CHAPTER IV

EXPERIMENTAL RESULTS
This chapter deals with the experimental observations regarding effect of concentration and temperature on mean size, size distribution and its time evolution for methylene blue, uranine and smoke aerosols.

4.1 SIZE

First samples at very low concentration (i.e., at infinite dilution) were prepared. Observations were made with freshly prepared samples after sonication. All measurements were analyzed using the technique of cumulants for three runs.

4.1.1 Methylene Blue

The observed correlogram for methylene blue is shown in fig (4.1) at Concentration (= 0.01 wt%) and Temperature (= 25°C). The inferred decay constants and sizes are given in table (4.1.1.).

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Decay Constant $\gamma$ (sec$^{-1}$)</th>
<th>Size (micron)</th>
<th>Mean Size (micron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$3.56 \times 10^2$</td>
<td>0.405</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>$3.53 \times 10^2$</td>
<td>0.409</td>
<td>0.407</td>
</tr>
<tr>
<td>3.</td>
<td>$3.55 \times 10^2$</td>
<td>0.406</td>
<td></td>
</tr>
</tbody>
</table>
METHYLENE BLUE
C=.01% T=25 SAMPLE TIME=110E-06

\[ g_2(\tau) \]

\[ 1 \]

\[ 0.8 \]

\[ 0.6 \]

\[ 0.4 \]

\[ 0.2 \]

\[ 0.0 \]

\[ 0 \]

\[ 0.002 \]

\[ 0.004 \]

\[ 0.006 \]

\[ 0.008 \]

DELAY TIME

\text{CORRELATION CURVE}

\text{Fig. 4.1:}
The mean size of the methylene blue particles at 25°C comes out to be 0.407 micron.

4.1.2 Uranine

Fig (4.2) shows the correlogram of uranine sample for Concentration (= 0.01wt%) and Temperature (= 25°C). The estimated decay constants and mean size are given in table (4.1.2).

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Decay Constant ( \gamma ) ( \text{sec}^{-1} )</th>
<th>Size ( \text{micron} )</th>
<th>Mean Size ( \text{micron} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( 4.63 \times 10^2 )</td>
<td>0.305</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>( 4.59 \times 10^2 )</td>
<td>0.308</td>
<td>0.308</td>
</tr>
<tr>
<td>3.</td>
<td>( 4.53 \times 10^2 )</td>
<td>0.312</td>
<td></td>
</tr>
</tbody>
</table>

The mean size of the uranine particles at 25°C is found to be 0.308 micron.

4.1.3 Smoke

Sonication of samples was not required in this case. Observations were made after one minute of lighting the cigarette. The correlogram is shown in Fig (4.3) for Concentration (= 0.01wt%) and Temperature
URANINE

T = 25, C = 0.01%  SAMPLE TIME = 75E-06

![Correlation Curve](image)

\[ g(\tau) \]

**Fig 42:**  
CORRELATION CURVE
SMOKE
T=25, C=0.01% SAMPLE TIME=2E-06

$g_2(\tau)$

DELAY TIME (1E-5)

CORRELATION CURVE

Fig 4.3:
(= 25°C). Table 4.1.3 presents the estimated decay constants and mean size.

Table 4.1.3: Mean Size for Smoke

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Decay Constant $\gamma$ (sec$^{-1}$)</th>
<th>Size (micron)</th>
<th>Mean Size (micron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>5.21x10$^4$</td>
<td>0.145</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>5.35x10$^4$</td>
<td>0.141</td>
<td>0.143</td>
</tr>
<tr>
<td>3.</td>
<td>5.32x10$^4$</td>
<td>0.142</td>
<td></td>
</tr>
</tbody>
</table>

The mean size of the smoke aerosols is found to be 0.143 micron at 25°C.

4.2 EFFECT OF CONCENTRATION

To study the effect of concentration on particle size, three concentration regimes were chosen by visible observation of turbidity. They were classified as low (0.01% - 0.05%), intermediate (0.1% - 0.5%) and high (1%). All the observations were made after 24 hours of sample preparation. Sonication was not done for concentration studies. Temperature was kept at 25°C.

4.2.1 Methylene Blue

Fig (4.4) shows correlograms at various concentrations at $T=25^\circ$C. Table 4.2.1 gives the observed decay constants and mean sizes at various concentrations.
METHYLENE BLUE

T=25, C=0.01% SAMPLE TIME=110E-06

METHYLENE BLUE

T=25, C=0.05% SAMPLE TIME=100E-06

METHYLENE BLUE

T=25, C=0.5% SAMPLE TIME=150E-06

METHYLENE BLUE

T=25, C=1% SAMPLE TIME=160E-06
Table 4.2.1: Effect of Concentration

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Concentration (wt%)</th>
<th>Decay Constant $\gamma$(sec$^{-1}$)</th>
<th>Size (micron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>0.01%</td>
<td>3.54x10$^2$</td>
<td>0.408</td>
</tr>
<tr>
<td>2.</td>
<td>0.05%</td>
<td>3.27x10$^2$</td>
<td>0.440</td>
</tr>
<tr>
<td>3.</td>
<td>0.1%</td>
<td>1.99x10$^2$</td>
<td>0.723</td>
</tr>
<tr>
<td>4.</td>
<td>0.5%</td>
<td>1.81x10$^2$</td>
<td>0.799</td>
</tr>
<tr>
<td>5.</td>
<td>1%</td>
<td>1.61x10$^2$</td>
<td>0.894</td>
</tr>
</tbody>
</table>

There was very little change in the size in the low concentration regime (0.01% to 0.05%) but a sort of transition takes place while going from low to intermediate concentration regime. A large increase was found while going from 0.05% to 0.1%. But after that size increase were not so high. There was gradual increase in size from 0.1% to 1%.

4.2.2 Uranine

Correlograms at various concentrations for T=25°C are given in fig (4.5). The inferred decay constants and sizes at various concentrations are given in table (4.2.2).
URANINE

T = 25, C = 0.01%  
SAMPLE TIME = 75E-06

Fig. 4.5

T = 25, C = 0.5%  
SAMPLE TIME = 150E-06
### Table 4.2.2: Effect of Concentration

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Concentration (wt%)</th>
<th>Decay Constant $\gamma$(sec$^{-1}$)</th>
<th>Size (micron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>0.01%</td>
<td>$4.53 \times 10^{-2}$</td>
<td>0.312</td>
</tr>
<tr>
<td>2.</td>
<td>0.05%</td>
<td>$4.36 \times 10^{-2}$</td>
<td>0.324</td>
</tr>
<tr>
<td>3.</td>
<td>0.1%</td>
<td>$3.26 \times 10^{-2}$</td>
<td>0.434</td>
</tr>
<tr>
<td>4.</td>
<td>0.5%</td>
<td>$1.84 \times 10^{-2}$</td>
<td>0.766</td>
</tr>
<tr>
<td>5.</td>
<td>1%</td>
<td>$1.44 \times 10^{-2}$</td>
<td>0.983</td>
</tr>
</tbody>
</table>

Uranine follows the same pattern of size evolution with concentration as methylene blue except that the jump in size occurs at 0.5% and increases gradually later on.

### 4.2.3 Smoke

Fig (4.6) shows correlograms at various concentrations for $T=25^\circ$C. The estimated decay constants and sizes are given in table (4.2.3).

### Table 4.2.3: Effect of Concentration

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Concentration (wt%)</th>
<th>Decay Constant $\gamma$(sec$^{-1}$)</th>
<th>Size (micron)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>0.01%</td>
<td>$5.28 \times 10^{4}$</td>
<td>0.143</td>
</tr>
<tr>
<td>2.</td>
<td>0.05%</td>
<td>$3.59 \times 10^{4}$</td>
<td>0.210</td>
</tr>
<tr>
<td>3.</td>
<td>0.1%</td>
<td>$1.99 \times 10^{4}$</td>
<td>0.378</td>
</tr>
<tr>
<td>4.</td>
<td>0.5%</td>
<td>$1.29 \times 10^{4}$</td>
<td>0.586</td>
</tr>
<tr>
<td>5.</td>
<td>1%</td>
<td>$1.06 \times 10^{4}$</td>
<td>0.712</td>
</tr>
</tbody>
</table>
For the smoke aerosols, size increases with concentration. No sudden increase in size is observed. However, it shows an increase even in the chosen low concentration regime.

4.3 EFFECT OF TEMPERATURE

Size evolution of particulates with temperature was observed at various concentrations. To study the samples, they were taken to optical bench after 24 hours of preparation except cigarette for which observations were made after 1 minute of lighting.

4.3.1 Methylene Blue

Figures (4.7) - (4.11) show sets of correlograms at various concentrations for different temperatures.

<table>
<thead>
<tr>
<th>Table 4.3.1: Effect of temperature on size at various concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration (wt%)</td>
</tr>
<tr>
<td>Temperature °C</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>35</td>
</tr>
<tr>
<td>40</td>
</tr>
</tbody>
</table>
METHYLENE BLUE
C=0.01%, T=20, SAMPLE TIME=120E-06

METHYLENE BLUE
C=0.01%, T=35, SAMPLE TIME=75E-06

METHYLENE BLUE
C=0.01%, T=30, SAMPLE TIME=80E-06

CORRELATION CURVES
METHYLENE BLUE
T-20, C-0.5% SAMPLE TIME-150E-06

METHYLENE BLUE
T-35, C-0.5% SAMPLE TIME-130E-06

METHYLENE BLUE
T-30, C-0.5% SAMPLE TIME-130E-06

Fig. 4.10
METHYLENE BLUE
T-20, C-1% SAMPLE TIME=160E-06

Fig. 4.1
Looking at the table it's amply clear that the effect of temperature on size is not so pronounced as the effect of concentration.

For 0.01% concentration there is no significant change in the size with increase in temperature. For 0.05% concentration size increases with temperature except a slight decrease at 40°C. Whereas for 0.1% concentration size increase with temperature initially and thereafter shows a decrease at 35°C onwards. For 0.5% and 1% concentrations size variation with temperature depicts the same pattern as that of 0.1% case.

4.3.2 Uranine

Figs (4.12) - (4.16) present correlograms of uranine at various concentrations for various temperatures.

Table 4.3.2: **Effect of temperature on size at various concentrations**

<table>
<thead>
<tr>
<th>Concentration (wt%)</th>
<th>0.01%</th>
<th>0.05%</th>
<th>0.1%</th>
<th>0.5%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>0.303</td>
<td>0.293</td>
<td>0.382</td>
<td>0.627</td>
<td>0.911</td>
</tr>
<tr>
<td>25</td>
<td>0.312</td>
<td>0.324</td>
<td>0.434</td>
<td>0.766</td>
<td>0.983</td>
</tr>
<tr>
<td>30</td>
<td>0.311</td>
<td>0.322</td>
<td>0.473</td>
<td>0.822</td>
<td>0.974</td>
</tr>
<tr>
<td>35</td>
<td>0.327</td>
<td>0.319</td>
<td>0.425</td>
<td>0.622</td>
<td>0.792</td>
</tr>
<tr>
<td>40</td>
<td>0.335</td>
<td>0.356</td>
<td>0.372</td>
<td>0.491</td>
<td>0.618</td>
</tr>
</tbody>
</table>
URANINE

T=20, C=0.1%
SAMPLE TIME = 100E-06

--- CORRELATION CURVE

T=25, C=0.1%
SAMPLE TIME = 105E-06

--- CORRELATION CURVE

T=30, C=0.1%
SAMPLE TIME = 100E-06

--- CORRELATION CURVE

T=35, C=0.1%
SAMPLE TIME = 85E-06

--- CORRELATION CURVE

T=40, C=0.1%
SAMPLE TIME = 60E-06

--- CORRELATION CURVE

Fig. 4.14
URANIINE
T=20,C=0.5% \hspace{1cm} \text{SAMPLE TIME}=130E-06

\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig1.png}
\caption{Correlation Curve}
\end{figure}

T=25,C=0.5% \hspace{1cm} \text{SAMPLE TIME}=150E-06

\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig2.png}
\caption{Correlation Curve}
\end{figure}

T=30,C=0.5% \hspace{1cm} \text{SAMPLE TIME}=140E-06

\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig3.png}
\caption{Correlation Curve}
\end{figure}

T=35,C=0.5% \hspace{1cm} \text{SAMPLE TIME}=120E-06

\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig4.png}
\caption{Correlation Curve}
\end{figure}

T=40,C=0.5% \hspace{1cm} \text{SAMPLE TIME}=80E-06

\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig5.png}
\caption{Correlation Curve}
\end{figure}

\textbf{Fig. 4.15}
At 0.01% concentration, size increases from 0.303 μ to 0.335 μ with increase in temperature in the range 20°C - 40°C. At 0.05% concentration, size increases from 0.293 μ to 0.356 μ with increase in temperature with the singular exception of size (0.319 μ) at 35°C. At 0.1% concentration, size increases from 0.382 μ to 0.473 μ with increase in temperature from 20°C to 30°C. However, with further increase in temperature from 35°C to 40°C it shows a decrease, depicted by sizes at which are 0.425 μ and 0.372 μ respectively. At 0.5% concentration, the same pattern is observed as for 0.1%. Size increases from 0.627 μ to 0.822 μ and then decreases to 0.491 μ. At 1% concentration, the situation is a bit different. Although size increases with increase in temperature initially, a sharp decrease in size is observed in the temperature range of 25°C to 40°C.

4.3.3 Smoke

Correlograms for different concentrations at various temperatures are presented in Figs (4.17) - (4.21).
SMOKE

T = 20, C = 0.01%  SAMPLE TIME = 3E-06

CORRELATION CURVE

T = 25, C = 0.01%  SAMPLE TIME = 2E-06

CORRELATION CURVE

T = 30, C = 0.01%  SAMPLE TIME = 2E-06

CORRELATION CURVE

T = 35, C = 0.01%  SAMPLE TIME = 2E-06

CORRELATION CURVE

T = 40, C = 0.01%  SAMPLE TIME = 1E-06

CORRELATION CURVE

Fig 4.17
**SMOKE**

**T=20, C=0.05% SAMPLE TIME=4E-06**

---

**CORRELATION CURVE**

---

**T=25, C=0.05% SAMPLE TIME=4E-06**

---

**T=30, C=0.05% SAMPLE TIME=3E-06**

---

**T=35, C=0.05% SAMPLE TIME=2E-06**

---

**T=40, C=0.05% SAMPLE TIME=2E-06**

---

**CORRELATION CURVE**

---

**Fig. 4.18**
SMOKE
T=20, C=0.1%  SAMPLE TIME=5E-06

T=25, C=0.1%  SAMPLE TIME=5E-06

T=30, C=0.1%  SAMPLE TIME=4E-06

T=35, C=0.1%  SAMPLE TIME=4E-06

T=40, C=0.1%  SAMPLE TIME=4E-06

Fig. 4.19
T=20,C=0.5%  SAMPLE TIME=5E-06

T=25,C=0.5%  SAMPLE TIME=6E-06

T=30,C=0.5%  SAMPLE TIME=6E-06

T=35,C=0.5%  SAMPLE TIME=6E-06

Fig. 4.20
Table 4.3.3: Effect of temperature on size at various concentrations

<table>
<thead>
<tr>
<th>Concentration (wt%)</th>
<th>Temperature °C</th>
<th>0.01%</th>
<th>0.05%</th>
<th>0.1%</th>
<th>0.5%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0.154</td>
<td>0.255</td>
<td>0.413</td>
<td>0.622</td>
<td>0.782</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>0.143</td>
<td>0.210</td>
<td>0.378</td>
<td>0.586</td>
<td>0.712</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0.112</td>
<td>0.198</td>
<td>0.315</td>
<td>0.525</td>
<td>0.681</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>0.089</td>
<td>0.154</td>
<td>0.298</td>
<td>0.516</td>
<td>0.632</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>0.061</td>
<td>0.097</td>
<td>0.212</td>
<td>0.420</td>
<td>0.613</td>
<td></td>
</tr>
</tbody>
</table>

In case of smoke aerosols situation is quite different from other samples. The sizes decrease with increase in temperature.

At 0.01% concentration, the size decreases gradually, starting from 0.154 μ at 20°C it declines to 0.061 μ at 40°C. At other concentrations also, same behaviour is noticed.

4.4 SIZE DISTRIBUTION

Generally most of the samples for particle sizing measurements are polydisperse except especially prepared monodisperse samples like polystyrene latex beads. In such cases knowledge of size distribution instead of mean size becomes desirable for a better and complete understanding of the sample.
With the use of CONTIN (constrained regularisation method) PCS data has been analysed for size distribution.

4.4.1 Methylene Blue

Size distribution curve of methylene blue for 0.01% concentration and temperature (=25°C) is given in fig (4.22). The distribution is a unimodal with particles from size 0.02 micron to 1.72 micron. $M_1/M_0$ ($M_1$ & $M_0$ are first and zero order moments of the distribution) for the distribution is found to be $4.04 \times 10^{-5}$ which corresponds to the mean size of 0.404 micron. The peak of the distribution occurs for particle size of $1.47 \times 10^{-5}$ cm (0.147 micron).

4.4.2 Uranine

The size distribution curve of uranine for concentration 0.01% and temperature (=25°C) is presented in fig (4.23). For uranine also, the distribution is unimodal. The particles present are in the size range of 0.01 micron to 1 micron. The peak of the distribution occurs at particle size of 0.117 micron. The mean size is found to be 0.302 micron.

4.4.3 Smoke

For smoke size distribution curve is given in Fig (4.24). The distribution obtained is for concentration 0.01% and temperature (=25°C).
METHYLENE BLUE
C = .01% T = 25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.22
URANINE
C = .01% T = 25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig 4.23

SIZE DISTB'N
Smoke also shows a unimodal distribution with particle size ranging from 0.01 micron to 0.6 micron. The peak of the distribution occurs at particle size of 0.063 micron. The mean size is found to be 0.140 micron.

4.5 TIME EVOLUTION OF SIZE DISTRIBUTION

Samples of 0.05% concentration were taken for time evolution studies. Observations were made at the interval of 24 hours for methylene blue and uranine and for cigarette at the interval of 2 minutes.

4.5.1 Methylene Blue

After 24 hours - The size distribution curve gives a peak at 0.126 micron (Fig. 4.25). The distribution is smooth one with particle sizes varying from 0.02 micron to 1.72 micron. The mean size comes out to be 0.356 micron.

After 48 hours - The size distribution curve (Fig. 4.26) peaks for 0.126 micron. The distribution is unimodal and smooth. Particle sizes present are from 0.02 micron to 1.26 micron. The mean size is found to be 0.309 micron.

After 72 hours - The peak for the distribution (Fig. 4.27) occurs at 0.108 micron. The distribution is smooth and unimodal with particles in the range of 0.02 micron to 1.08 micron. The mean size is 0.262 micron.
METHYLENE BLUE
C = 0.05% T = 25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

SIZE DISTBN 24H
METHYLENE BLUE
C-.05% T-25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.27

SIZE DISTB'N 72hrs
METHYlene BLUE
C-.05% T-25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.28
SIZE DISTB'N 96hrs
METHYLENE BLUE
C=.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.29

SIZE DISTB'N 120hrs
After 96 hours - The distribution (Fig. 4.28) is smooth with particle sizes varying from 0.02 micron to 0.586 micron. The peak for distribution is observed at 0.108 micron. The mean size for the distribution is 0.178 micron.

After 120 hours - The distribution (Fig. 4.29) is smooth with peak at 0.108 micron and particle sizes from 0.02 micron to 0.431 micron. The mean size for the distribution is 0.161 micron.

4.5.2 Uranine

After 24 hours - A smooth unimodal size distribution curve is obtained (Fig. 4.30). The peak of the distribution is at 0.126 micron. Particles are in the range of 0.02 micron to 1.08 micron. The mean size for the distribution is 0.281 micron.

After 48 hours - The size distribution curve (Fig. 4.31) obtained is smooth and unimodal with peak at 0.108 micron. Size of the particles vary from 0.02 micron to 0.928 micron. The mean size is found to be 0.246 micron.

After 72 hours - The size distribution curve (Fig. 4.32) is smooth and unimodal. The peak of the distribution occurs at 0.108 micron. Size of the particles vary from 0.02 micron to 0.796 micron. The mean size for the distribution is found to be 0.225 micron.
URANINE
C=.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.30

SIZE DISTB'N 24hrs
URANINE
C= .05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.31

SIZE DISTB'N 4.8hrs
URANINE
C=0.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.32

SIZE DISTB'N 72hrs
URANINE
C=.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.33

SIZE DISTB’N 96hrs
URANINE
C=.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.34  --- SIZE DISTBN'N 120hrs
After 96 hours - The peak of the distribution (Fig. 4.33) can be noticed at 0.108 micron again. Particle sizes vary from 0.02 micron to 0.683 micron. The mean size for the distribution is 0.208 micron.

After 120 hours - Again the peak occurs at 0.108 micron (Fig. 4.34) but the range reduces from 0.02 micron to 0.586 micron. The mean size turns out to be 0.171 micron.

4.5.3 Smoke

The distribution curves obtained at different time intervals, starting after 1 minute were smooth and unimodal.

After 1 minute - The peak of the distribution (Fig. 4.35) is at 0.053 micron. Particles present are in the range of 0.001 micron to 1 micron. Mean size is 0.193 micron.

After 3 minutes - The peak of the distribution shifts to 0.046 micron (Fig. 4.36). Range of particle size is 0.01 micron to 0.858 micron and the mean size is 0.224 micron.

After 5 minutes - The distribution curve (Fig. 4.37) shows the peak at 0.045 micron. Size range is from 0.01 micron to 1 micron and the mean size is 0.254 micron.
SMOKE
C=.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig 4.35

SIZE DISTB'N 1 mnt
SMOKE
C = .05% T = 25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig. 4.36

SIZE DISTB'N 3 mnts
SMOKE
C= .05% T= 25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig 4.37  SIZE DISTB'N 5 mnts
SMOKE
C=-0.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig 4.38
SIZE DISTB'N 7 mnts
SMOKE
C=0.05% T=25

RELATIVE INTENSITY

PARTICLE SIZE (micron)

Fig 4.39
SIZE DISTB’N 9 mnts
After 7 minutes - The peak of the distribution shifts further to 0.039 micron (Fig. 4.38). Range of particle size is from 0.01 micron to 0.631 micron and the mean size is 0.295 micron.

After 9 minutes - The peak shifts towards higher size at 0.117 micron (Fig. 4.39). Size range is from 0.01 micron to 1 micron with mean size of 0.315 micron.