

# Nose-Only Inhalation Exposure

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Larry E. Bowen  
Southern Research  
Birmingham, AL

# Overview

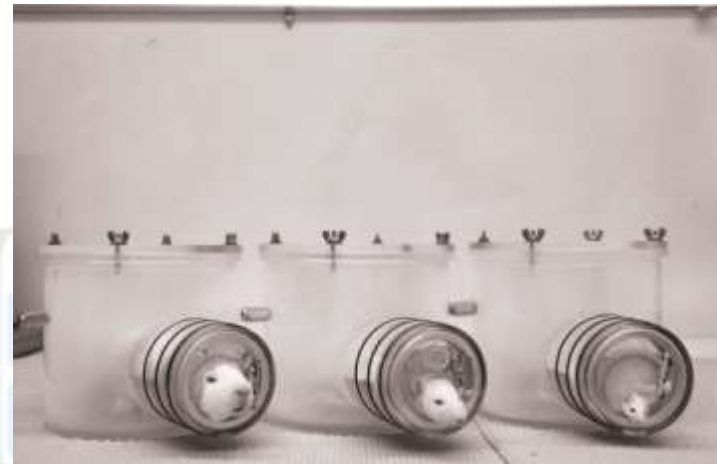
- History of Inhalation
- Types of Inhalation Exposure
- Nose-Only Inhalation Exposure
- Plastic versus Metal Plenums
- In-Tox Products Nose-Only Exposure Plenums
- Plenum Design & Characterization
- Applications & Flexibility

# History of Inhalation

- Historical
  - Airborne pollutants → Disease
- WWI
  - use of poisonous gases
- WWII
  - chemical, biological, and radioactive materials
- Post WWII
  - engine exhaust, cigarette smoke

# Types of Inhalation Exposure

- Whole Body
- Head Only
- Lung Only
- Partial Lung
- Nose Only



# Nose-Only Inhalation

- Types of Chambers
  - Flow-past
  - Directed flow



# Nose-Only Inhalation

- Advantages
  - Efficient use of test and challenge articles
  - Reduces exposure routes
  - Increases containment
  - Even distribution of test article in lungs
  - Most natural route of exposure

# Nose-Only Inhalation

- Disadvantages
  - Labor intensive
  - Indirect measurement of inhaled and deposited doses
  - Restraint related stress

# Problems With Plastic

- Issues
  - Age rapidly with use
  - Temperature and pressure effects
  - Decontamination
  - Disposal
  - Static charge





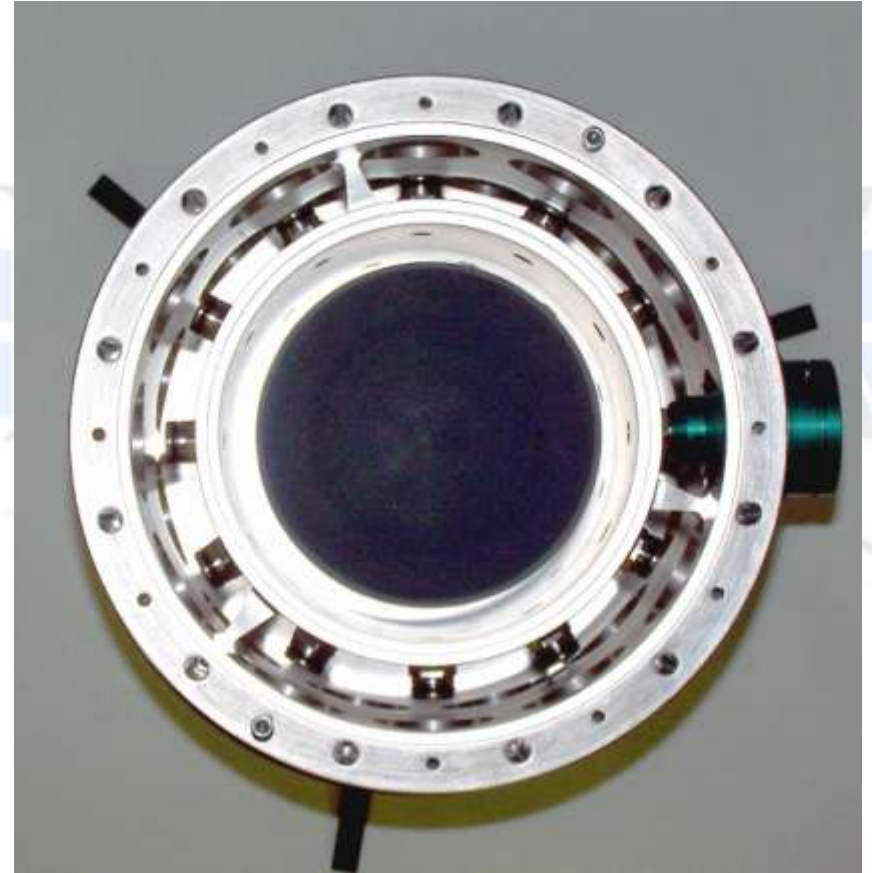
# In-Tox Nose-Only Plenums

- Design
- Characterization
- Applications
- Flexibility



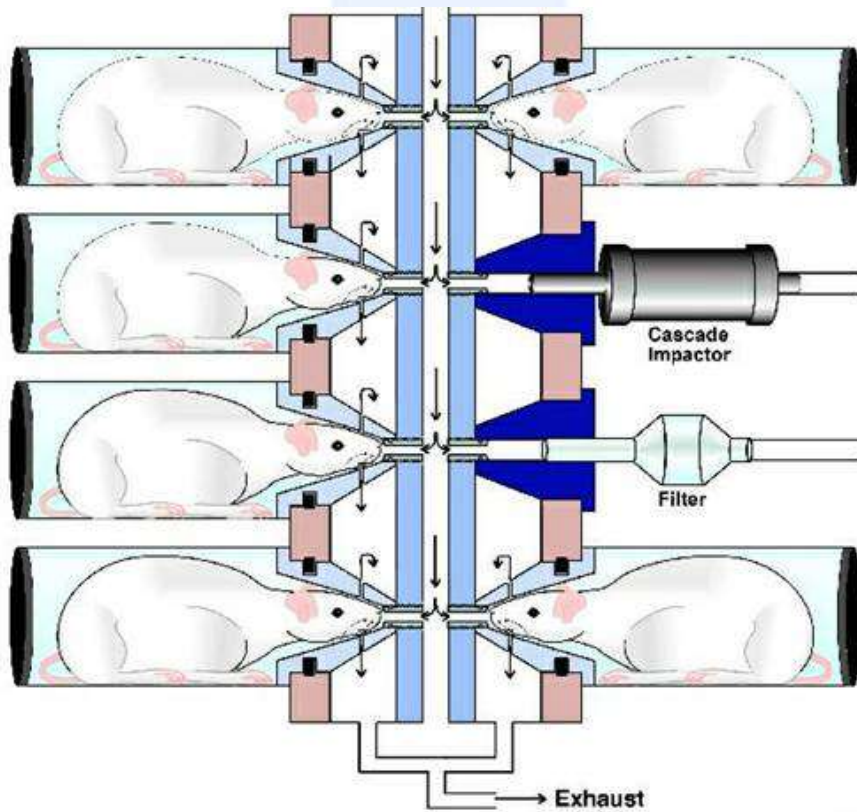
# In-Tox Nose-Only Plenums

- Design
  - Directed flow
  - Positive Flow-By™ nose cones
  - Negative pressure operation
  - Non re-breathing

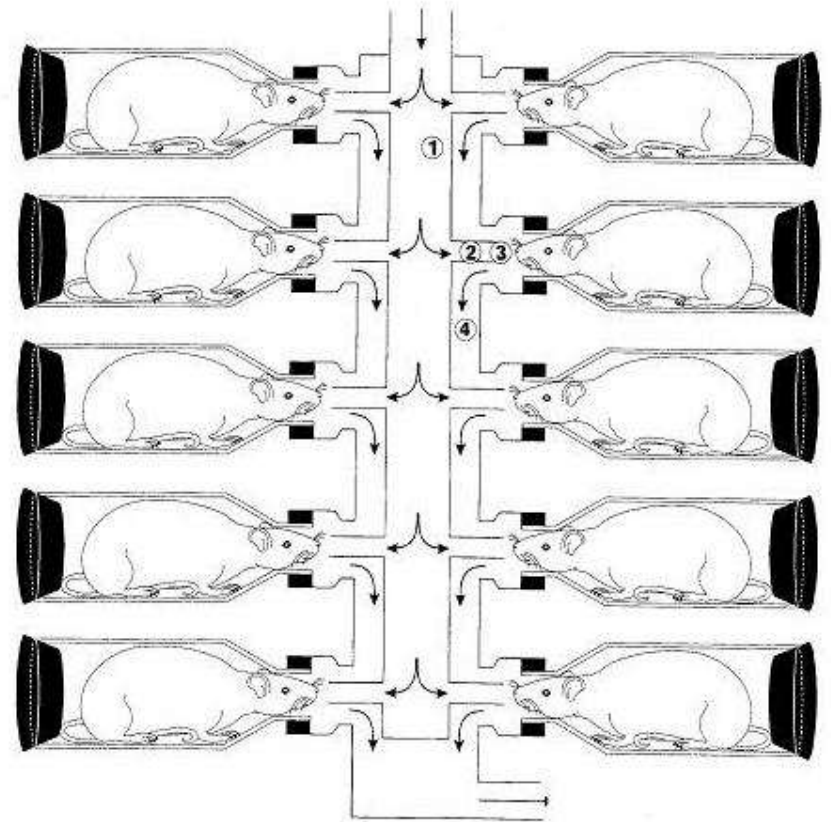


# Plenum Design

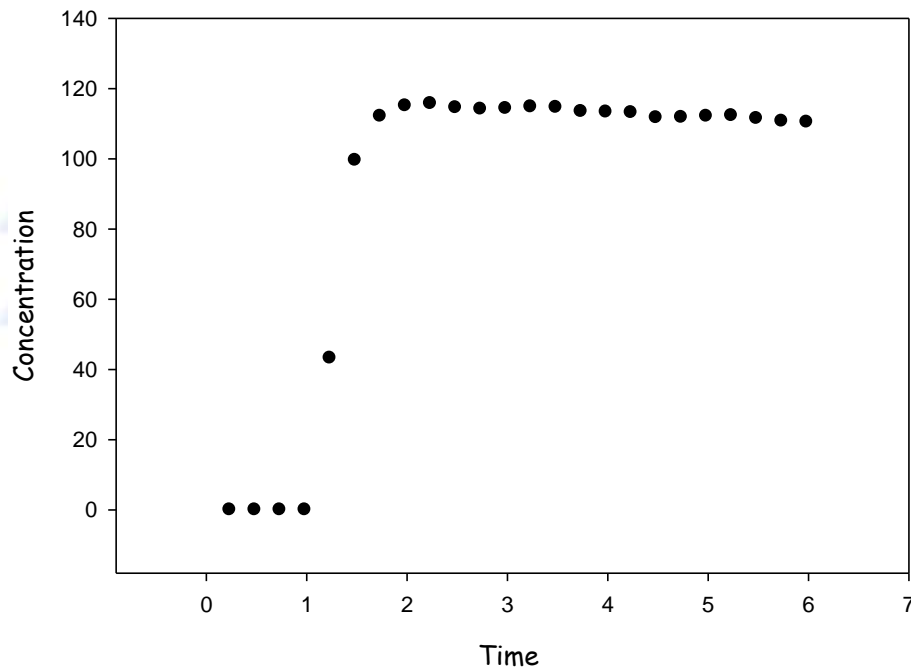
In-Tox



Others



# Plenum Time-to-Concentration



Time	Conc.	Time	Conc.	Time	Conc.
0.00	0.000	2.23	115.710	4.23	113.12
0.23	0.002	2.48	114.500	4.48	111.66
0.48	0.006	2.73	114.120	4.73	111.77
0.73	0.005	2.98	114.310	4.98	112.08
0.98	0.003	3.23	114.810	5.23	112.27
1.23	43.210	3.48	114.620	5.48	111.44
1.48	99.550	3.73	113.440	5.73	110.67
1.73	112.090	3.98	113.300	5.98	110.43
				$T_{max}$	2.23
				$T_{90}$	2.11

# Plenum Homogeneity/Distribution

$$(\%CV_{\text{spatial}})^2 = (\%CV_{\text{total}})^2 - (\%CV_{\text{temporal}})^2$$

- In-Tox Plenum

- $\%CV_{\text{total}} = 6.0$
- $\%CV_{\text{temporal}} = 4.3$
- $\%CV_{\text{spatial}} = 4.2$

- Canon Plenum

- $\%CV_{\text{total}} = 9.1$
- $\%CV_{\text{temporal}} = 1.5$
- $\%CV_{\text{spatial}} = 8.7$



# Applications



# Applications



# Applications



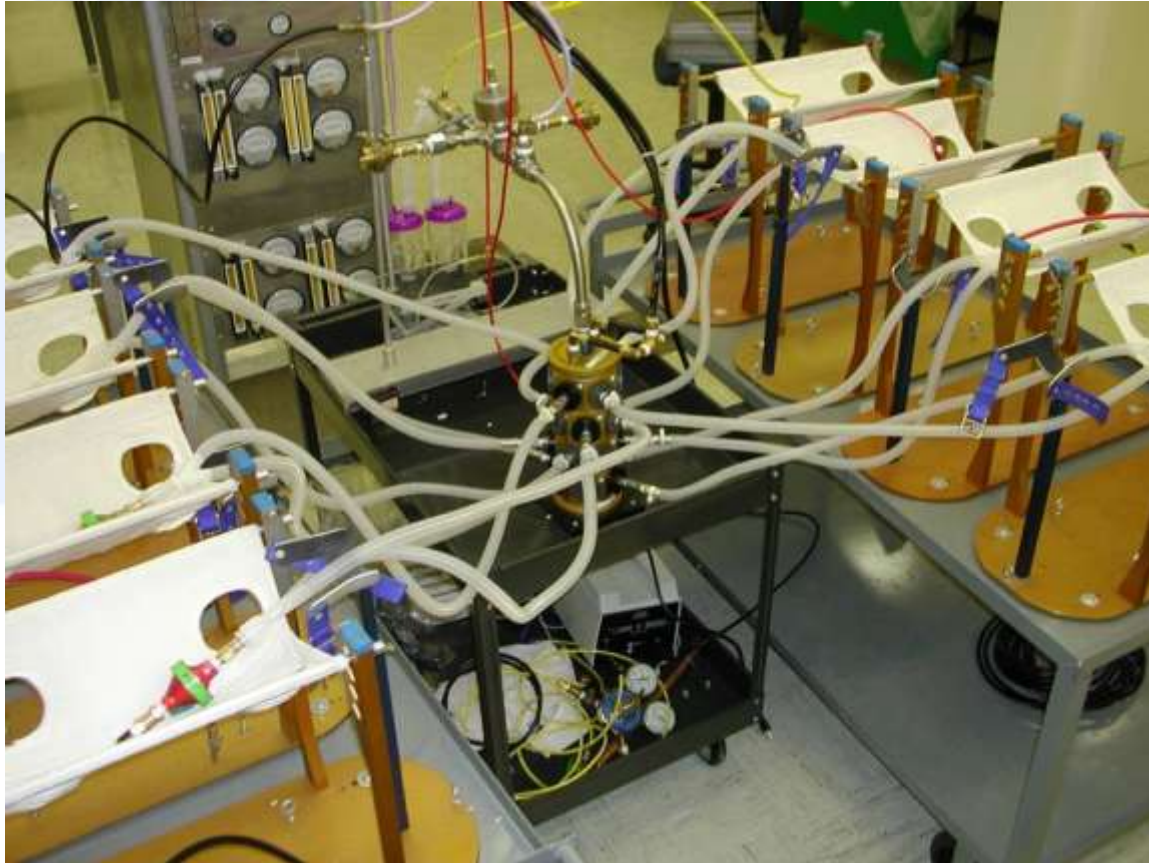
OX  
CTS



# Versatility



# Versatility



OX  
CTS



X  
TS



Questions?

INTOX  
PRODUCTS