

## Charcoal Tube, Standard

### OPERATION MANUAL

Thank you for purchasing this product.

- This operation manual describes important precautions for preventing accidents as well as procedures for handling the product.
- To ensure safety, read this operation manual thoroughly before use and use the product correctly.
- After reading this operation manual, keep it handy for future reference.

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## Before Use

Before use, please read through this operation manual carefully. In particular, be sure to read the "Safety Precautions," which describe important information for ensuring the safe use of the product, and for preventing harm to you and other people, and damage to property.

## Included Items

Check the contents of the package before using the product.

● Charcoal tube	Item Code 080150-053	Set of 120
	Item Code 080150-054	Set of 24
● Vinyl tube		1
● Heart-shaped cutter		1
● Cutting plate		1
	(It comes with set of 120 only.)	
● Label		1 Sheet
	(5 Sheets for set of 120)	

- ★ If any of the items are damaged or missing, contact the distributor where you purchased the product.
- ★ This product does not include a sorbent tube holder, suction pump, or connecting silicon tube, so prepare them separately.

## Product Shelf Life

The product shelf life is 3 years after manufacture. For the month and year of manufacture, refer to the lot No. indicated on the box.

**Example**

Last digit of the calendar year

Indicates the month (October to December) are written as "X" to "Z."

Lot No. 2 5 \* \*

- In this example, the number indicates that it was manufactured in May 2022.

## Safety Precautions

The precautionary information in this operation manual is provided to ensure the safe use of the product and to prevent property damage and injury to you and other people. It is all important for ensuring safety, so be sure to read it thoroughly before using the product and observe it during use.

## Symbols

Various symbols are used in this operation manual to indicate warnings and instructions. The meanings of the symbols are as follows. Fully understand the following descriptions before reading the subsequent sections.

	<b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.
	<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
● Examples of Symbols		
	<b>Do Not Touch</b>	The  symbol indicates prohibited actions (that must not be done). Specific details are given in or near the symbol. The label on the left indicates that touching is prohibited.
	<b>Mandatory</b>	The  symbol indicates a mandatory action (that must be done). Specific details are given in or near the symbol. The label on the left indicates instructions that must be followed.

## Inquiries



If you have any questions about this product, or if there is any other way in which we can be of assistance, contact your Sibata representative or the distributor where you purchased the product.

DISTRIBUTED BY:



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## Precautionary Information

<p> <b>WARNING</b></p> <p>The analysis should be performed by someone with skills and expertise in the field of chemistry.</p> <p> <b>Mandatory</b></p> <p>Inexperienced operators should always perform analysis work under the supervision of an experienced operator or outsource the process to an analysis and measurement service provider qualified to do so.</p>	<p> <b>WARNING</b></p> <p>Do not use this product for other purposes or applications.</p> <p> <b>Prohibited</b></p> <p>Safety cannot be ensured if the product is used for anything other than noted in this operation manual.</p>	<p> <b>WARNING</b></p> <p>Do not leave the product within reach of children.</p> <p> <b>Do Not Touch</b></p> <p>Otherwise there is a risk of accidents such as children putting the product in their mouths.</p>
<p> <b>CAUTION</b></p> <p>Use a sorbent tube holder for individual exposure measurements.</p> <p> <b>Mandatory</b></p> <p>Failure to do so may result in injuries.</p>	<p> <b>CAUTION</b></p> <p>Never touch glass cut surfaces or fragments.</p> <p> <b>Do Not Touch</b></p> <p>Failure to do so may result in injuries.</p>	<p> <b>CAUTION</b></p> <p>Dispose of this product appropriately after use.</p> <p> <b>Mandatory</b></p> <p>After use, be sure to dispose of it appropriately as specified by your local government.</p>

## About This Product

This product consists of a glass tube filled with cleaned activated carbon collected in two layers, and sealed. It is widely used for personal samplers, because of the high collection rate for many non-polar solvents.

Moreover, thanks to a two-layer system, it is possible to judge the breakthrough amount at the time of measurement.

This product conforms to the standards of working environment measurement and NIOSH. The glass tube has been subjected to precutting processing to make it easy to snap.

### Main Specifications

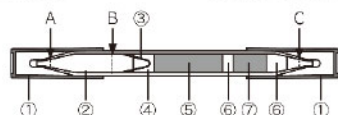
Adsorbent	Activated carbon (mesh of 20 to 40) 100 mg + 50 mg
Size	About O.D. 6 × 70 mm
Weight	About 1.8 g (per tube)
Item Code	080150-053 (Set of 120) 080150-054 (Set of 24)

★ Purchase a sorbent tube holder, type A (item code: 080150-055), which is optional and optimal for this product.

## Names of Parts

### Charcoal tube

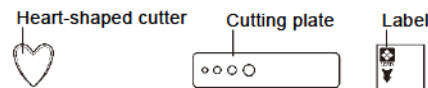
▶ Air Intake ◀ Out (to suction pump) ▶



- (1) PE caps
- (2) Glass tube
- (3) Spring stopper
- (4) Quartz wool
- (5) Front section activated carbon (100 mg)
- (6) Urethane foam
- (7) Back section activated carbon (50 mg)

★ Positions A, B, and C have been subjected to precutting processing.

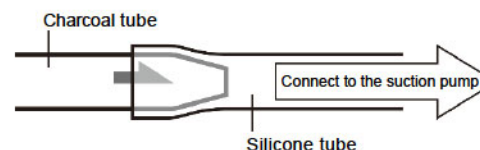
### Others



- ★ The heart-shaped cutter is used to further deepen the precut grooves.
- ★ The glass tube tip can be cut by putting the tip into a hole where the diameter of tip matches that of cutting plate hole and tilting the tube.
- ★ Use the label as memo pad.

## Connection to Suction Pump

Connect the suction pump to the end of the arrow printed on the charcoal tube as shown in the figure below.



## Desorption Rate

Obtain the desorption rate in accordance with the intended measurement method.

### Example

#### Working environment measurements

- ▶ It is obtained by the standard gas method or the phase equilibration method.

#### Indoor environment measurements

- ▶ It is obtained by the standard gas method or the solvent vaporization adsorbent method.

## After Measurement

- After use, separately dispose of each material in the charcoal tube, as specified by your local government.

Part Name	Material
Charcoal tube	Glass
PE cap	Polyethylene
Heart-shaped cutter	Abrasive sand
Cutting plate	Aluminum
Vinyl tube	Vinyl chloride
Labels and packing materials	Paper

- Store the charcoal tube in a cool, dark, dry location.

## Instructions for Use

Before use, be sure to thoroughly read the "Safety Precautions."

### Sampling Procedure

- (1) Immediately before sampling, snap off the PE caps at both ends of the charcoal tube from above, as shown in the figure below.



- (2) Remove the PE caps, and connect the charcoal tube and suction pump using a silicone tube. For individual exposure measurements, be sure to use a sorbent tube holder, purchased separately, to ensure that the cut surface of the glass is not touched during the measurement.

★ Do not throw away the PE caps, as they are used after sampling.

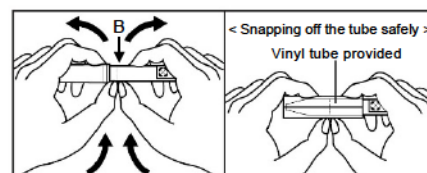
- (3) Set up the suction pump to suit the purpose of the measurements. Start the suction, and at the same time sampling starts.

- (4) When sampling is finished, remove the silicone tube (sorbent tube holder) from the charcoal tube. Re-attach the previously removed PE caps to both ends of the charcoal tube.

After sampling, store the charcoal tube in a clean, cool, dark location until analysis is performed.

### Analysis Procedure (Typical Example)

- (1) Immediately before analysis, snap off the charcoal tube by putting your fingernails at the precut groove (B), and then pulling both sides apart (as shown in the figure below). After the tube is snapped, use tweezers to take out the spring stopper and quartz wool from inside. Place 100 mg of front section activated carbon in a dark brown test tube with a stopper, or in a dark brown vial bottle (with a rubber septum), and seal it.



- (2) Also similarly place 50 mg of back section activated carbon in another identical test tube or vial bottle and seal it.
- (3) Using a volumetric pipette, add 1 mL of desorption solvent (such as carbon disulfide) to the respective dark brown test tube. Recap the tube, and shake it gently. Leave it for approximately 2 hours for extraction. Shake it several times while it is left standing.
- (4) After extraction is finished, collect 1.0 μL of the solution using a micro syringe, and inject it into a gas chromatograph. Measure the peak area (or peak height (same below)) of the separated target substance. Using the calibration curve obtained by the gas chromatograph, determine the absolute quantity (M<sub>1</sub>: g) of the injected target substance.
- (5) **Calculating the concentration in air**

The total quantity of the extract is 1 mL, so if the total quantity of the target substance contained in the activated carbon is M<sub>s</sub> (g), then

$$M_s = \frac{1.0 \times 10^{-3} \text{ (L)}}{1.0 \times 10^{-6} \text{ (L)}} \times M_1 \text{ (g)} = 1.0 \times 10^3 M_1 \text{ (g)}$$

Furthermore, M<sub>a</sub> will be the value with the desorption rate (D: %) applied.

$$M_a = M_s / (D / 100)$$

If M<sub>a</sub> is converted to the volume at the measurement temperature, the volume is V<sub>s</sub> (L), the measurement temperature is 25 °C, the pressure is 101 kPa, and the molecular weight of the target substance is W (g), then

$$V_s = M_a \times \frac{22.4}{W} \times \frac{273 + 25}{273} = \frac{24.46}{W} \times M_a$$

Accordingly, if the quantity of sample gas collected is V<sub>o</sub> (L), the concentration C (ppm) of the target substance in the sample gas will be obtained from the following formula.

$$C = \frac{V_s \text{ (L)}}{V_o \text{ (L)}} \times 10^6$$

If the Peak Area of the rear activated carbon exceeds 10% of the rear activated carbon 100 mg, it is generally assumed that the correct measured value cannot be obtained. When the charcoal tube is not saturated, calculate as above by summing peak area of the front and rear activated carbon of the subject substance to be measured.