

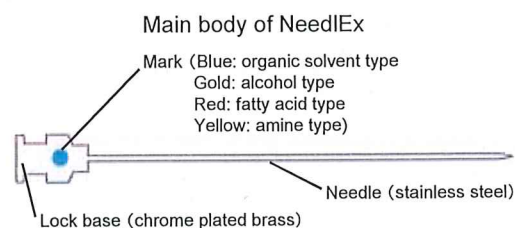
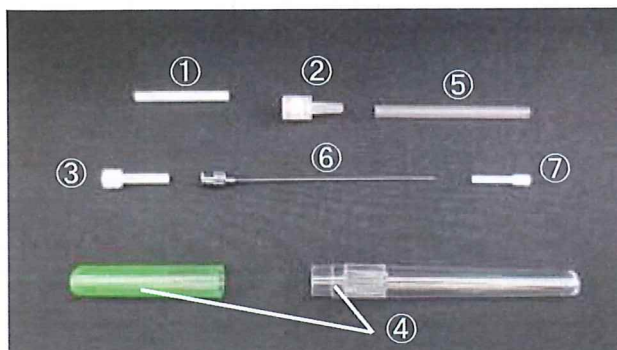
NeedEx Instruction Manual

NeedEx needles contain adsorbents and are capable of collecting and desorbing volatile organic compounds in air selectively and easily. NeedEx needles should be used with the Model AP-20 (or AP-20N) KITAGAWA Gas Aspirating Pump and a gas chromatograph.

⚠ Handling Precautions

- Do not use NeedEx needles for medical applications.
- Exercise care when using needles in order to avoid injuries.
- Read this instruction manual as well as the KITAGAWA Gas Aspirating Pump instruction manual thoroughly prior to using needles.

● Name and description of each part



SPECIFICATIONS
 Inner diameter: 0.5 φ
 Outer diameter: 0.7 φ
 Length: 85 mm
 Lock type: Luer lock

No.	Name	Description
1	Teflon tube	For connecting needles to KITAGAWA gas aspirating pumps. (1 pc./box)
2	Hub	For attaching safety tubes to needles. Used when sampling gases.
3	Teflon plug for lock base	For preventing loss of adsorbed samples after the completion of sampling. Insert into the lock base after conditioning needles to prevent the adsorption of unwanted compounds from air during the storage of needles.
4	Carrying case	For storing needles.
5	Safety tube	For the prevention of injuries when sampling gases. Connect to the hub when sampling gases.
6	Needle	Main body of the NeedEx.
7	Teflon plug for tip of needle	For preventing loss of adsorbed samples after the completion of sampling. Has a hole at one end into which the tip of the needle can be inserted. Attach to needle tips after conditioning needles to prevent the adsorption of unwanted compounds from air during the storage of needles.

● Directions for use

• Gas sampling

- 1) Perform a leak test prior to use in accordance with this instruction manual and the "CHECKING PRIOR TO USE (Leakage Test)" section in the instruction manual for the model AP-20 (or AP-20N) KITAGAWA gas aspirating pump.
- 2) Remove the Teflon plugs ③ and ⑦, and connect the NeedEx to the model AP-20 (or AP-20N) KITAGAWA gas aspirating pump using the Teflon tube ①.
- 3) Refer to numbers ④ to ⑥ in the "MEASUREMENT" section in the instruction manual for the model AP-20 (or AP-20N) KITAGAWA gas aspirating pump for instructions on how to sample gases.

Notes:

- Approximately 10 to 15 minutes is required to sample 100 mL of gas.
- The ambient temperature must be 30°C or lower, and the relative humidity must be 80% or lower when sampling gases.
- The model AP-20N KITAGAWA gas aspirating pump is required when sampling gases in units of 10 mL. When sampling in units of 50 and 100 mL, both the model AP-20N and the model AP-20 KITAGAWA gas aspirating pumps can be used.

- 4) If you do not intend to analyze a sampled gas soon after sampling, put the Teflon plugs ③ and ⑦ on both ends of the needle before storing the needle for an extended period of time.

Note:

- Needles can be stored for approximately 10 days after sampling without significant loss of adsorbed compounds by storing in a cool, dark location.

• Desorption

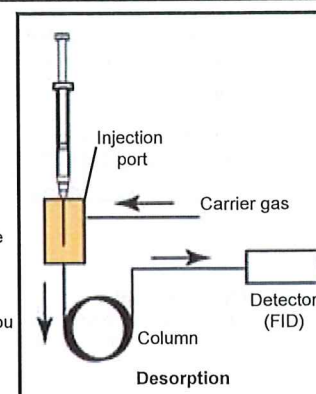
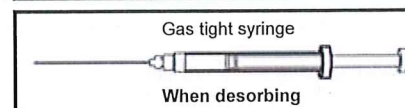
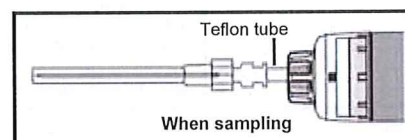
- 1) Prepare a digital timer, and set the timer to 5 seconds.
- 2) Remove the Teflon plugs ③ and ⑦, the safety tube, and the hub. Attach the NeedEx to a 1 mL Luer lock type gas tight syringe.
- 3) Draw 1 mL of nitrogen gas from a Tedlar bag.
- 4) After inserting the NeedEx into the injection port of the gas chromatograph as far as it will go, immediately start the digital timer and inject the nitrogen gas uniformly over a period of 5~10 seconds (we recommend that you practice the uniform injection of nitrogen gas several times using ambient air and a gas tight syringe without a NeedEx attached, before injecting actual samples).
- 5) Remove the NeedEx from the injection port immediately after injecting the nitrogen gas.

Notes:

- The temperature of the injection port should always be set to the desorption temperature of the NeedEx being used (NeedEx desorption temperatures are shown in the "Sampling volumes" section on page 2 of this instruction manual).
- Exercise care when inserting needles into injection ports in order to avoid bending needles.
- As needles can be very hot immediately after removal from injection ports, exercise care in order to avoid burns.
- 6) Although NeedEx needles can be reused approximately 25 to 30 times, trace amounts of sampled compounds remain inside NeedEx needles after the completion of analyses. Consequently, needles must be conditioned before being used again (see the "Conditioning" section below). After conditioning, attach Teflon plugs to both ends of NeedEx needles, and store needles in carrying cases.

Note:

- We recommend that you keep a record of NeedEx needle usage using the usage record sheet included with these needles.



•Conditioning

- 1) Set the temperature of the injection port of the gas chromatograph to the conditioning temperature for each type of needle shown in the "Sampling volumes" section below. Set the inlet pressure of the column at 100~200 kPa.
- 2) Remove the Teflon plugs ③ and ⑦, the safety tube, and the hub from the needle. Insert the needle into the injection port of the gas chromatograph as far as it will go.

Note:

- A portion of the carrier gas will flow through the needle and remove any remaining trace amounts of compounds.
- 3) Remove the needle from the injection port after 30 seconds.

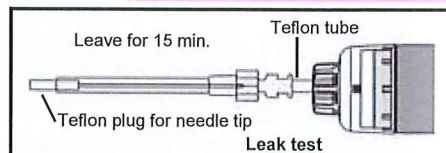
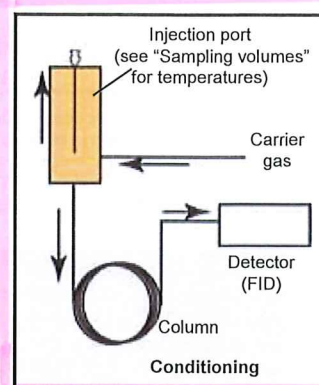
Notes:

- Excessively long conditioning times may shorten the lifetimes of NeedEx needles.
- As needles can be very hot immediately after removal from injection ports, exercise care in order to avoid burns.
- Although NeedEx needles are conditioned before shipment, make sure to condition needles before use if they have been stored for long periods of time after purchase. Condition needles for 3 minutes when needles have not been used for extended periods of time.
- Condition needles for 3 minutes when needles have been used to sample gases containing high concentrations of analytes.

•Leak test for the AP-20 (or AP-20N)

Refer to the instruction manual of the model AP-20 (or AP-20N) KITAGAWA gas aspirating pump for details regarding leak tests using the conditions below.

- Insert a NeedEx needle instead of a sealed, unbroken detector tube into the rubber tube connector and wait for approximately 15 minutes.



●Sampling volumes

Alcohol type (desorption/conditioning temperature (injection port temperature): 300°C)

Sampling volume	Compound name
Greater than 100 mL	acetaldehyde, acetone, 1,3-butadiene, iso-butane, n-butane, iso-butene, 1-butene, carbon tetrachloride, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene (1,1-dichloroethene), <i>cis</i> -, <i>trans</i> -1,2-dichloroethylene (<i>cis</i> -, <i>trans</i> -1,2-dichloroethene), dichloromethane, diethyl ether, ethanol, ethylene oxide, isopentane (2-methylbutane), methyl acetate, n-pentane, propane, 1-propanol, 2-propanol
50~100 mL	formaldehyde, methanol

*Sampling volumes for the above compounds are based on concentrations of approximately 10 ng/mL.

Amine type (desorption/conditioning temperature (injection port temperature): 200°C)

Gases containing trimethylamine can be sampled in volumes up to 300 mL when the concentrations of this compound in gases are less than 0.7 ng/mL.

Fatty acid type (desorption/conditioning temperature (injection port temperature): 250°C)

Gases containing n-butyric acid (butanoic acid), isobutyric acid (2-methylpropanoic acid), isovaleric acid (3-methylbutanoic acid), and propionic acid (propanoic acid) can be sampled in volumes up to 500 mL when the concentrations of these compounds in gases are less than 20 ng/mL.

Organic solvent type (desorption/conditioning temperature (injection port temperature): 200°C)

Sampling volumes differ according to the type of solvent to be sampled. Sample gases based on the table below when the concentrations of solvents in gases are less than 100 ng/mL.

Sampling volume	Compound name
100 mL	n-amyl acetate (n-pentyl acetate), 1-butanol, 2-butanol, n-butyl acetate, butyl cellosolve (2-butoxyethanol), cellosolve acetate (2-ethoxyethyl acetate), chlorobenzene, cyclohexanol, cyclohexanone, 1,2-, 1,3-, 1,4-dichlorobenzene, N,N-dimethylformamide, 1,4-dioxane, ethylbenzene, ethyl cellosolve (2-ethoxyethanol), isoamyl acetate (isopentyl acetate), isoamyl alcohol (3-methyl-1-butanol), isobutyl acetate, isobutyl alcohol, methyl acetate, methyl n-butyl ketone (2-hexanone), 1-, 2-, 3-, 4-methyl cyclohexanol, 1-, 2-, 3-, 4-methyl cyclohexanone, methyl isobutyl ketone, n-propyl acetate, styrene, 1,1,2,2-tetrachloroethane, tetrachloroethylene (tetrachloroethene), toluene, xylene
50 mL	ethyl acetate, isopropyl acetate, methyl ethyl ketone (2-butanone)

*Please contact us for sampling volumes for other solvents.

●Calculating actual concentrations

- 1) Prepare a calibration curve of the compound to be measured with the x axis expressed in nanograms.
- 2) Read the weight of the compound desorbed from the needle (W [ng]) from the calibration curve.
- 3) Calculate the actual concentration of the compound (C [ng/mL]) by dividing the weight of the compound desorbed from the needle (W [ng]) by the volume of gas sampled (V [mL]). The actual concentration of the compound in this case is expressed in ng/mL.
- 4) Actual concentrations in ng/mL can also be converted to concentrations in mg/m³ and ppm using the formulae shown below.

•Calculating actual concentrations in ng/mL

$$\text{Actual concentration} = \frac{W \text{ [ng]}}{V \text{ [mL]}} \\ (\text{C [ng/mL]})$$

•Calculating actual concentrations in mg/m³

$$\text{Actual concentration} = C \text{ [ng/mL]} \\ (\text{C [mg/m}^3\text{)})$$

•Calculating actual concentrations in ppm

$$\text{Actual concentration} = \frac{C \text{ [ng/mL]}}{M} \times 22.4 \times \frac{(273+t)}{273} \times \frac{1,013}{p} \\ (\text{C [ppm]})$$

M: molecular weight [g/mole] t: temperature [°C]
p: atmospheric pressure [hPa]

●Disposal of NeedEx needles

When disposing of NeedEx needles, separate and dispose of the components of needles according to material type where required by local regulations. Place needles in a metal container in order to avoid injuries to others, and dispose of needles as scrap metal.

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