FORBLUE sunsep™

Membranes for Gas Drying and Humidification

AGC Chemicals Americas, Inc.

Your Dreams, Our Challenge

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Introduction

Your Dreams, Our Challenge

FORBLUE sunsep Hollow Fiber Membranes

- FORBLUE sunsep modules differ in shape
- All modules incorporate the same hollow fibers

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What is FORBLUE sunsep?

- A “membrane gas dryer“ that uses a perfluorocarbon ion-exchange resin
- Can be used to dry or humidify both air and gas
- Developed by AGC and launched in 1990

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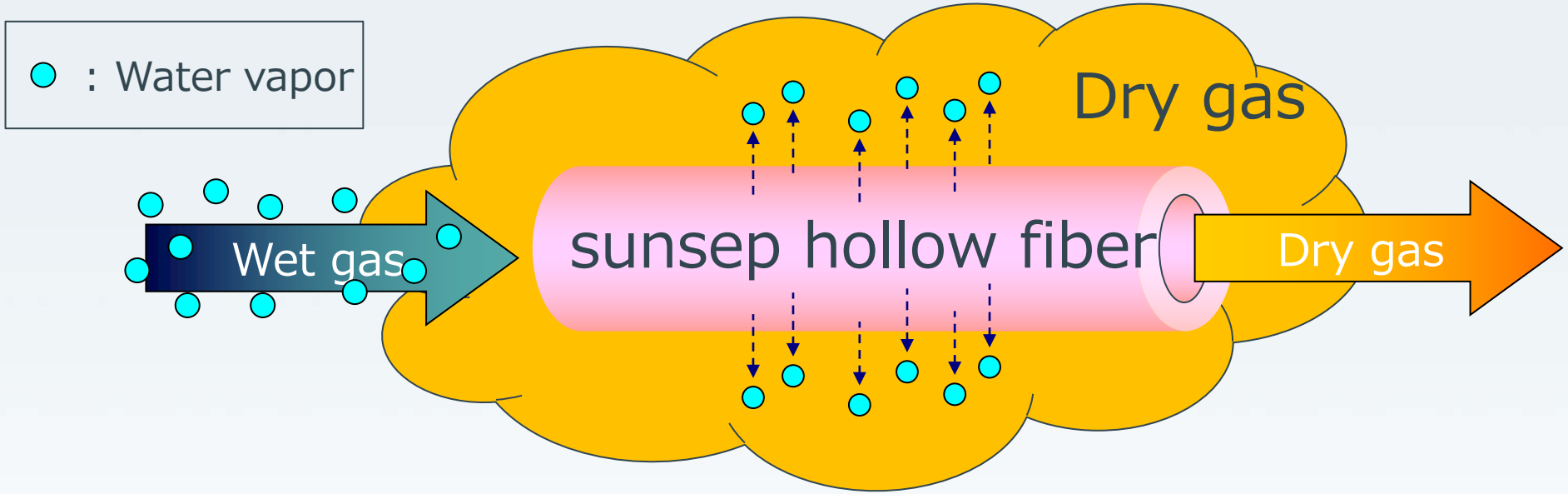
The principle of FORBLUE sunsep



The sunsep membrane transports water vapor from the inside to the outside of the hollow fiber depending on the “water vapor pressure differential”.

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Product Lineup

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Applications

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Major Applications

Dehumidification

- Industrial compressed air : pneumatics
- Gas analysis: environmental, medical

Humidification

- Industrial gas treatment
- Medical oxygen gas
- Fuel cell

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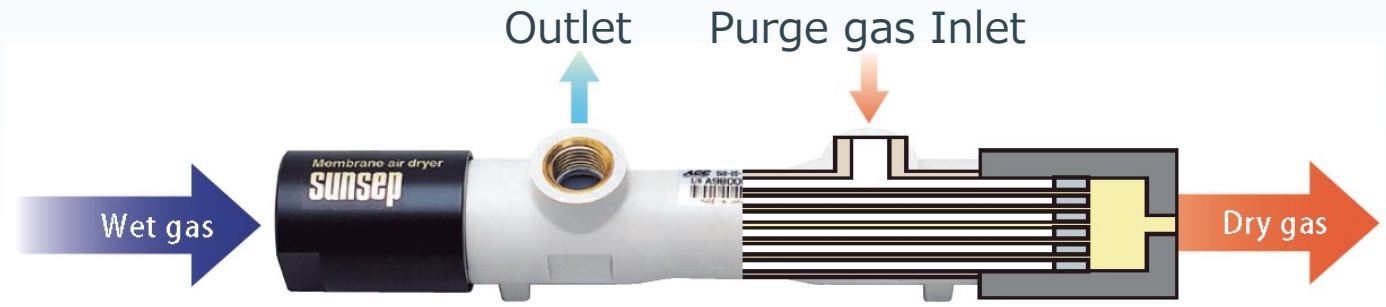
Purge Gas (Dehumidify Source)

- Purge gas = source of the water vapor pressure differential between inside and the outside of membrane.
- 2 methods of supplying the purge gas:
  - 1. Internal: Using a small portion of the dry gas that is produced
  - 2. External: Providing dry gas from an external source
- The standard purge gas flow rate is 20% of supply gas flow rate.
- The purge gas flow direction should be counterflow.



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SWB/C/F Series for Pneumatics Applications

sunsep SWB/C/F series

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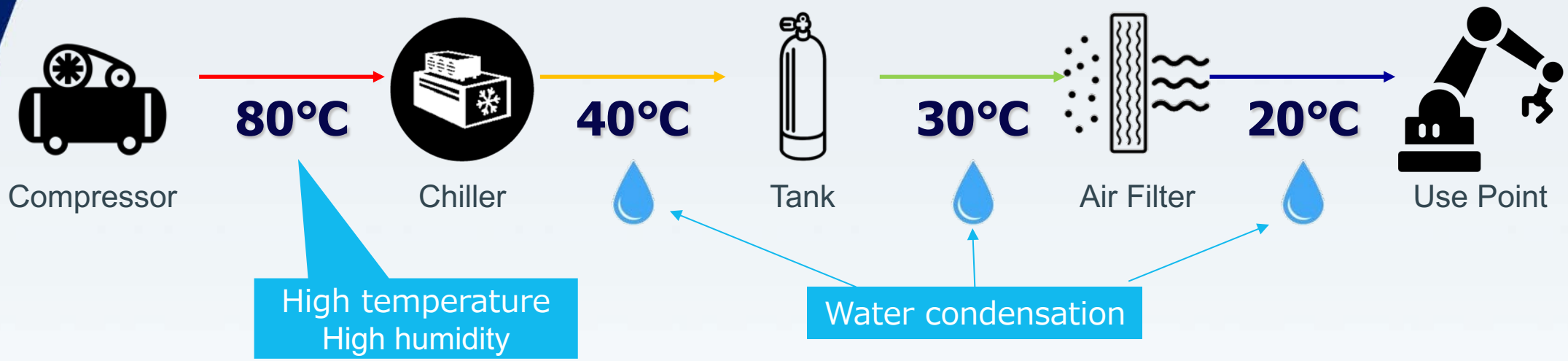
The Importance of Dehumidifying Pneumatic Lines



- Pressurized air contains a lot of water vapor.
- Water condensation can damage pneumatic equipment.
- To protect the equipment, water vapor has to be removed before it condenses.

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Methods of Compressed Air Dehumidification

- Cooling and condensing
  - Cooler (refrigeration/adiabatic compression)
- Absorption
  - Silica gel
  - Zeolite
- Membrane separation
  - Porous membrane (Molecular sieve)
  - Non porous membrane (sunsep)

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Industrial Air Dryer Comparison

Type	Air Cooler (Refrigeration)	Absorption	Membrane (Porous)	Membrane (Non porous)
Unit Size	Large	Medium	Small	Very Small
Applicable Flow rate	Large	Medium	Small	Small
Dew point	-17°C	-50°C	-50°C	-40°C
Running cost	High	Medium	Low	Low
Maintenance	Yes	Yes	No	No

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SWG Series for Gas Analysis Applications

sunsep SWG series

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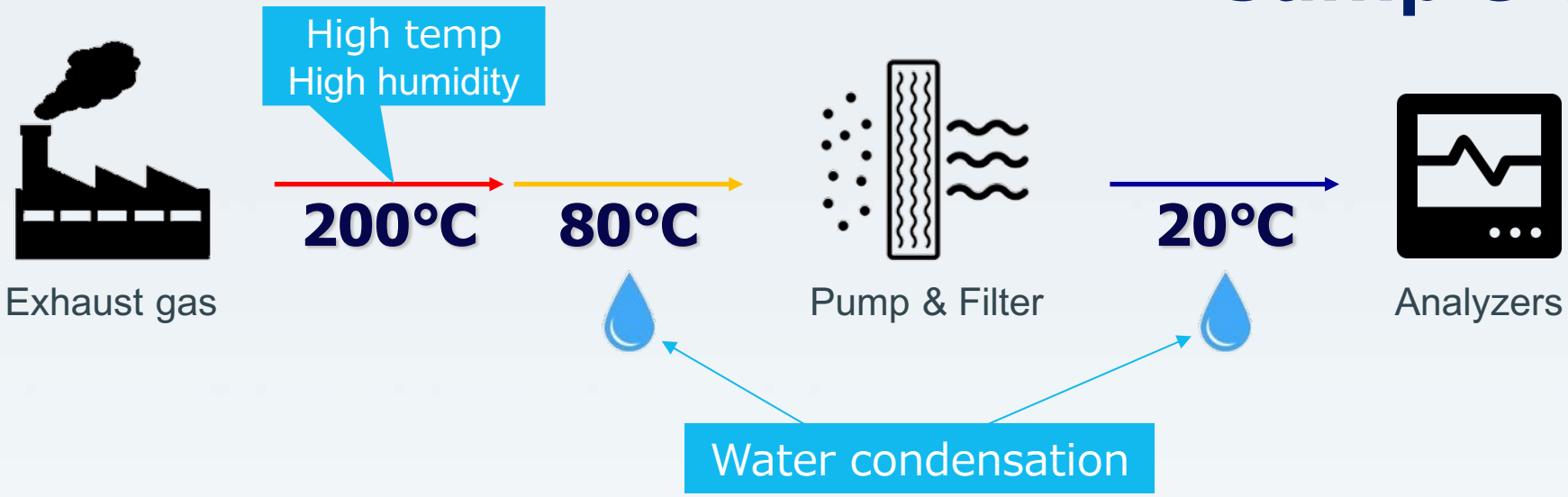
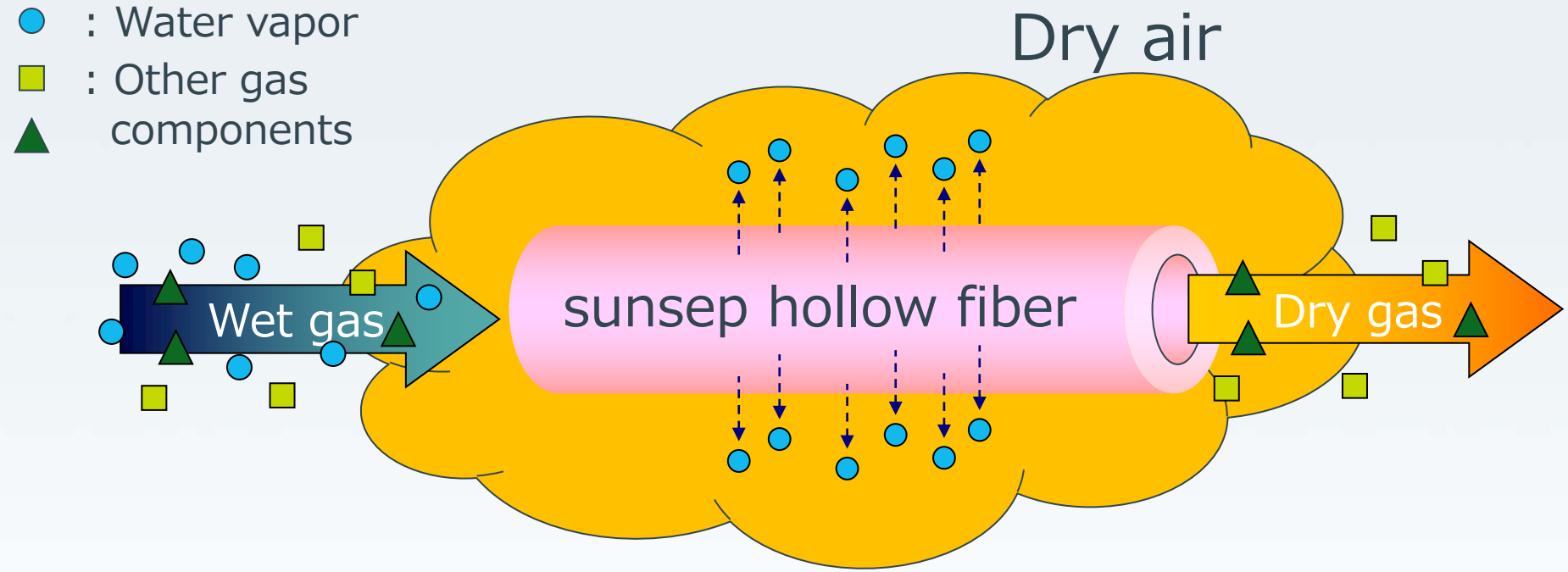
The Importance of Dehumidifying Sample Gas



- Sample gas contains a lot of water vapor.
- Condensed water causes trouble such as corrosion or a decrease in analytical precision.
- So the water vapor has to be removed from the sample gas.

High Water Vapor Flux



The sunsep hollow fiber membrane is selectively permeable to water vapor only.

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Dehumidification

Advantages:

- High water vapor removal
- Chemical resistance
- Little effect on the original gas composition

Applications:

- Environmental monitoring
- Exhaust gas monitoring
- Expiration gas analysis

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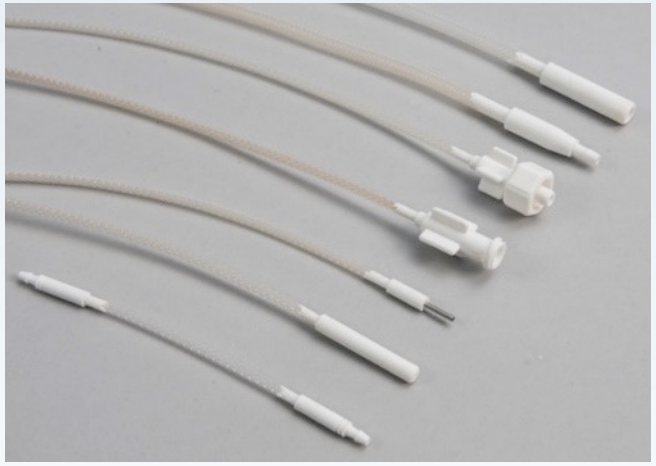
Humidification Applications



FORBLUE sunsep humidification modules are equipped with rust-proof materials.

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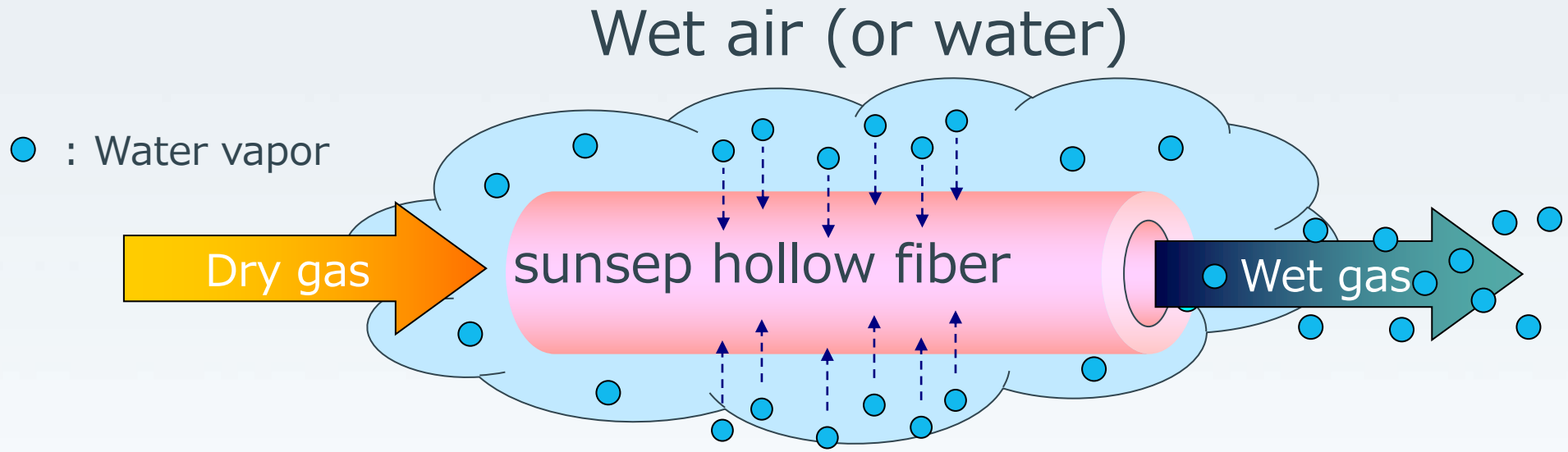
Mechanism of Humidification



The sunsep membrane transports water vapor from the outside to inside.

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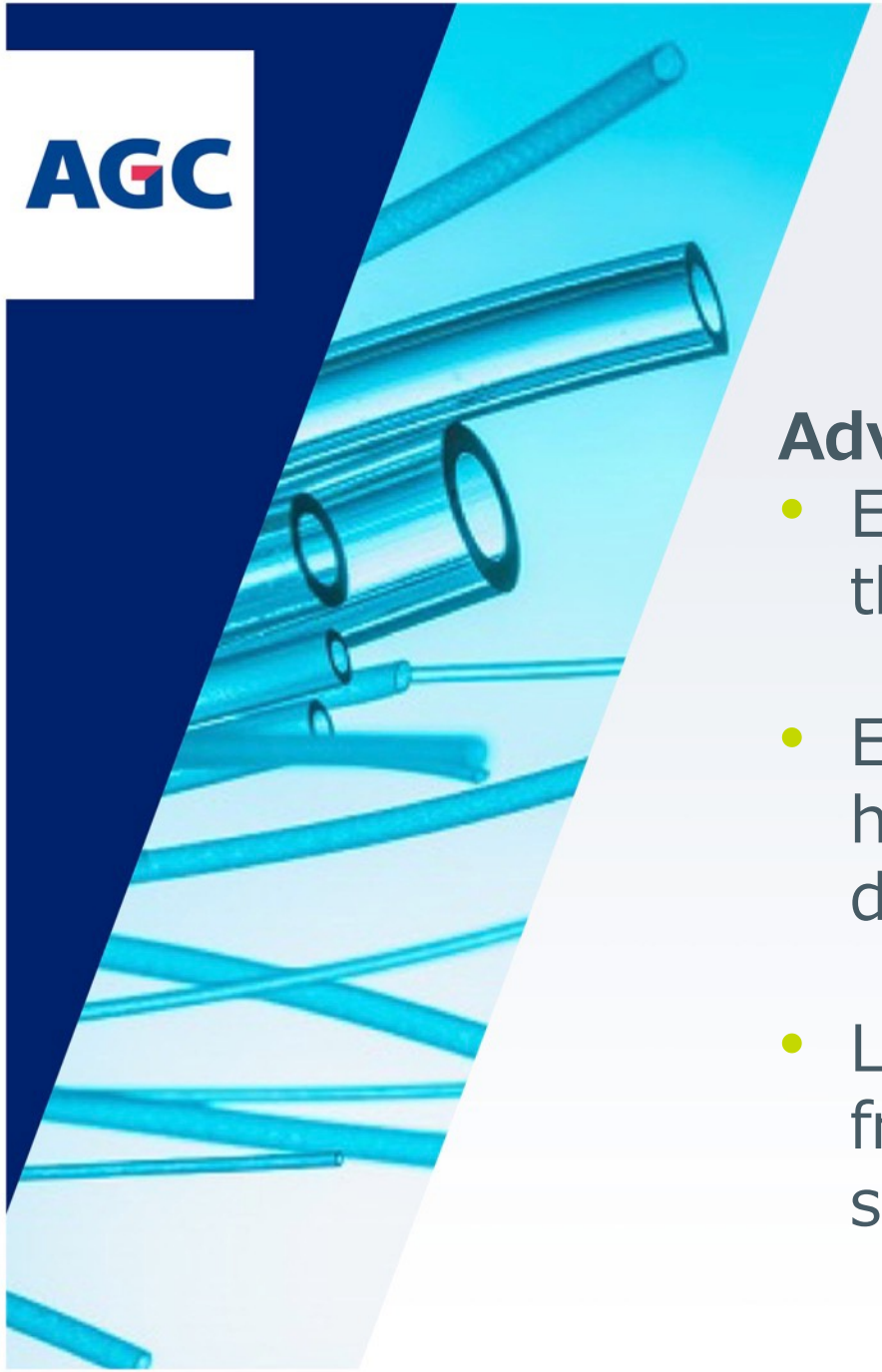

Humidification

Advantages:

- Easy and fast to make the gas saturated
- Enables gas humidification without direct contact with water
- Low contamination risk from humidification source

Applications:

- Medical oxygen humidification for home oxygen therapy
- Industrial gas humidification
- Humidification for fuel cells

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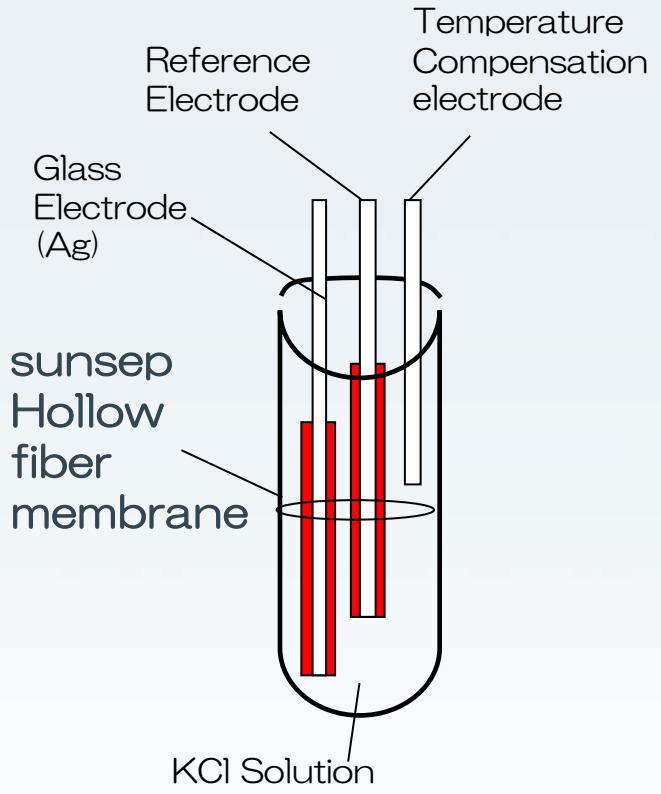
Other Applications

Ammonia scrubber



pH electrode cover

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So Why Use sunsep?

- Non-porous, for water-selective permeability
- Available in a wide variety of sizes
- Can be used for drying and humidification
- Easily connectable modules
- Ecological – no energy input required
- Durable, flexible, corrosion-resistant

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