



## Operating Instructions

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# UME<sup>x</sup>200 Passive Sampler for Sulfur Dioxide Cat. No. 500-200



### Performance Profile

|                                       |                                                                                                                                      |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sampling Rate:</b>                 | 15.2 ml/min with a relative standard deviation of 16.5%                                                                              |
| <b>Validated Concentration Range:</b> | 0.4 to 8 ppm, 15 mins to 24 hrs                                                                                                      |
| <b>Analysis Method:</b>               | Solvent extraction and IC analysis with conductivity detection                                                                       |
| <b>Lower Detection Limits:</b>        | 15 min: 1.8 ppm<br>8 hrs: 52 ppb<br>24 hrs: 17.4 ppb                                                                                 |
| <b>Collection Method:</b>             | Tape treated with triethanolamine (TEA); built-in blank included                                                                     |
| <b>Shelf-life:</b>                    | 18 mos from date of manufacture at ambient temperature                                                                               |
| <b>Storage:</b>                       | <i>Before use:</i> Ambient temperature<br><i>After use:</i> Ambient temperature or at $\leq 39.2$ F (4 C) and analyze within 3 weeks |
| <b>Accuracy:</b>                      | $\pm 30\%$                                                                                                                           |
| <b>Temperature Effects:</b>           | No effect on sampling rate from 20 to 25 C                                                                                           |
| <b>Humidity Effects:</b>              | No effect from 20 to 80% relative humidity (RH)                                                                                      |
| <b>Wind Velocity Effects:</b>         | No effect from 5 to 100 cm/sec                                                                                                       |
| <b>Interferences:</b>                 | None identified                                                                                                                      |
| <b>Dimensions:</b>                    | 3.4 x 1.1 x 0.35 in (8.6 x 2.8 x 0.89 cm)                                                                                            |
| <b>Weight:</b>                        | 0.38 oz (10.9 gm)                                                                                                                    |
| <b>Slide Cover:</b>                   | Yellow                                                                                                                               |

*Note: NO<sub>2</sub> can be analyzed on the same UME<sup>x</sup> 200 Sampler as SO<sub>2</sub>.*

# Sampling Instructions

**Cautions:** • Do not store with food.

- Before sampling, check the expiration date on the label on the outside of the pouch. Do not use after the last day of the month indicated.
- SKC recommends using gloves when handling chemically treated media.
- UME<sup>x</sup> samplers are designed for single use only. Do NOT reuse UME<sup>x</sup> samplers.

1. Open the aluminized pouch and remove the sampler. Do not discard the pouch; use it to send sampler to the laboratory. **Store the pouch away from potential sulfur dioxide sources.**
2. Enter date and location in the space provided on the back of the sampler.
3. Position the sampler on a worker's collar for personal sampling or in an appropriate location for area sampling.
4. Slide the sampler cover to the "on" position to begin sampling. Enter the sample start time in the space provided on the back of the sampler.
5. After sampling for the desired time, up to 24 hours, slide the sampler cover to the "off" position to stop sampling. Enter the sample stop time in the space provided on the back of the sampler.
6. Place the sampler in the original pouch immediately after sampling.
7. Seal the pouch. Send pertinent information and sample to an accredited laboratory for analysis.

## Analysis Instructions for Sulfur Dioxide

### Calibration Standards - Sulfate

Purchase commercially available sulfate standards appropriate for your application. Prepare a range of sulfate standards in de-ionized ultra-filtered (DIUF) water and prepare as outlined in *Sample Preparation*. **Note: Standards for sulfur dioxide require a 1:1 dilution with 0.15% hydrogen peroxide.**

### Sample Preparation for Sulfur Dioxide

1. Remove the sampler from the pouch and the sliding cover from the sampler.
2. Use clean forceps to lift out the reactive tape from each section. Place each section in a sealed vial. This provides a sample and a blank/correction.

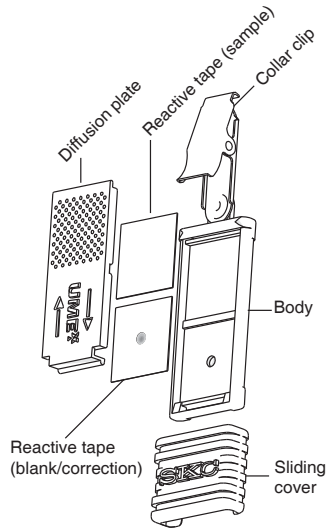
**Note:** *It is also acceptable to use a "lot" blank to correct for background. One lot blank is included in each box of badges.*

**Note:** *The blank/correction section of tape has an indentation for easy identification.*

3. Sulfate is desorbed from both the sample and the blank/correction tapes by inserting each in its own 4-ml glass vial containing 2 ml of de-ionized ultra-filtered water and placing them on a vibrator/shaker for 20 minutes.

- Pipette 1 ml of extract into a vial and dilute with 1 ml of 0.15% hydrogen peroxide. Shake well for analysis of sulfur dioxide.
- If also analyzing for  $\text{NO}_2$ ,<sup>§</sup> transfer the remaining 1 ml of extract to an auto-sampler vial for analysis of nitrogen dioxide.

§ Sampling rate for  $\text{NO}_2$  is 17.3 ml/min.



### Sulfur Dioxide Sample Analysis

- The sample extracts are analyzed for sulfate by ion chromatography with conductivity detection.
- A 20-microliter portion of the extract is injected onto a Dionex 4 x 250 mm AS14A column and with an 8.0/1.0-mM sodium carbonate/sodium bicarbonate eluent.
- Calculate the sulfate results by comparing against a standard calibration curve.
- Convert the results from sulfate to sulfur dioxide using the following formula:

$$\text{Concentration } \mu\text{g/ml sulfur dioxide} = \text{Concentration } \mu\text{g/ml sulfate} \times (64.1/96.1)$$

Where 64.1 is the molecular weight of sulfur dioxide and

Where 96.1 is the molecular weight of sulfate

- Total mass of sulfur dioxide is calculated below:
- The sulfur dioxide of the blank/correction tape must always be subtracted from the sample tape when calculating air concentrations.
- Calculate the air concentration in ppm using the following equations:

$$\text{Volume of air (liters)} = \frac{\text{Time (minutes)} \times \text{Sampling rate (15.2 ml/min)}}{1000}$$

$$\text{Concentration (ppm)} = \frac{\text{Mass (mg)} \times 24450}{\text{Air volume (L)} \times \text{Molecular weight (64.1 gm/mole)}}$$

| <b>UME<sup>x</sup> Passive Samplers<sup>#</sup></b>                                        | <b>Cat. No.</b> |
|--------------------------------------------------------------------------------------------|-----------------|
| <b>UME<sup>x</sup> 200,<sup>**</sup></b> for sulfur dioxide and/or nitrogen dioxide, pk/10 | <b>500-200</b>  |
| <b>UME<sup>x</sup> 100,<sup>**†</sup></b> for formaldehyde and other aldehydes, pk/10      | <b>500-100</b>  |
| <b>UME<sup>x</sup> 300,<sup>**</sup></b> for ammonia, pk/10                                | <b>500-300</b>  |

|                                                                      |               |
|----------------------------------------------------------------------|---------------|
| <b>Treated Tape for QC - UME<sup>x</sup> 200,<sup>**</sup> pk/25</b> | <b>P20098</b> |
|----------------------------------------------------------------------|---------------|

\* Limited shelf-life      † Do not store with food.      ‡ Storage at ≤ 39.2 F (4 C) required

# UME<sup>x</sup> passive samplers are designed for single use only. Do NOT reuse UME<sup>x</sup> samplers.

### **SKC Limited Warranty and Return Policy**

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