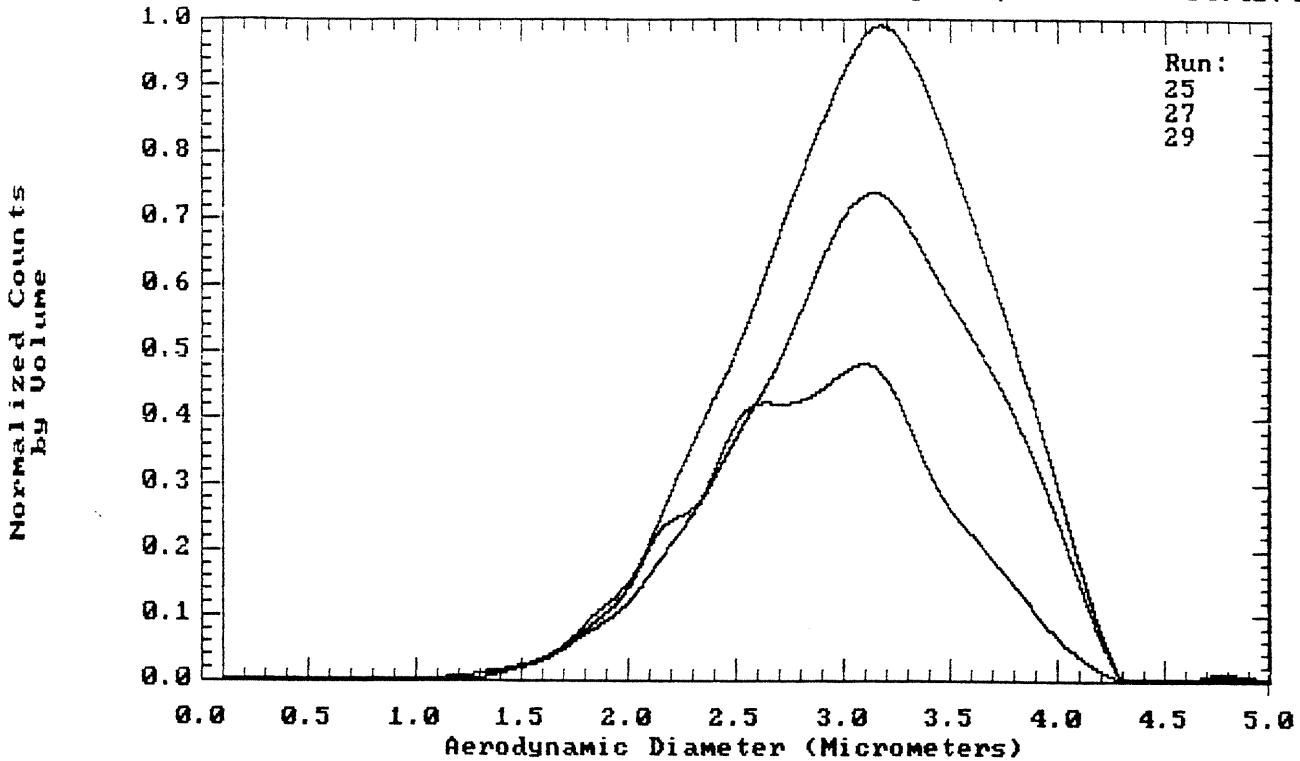
PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.26	55%	2.09
Density	: 1.00	Heater	: ON	10%	1.40	60%	2.16
Run Length (sec)	: 9.8	Purge	: ON	15%	1.50	65%	2.24
PMT Voltage (volts)	: 1100.0			20%	1.59	70%	2.32
Laser Intensity	: 19			25%	1.67	75%	2.42
Clock Freq (MHz)	: 40.0			30%	1.74	80%	2.52
Sum of channels	: 78070			35%	1.81	85%	2.65
Lower Size Limit	: 0.10			40%	1.88	90%	2.80
Upper Size Limit	: 4.99			45%	1.95	95%	3.01
Mean Size	: 2.02	SCANS 17 AND 18 COMBINED		50%	2.02		
Standard Deviation	: 1.30	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.08	D(3,2)	: 1.94	Spec surf area:	3.10 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.57	0.86	0.16
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.14	0.74	0.02
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.02	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.60	3.40	99.40	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	6.77	2.90	92.63	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	13.68	2.50	78.95	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	16.36	2.20	62.58	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	28.25	1.80	34.33	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	13.71	1.60	20.62	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	10.75	1.40	9.87	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	6.40	1.20	3.47	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	2.74	1.00	0.72	0.12	0.00	0.10	0.00

Directory: c:\micro91891 Run 13 taken on Wed Sep 18 13:58:55 1991 AERODYNAMIC VOLUME DISTRIBUTION
 albuterol with microchamber Smoothing Level: Coarse
 and larger screen

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.22	55%	1.93
Density	: 1.00	Heater	: ON	10%	1.34	60%	1.99
Run Length (sec)	: 9.9	Purge	: ON	15%	1.43	65%	2.06
PMT Voltage (volts)	: 1100.0			20%	1.51	70%	2.14
Laser Intensity	: 19			25%	1.57	75%	2.22
Clock Freq (MHz)	: 40.0			30%	1.64	80%	2.31
Sum of channels	: 88155			35%	1.70	85%	2.42
Lower Size Limit	: 0.10			40%	1.75	90%	2.55
Upper Size Limit	: 4.99			45%	1.81	95%	2.74
Mean Size	: 1.88	SCANS 13 AND 14 COMBINED		50%	1.87		
Standard Deviation	: 1.28	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 1.92	D(3,2)	: 1.81			Spec surf area:	3.31 sq meter/cc

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.74	0.86	0.17
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.16	0.74	0.02
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.02	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	0.00	3.40	100.00	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	1.97	2.90	98.03	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	9.85	2.50	88.17	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	14.14	2.20	74.04	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	30.08	1.80	43.95	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	16.81	1.60	27.14	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	14.09	1.40	13.05	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	8.58	1.20	4.47	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	3.56	1.00	0.91	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 25 taken on Wed Sep 18 14:41:03 1991 AERODYNAMIC VOLUME DISTRIBUTION
 beclomethasone without Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	2.04	55%	3.03
Density	: 1.00	Heater	: ON	10%	2.26	60%	3.10
Run Length (sec)	: 9.9	Purge	: ON	15%	2.40	65%	3.16
PMT Voltage (volts)	: 1100.0			20%	2.51	70%	3.23
Laser Intensity	: 19			25%	2.61	75%	3.30
Clock Freq (MHz)	: 40.0			30%	2.70	80%	3.38
Sum of channels	: 6275			35%	2.78	85%	3.47
Lower Size Limit	: 0.10			40%	2.85	90%	3.58
Upper Size Limit	: 4.99			45%	2.91	95%	3.71
Mean Size	: 2.93	SCANS 25 AND 26 COMBINED		50%	2.97		
Standard Deviation	: 1.21	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.96	D(3,2)	: 2.85	Spec surf area:	2.10 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.02	0.86	0.03
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.01	0.74	0.02
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.01	0.63	0.01
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	18.69	3.40	81.31	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	37.36	2.90	43.95	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	24.61	2.50	19.34	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	10.82	2.20	8.52	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	6.38	1.80	2.14	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	1.21	1.60	0.93	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.55	1.40	0.38	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.24	1.20	0.14	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.09	1.00	0.05	0.12	0.00	0.10	0.00

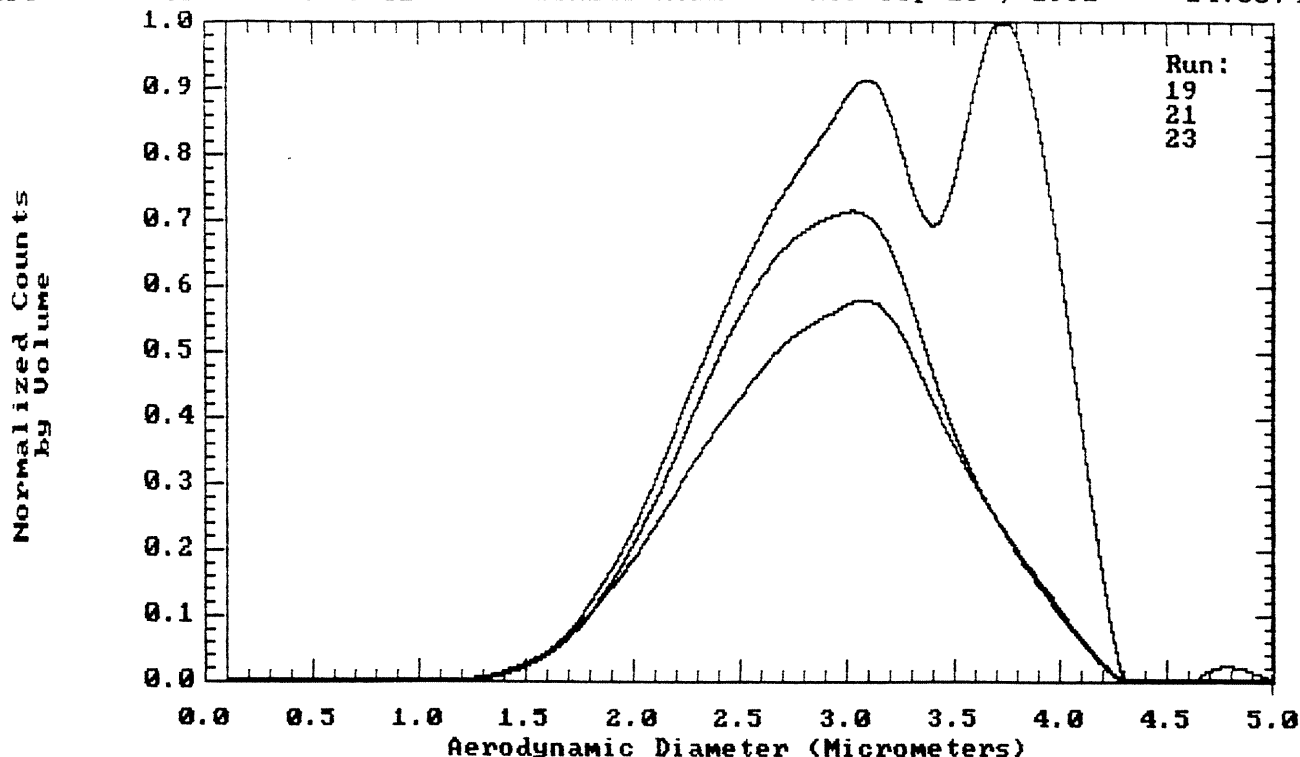
Directory: c:\micro91891 Run 29 taken on Wed Sep 18 14:48:40 1991 AERODYNAMIC VOLUME DISTRIBUTION
 beclomethasone with microspacer Smoothing Level: Coarse
 with larger screen

PARAMETERS				DISPERSER CONTROL				%UNDER	SIZE	%UNDER	SIZE
Material	:	Freon		Dispenser Type	:	AeroSampler		5%	2.07	55%	3.03
Density	:	1.00		Heater	:	ON		10%	2.27	60%	3.09
Run Length (sec)	:	9.9		Purge	:	ON		15%	2.41	65%	3.16
PMT Voltage (volts)	:	1100.0						20%	2.52	70%	3.23
Laser Intensity	:	19						25%	2.62	75%	3.30
Clock Freq (MHz)	:	40.0						30%	2.70	80%	3.38
Sum of channels	:	8120						35%	2.78	85%	3.47
Lower Size Limit	:	0.10						40%	2.85	90%	3.57
Upper Size Limit	:	4.99						45%	2.91	95%	3.69
Mean Size	:	2.94		SCANS 29 AND 30 COMBINED				50%	2.97		
Standard Deviation	:	1.20		BETWEEN 3.0 & 4.0 MICRONS							
D(4,3)	:	2.96		D(3,2)	:	2.87		Spec surf area:	2.09 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.01	0.86	0.01
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.01	0.74	0.01
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.01
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	19.05	3.40	80.95	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	36.89	2.90	44.06	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	25.15	2.50	18.91	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	11.07	2.20	7.84	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	6.18	1.80	1.66	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	1.05	1.60	0.61	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.38	1.40	0.23	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.19	1.20	0.04	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.02	1.00	0.03	0.12	0.00	0.10	0.00

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.95	55%	2.87
Density	: 1.00	Heater	: ON	10%	2.13	60%	2.94
Run Length (sec)	: 9.9	Purge	: ON	15%	2.24	65%	3.00
PMT Voltage (volts)	: 1100.0			20%	2.36	70%	3.06
Laser Intensity	: 19			25%	2.45	75%	3.13
Clock Freq (MHz)	: 40.0			30%	2.52	80%	3.21
Sum of channels	: 5101			35%	2.59	85%	3.31
Lower Size Limit	: 0.10			40%	2.66	90%	3.42
Upper Size Limit	: 4.99			45%	2.73	95%	3.57
Mean Size	: 2.78	SCANS 27 AND 28 COMBINED		50%	2.80		
Standard Deviation	: 1.20	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.80	D(3,2)	: 2.71	Spec surf area:	2.22 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	10.82	3.40	89.18	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	32.00	2.90	57.18	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	28.83	2.50	28.35	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	15.21	2.20	13.14	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	10.62	1.80	2.51	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	1.72	1.60	0.80	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.64	1.40	0.15	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.13	1.20	0.02	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.02	1.00	0.00	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 19 taken on Wed Sep 18 14:27:13 1991 AERODYNAMIC VOLUME DISTRIBUTION
 cromolyn sodium without Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	2.05	55%	3.15
Density	: 1.00	Heater	: ON	10%	2.25	60%	3.26
Run Length (sec)	: 9.6	Purge	: ON	15%	2.40	65%	3.37
PMT Voltage (volts)	: 1100.0			20%	2.52	70%	3.52
Laser Intensity	: 19			25%	2.62	75%	3.62
Clock Freq (MHz)	: 40.0			30%	2.72	80%	3.74
Sum of channels	: 266314			35%	2.81	85%	3.88
Lower Size Limit	: 0.10			40%	2.90	90%	4.88
Upper Size Limit	: 4.99			45%	2.98	95%	4.92
Mean Size	: 3.08	SCANS 19 AND 20 COMBINED		50%	3.06		
Standard Deviation	: 1.27	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 3.15	D(3,2)	: 2.97	Spec surf area:	2.02 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	11.70	4.60	88.30	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	88.30	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	22.37	3.40	65.93	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	25.76	2.90	40.17	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	20.92	2.50	19.25	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	10.80	2.20	8.45	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	6.93	1.80	1.53	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	1.11	1.50	0.42	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.37	1.40	0.05	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.05	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00

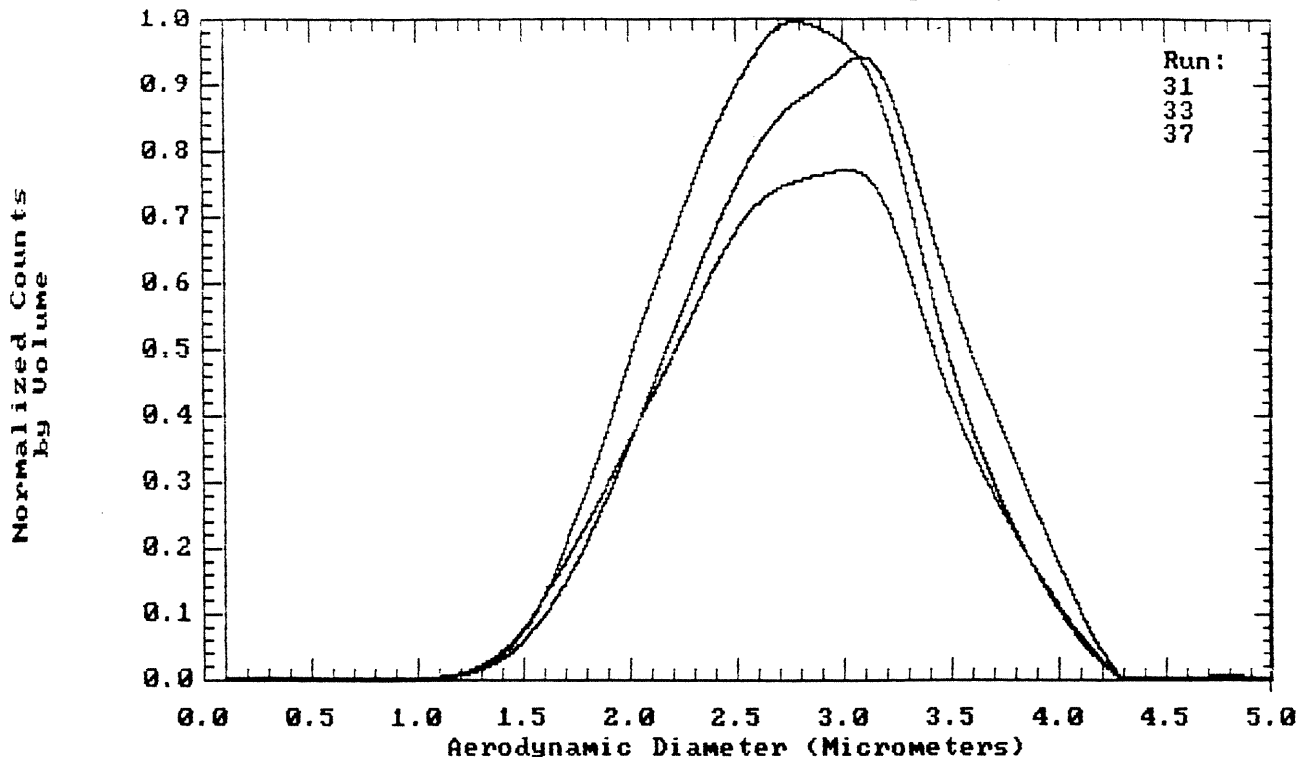
Directory: c:\micro91891 Run 23 taken on Wed Sep 18 14:33:40 1991 AERODYNAMIC VOLUME DISTRIBUTION
 chromolyn sodium with microspacer Smoothing Level: Coarse
 with larger screen

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.92	55%	2.88
Density	: 1.00	Heater	: ON	10%	2.10	60%	2.95
Run Length (sec)	: 9.8	Purge	: ON	15%	2.23	65%	3.01
FMT Voltage (volts)	: 1100.0			20%	2.34	70%	3.08
Laser Intensity	: 19			25%	2.44	75%	3.15
Clock Freq (MHz)	: 40.0			30%	2.52	80%	3.24
Sum of channels	: 181076			35%	2.60	85%	3.33
Lower Size Limit	: 0.10			40%	2.67	90%	3.45
Upper Size Limit	: 4.99			45%	2.75	95%	3.60
Mean Size	: 2.78	SCANS 23 AND 24 COMBINED		50%	2.81		
Standard Deviation	: 1.21	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.81	D(3,2)	: 2.71	Spec surf area:	2.22 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	12.01	3.40	87.99	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	31.50	2.90	56.49	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	27.80	2.50	28.70	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	15.14	2.20	13.56	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	10.58	1.80	2.97	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	2.00	1.60	0.98	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.77	1.40	0.21	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.19	1.20	0.02	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.02	1.00	0.00	0.12	0.00	0.10	0.00

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.97	55%	2.86
Density	: 1.00	Heater	: ON	10%	2.14	60%	2.92
Run Length (sec)	: 9.7	Purge	: ON	15%	2.26	65%	2.99
PMT Voltage (volts)	: 1100.0			20%	2.36	70%	3.05
Laser Intensity	: 19			25%	2.45	75%	3.12
Clock Freq (MHz)	: 40.0			30%	2.53	80%	3.20
Sum of channels	: 210619			35%	2.60	85%	3.29
Lower Size Limit	: 0.10			40%	2.67	90%	3.41
Upper Size Limit	: 4.99			45%	2.73	95%	3.56
Mean Size	: 2.78	SCANS 21 AND 22 COMBINED		50%	2.80		
Standard Deviation	: 1.20	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.80	D(3,2)	: 2.71	Spec surf area:	2.21 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	10.28	3.40	89.72	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	31.73	2.90	57.99	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	29.76	2.50	28.24	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	16.01	2.20	12.23	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	10.03	1.80	2.20	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	1.60	1.60	0.60	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	0.52	1.40	0.07	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.07	1.20	0.00	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.00	1.00	0.00	0.12	0.00	0.10	0.00



Directory: c:\micro91891 Run 31 taken on Wed Sep 18 14:57:08 1991 AERODYNAMIC VOLUME DISTRIBUTION
 flunisolide without Smoothing Level: Coarse

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.86	55%	2.85
Density	: 1.00	Heater	: ON	10%	2.05	60%	2.92
Run Length (sec)	: 9.8	Purge	: ON	15%	2.18	65%	2.99
PMT Voltage (volts)	: 1100.0			20%	2.30	70%	3.06
Laser Intensity	: 19			25%	2.39	75%	3.14
Clock Freq (MHz)	: 40.0			30%	2.48	80%	3.22
Sum of channels	: 186222			35%	2.56	85%	3.32
Lower Size Limit	: 0.10			40%	2.64	90%	3.44
Upper Size Limit	: 4.99			45%	2.71	95%	3.60
Mean Size	: 2.75	SCANS 31 AND 32 COMBINED		50%	2.78		
Standard Deviation	: 1.22	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.78	D(3,2)	: 2.67	Spec surf area:	2.25 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	11.43	3.40	88.57	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	30.28	2.90	58.29	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	26.95	2.50	31.35	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	15.65	2.20	15.69	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	11.89	1.80	3.80	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	2.49	1.60	1.31	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	1.00	1.40	0.31	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.27	1.20	0.04	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.04	1.00	0.00	0.12	0.00	0.10	0.00

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.78	55%	2.79
Density	: 1.00	Heater	: ON	10%	1.97	60%	2.86
Run Length (sec)	: 9.7	Purge	: ON	15%	2.10	65%	2.93
PMT Voltage (volts)	: 1100.0			20%	2.22	70%	3.00
Laser Intensity	: 19			25%	2.32	75%	3.08
Clock Freq (MHz)	: 40.0			30%	2.41	80%	3.16
Sum of channels	: 178665			35%	2.49	85%	3.26
Lower Size Limit	: 0.10			40%	2.57	90%	3.38
Upper Size Limit	: 4.99			45%	2.64	95%	3.55
Mean Size	: 2.68	SCANS 37 AND 38 COMBINED		50%	2.72		
Standard Deviation	: 1.23	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.71	D(3,2)	: 2.60	Spec surf area:	2.31 sq meter/cc		

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	9.25	3.40	90.75	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	27.89	2.90	62.85	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	27.17	2.50	35.68	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	16.51	2.20	19.17	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	13.71	1.80	5.46	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	3.42	1.60	2.04	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	1.52	1.40	0.52	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.44	1.20	0.08	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.08	1.00	0.00	0.12	0.00	0.10	0.00

PARAMETERS		DISPERSER CONTROL		%UNDER	SIZE	%UNDER	SIZE
Material	: Freon	Dispenser Type	: AeroSampler	5%	1.82	55%	2.76
Density	: 1.00	Heater	: ON	10%	1.99	60%	2.83
Run Length (sec)	: 9.7	Purge	: ON	15%	2.11	65%	2.90
PMT Voltage (volts)	: 1100.0			20%	2.22	70%	2.97
Laser Intensity	: 19			25%	2.31	75%	3.04
Clock Freq (MHz)	: 40.0			30%	2.40	80%	3.12
Sum of channels	: 221521			35%	2.47	85%	3.22
Lower Size Limit	: 0.10			40%	2.55	90%	3.34
Upper Size Limit	: 4.99			45%	2.62	95%	3.51
Mean Size	: 2.67	SCANS 33 AND 34 COMBINED		50%	2.69		
Standard Deviation	: 1.22	BETWEEN 3.0 & 4.0 MICRONS					
D(4,3)	: 2.70	D(3,2)	: 2.59	Spec surf area:		2.32 sq meter/cc	

UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER	UPPER SIZE	% IN	LOWER SIZE	% UNDER
				100.00	0.00	86.00	100.00	10.00	0.00	8.60	100.00	1.00	0.00	0.86	0.00
				86.00	0.00	74.00	100.00	8.60	0.00	7.40	100.00	0.86	0.00	0.74	0.00
				74.00	0.00	63.00	100.00	7.40	0.00	6.30	100.00	0.74	0.00	0.63	0.00
				63.00	0.00	54.00	100.00	6.30	0.00	5.40	100.00	0.63	0.00	0.54	0.00
				54.00	0.00	46.00	100.00	5.40	0.00	4.60	100.00	0.54	0.00	0.46	0.00
				46.00	0.00	40.00	100.00	4.60	0.00	4.00	100.00	0.46	0.00	0.40	0.00
				40.00	0.00	34.00	100.00	4.00	7.99	3.40	92.01	0.40	0.00	0.34	0.00
				34.00	0.00	29.00	100.00	3.40	26.82	2.90	65.19	0.34	0.00	0.29	0.00
				29.00	0.00	25.00	100.00	2.90	28.56	2.50	36.63	0.29	0.00	0.25	0.00
				25.00	0.00	22.00	100.00	2.50	17.58	2.20	19.05	0.25	0.00	0.22	0.00
220.00	0.00	180.00	100.00	22.00	0.00	18.00	100.00	2.20	14.41	1.80	4.64	0.22	0.00	0.18	0.00
180.00	0.00	160.00	100.00	18.00	0.00	16.00	100.00	1.80	3.16	1.60	1.48	0.18	0.00	0.16	0.00
160.00	0.00	140.00	100.00	16.00	0.00	14.00	100.00	1.60	1.17	1.40	0.31	0.16	0.00	0.14	0.00
140.00	0.00	120.00	100.00	14.00	0.00	12.00	100.00	1.40	0.29	1.20	0.02	0.14	0.00	0.12	0.00
120.00	0.00	100.00	100.00	12.00	0.00	10.00	100.00	1.20	0.02	1.00	0.00	0.12	0.00	0.10	0.00