Crystalline Silica Sampling and Analysis

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Silica Sampling

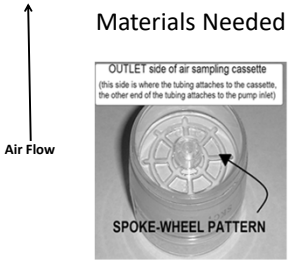
Materials Needed

Filter Cassette – 37 MM, 5u PVC filter-Preweighted

2 or 3 Piece

Silica Sampling

Materials Needed



Silica Sampling
Materials Needed

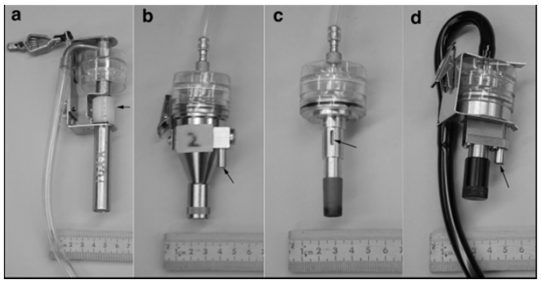
- Personal Calibrated Sampling Pump

Silica Sampling
Materials Needed

SIZE SELECTIVE DEVICE –

- A cyclone is a size-selective device used to separate respirable and nonrespirable-sized particles from the air. The cyclone has the following parts: A vortex finder that brings the dust-laden air in at an angle and spins it.
- A cyclone body where respirable and non-respirable dust particles are separated.
- A grit pot that collects the separated nonrespirable particles.

Cyclones



Cyclones

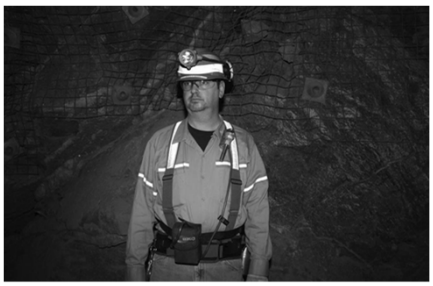
Type of Cyclone	**Flow Rate (L/min.)**
10 mm Dorr-Oliver nylon cyclone	1.7
SKC aluminum cyclone	2.5
Higgins-Dewell cyclone	2.2
GK 2.69 cyclone	4.2

Alternative Size Selective Devices

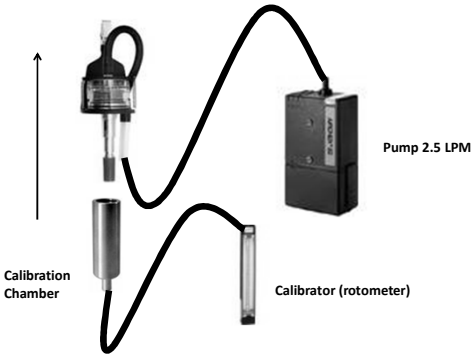
- **Respirable PPIs — Disposable**
- 2, 4, and 8 LPM

Setting up the Sampling Train

Setting up the Sampling Train



SKC Cyclone Calibration



CHAIN OF CUSTODY

SILICA SAMPLING METHODS

- Two Step Process
  1) Gravimetric (weighing)
     - Total Mass Collected on the Filter
  2) X-Ray Diffraction
     - Measures how much of the mass collected is Crystalline Silica

Crystalline Silica Analysis

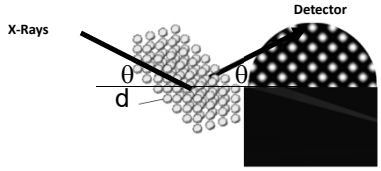
- Gravimetric – NIOSH 0600
- Filters conditioned at Standard Temperature and Humidity (20 °C ± 1 °C and 50% ± 5% RH)
- Samples Taken on Filter using a cyclone
- Filters Re-conditioned for at least 2 Hours
- Weighed on Microbalance
- Detection Limit is 100 micrograms (ug)

Crystalline Silica Analysis

- X-Ray Diffraction – NIOSH 7500/ OSHA ID-142

Crystalline Silica Analysis

- Measures the three angles occurring from the x-rays bouncing off of the crystalline silica
- Amorphous silica not measured as there is no crystalline structure



What if It's not a Full Shift Sample?

- **TWA = ∑ (conc1)*(time1)+ (conc 2)*(time2)+…+(conc x)*(time x) / Total time (should be 480 minutes)**

Several Possibilities:

1) Combination of Sample adds up to full shift – Calculate TWA using formula above

2) Combination of Samples do not add up to full shift (partial sample).

a) Employee only did job part of shift = TWA = Conc.*Time sampled / 480

b) Employee did job continuously, but only partial shift sample

- **Assume constant exposure and that measured concentration = TWA**
- **Not a good choice as how can you prove exposure was constant?**