Water Filtration

Filtration

- Physical process that occurs when liquids, gases, dissolved or suspended matter adhere to the surface of, or in the pores of, an absorbent material

- Depends highly on:
  - amount of contaminant
  - size of contaminant particle
  - Charge of contaminant particle

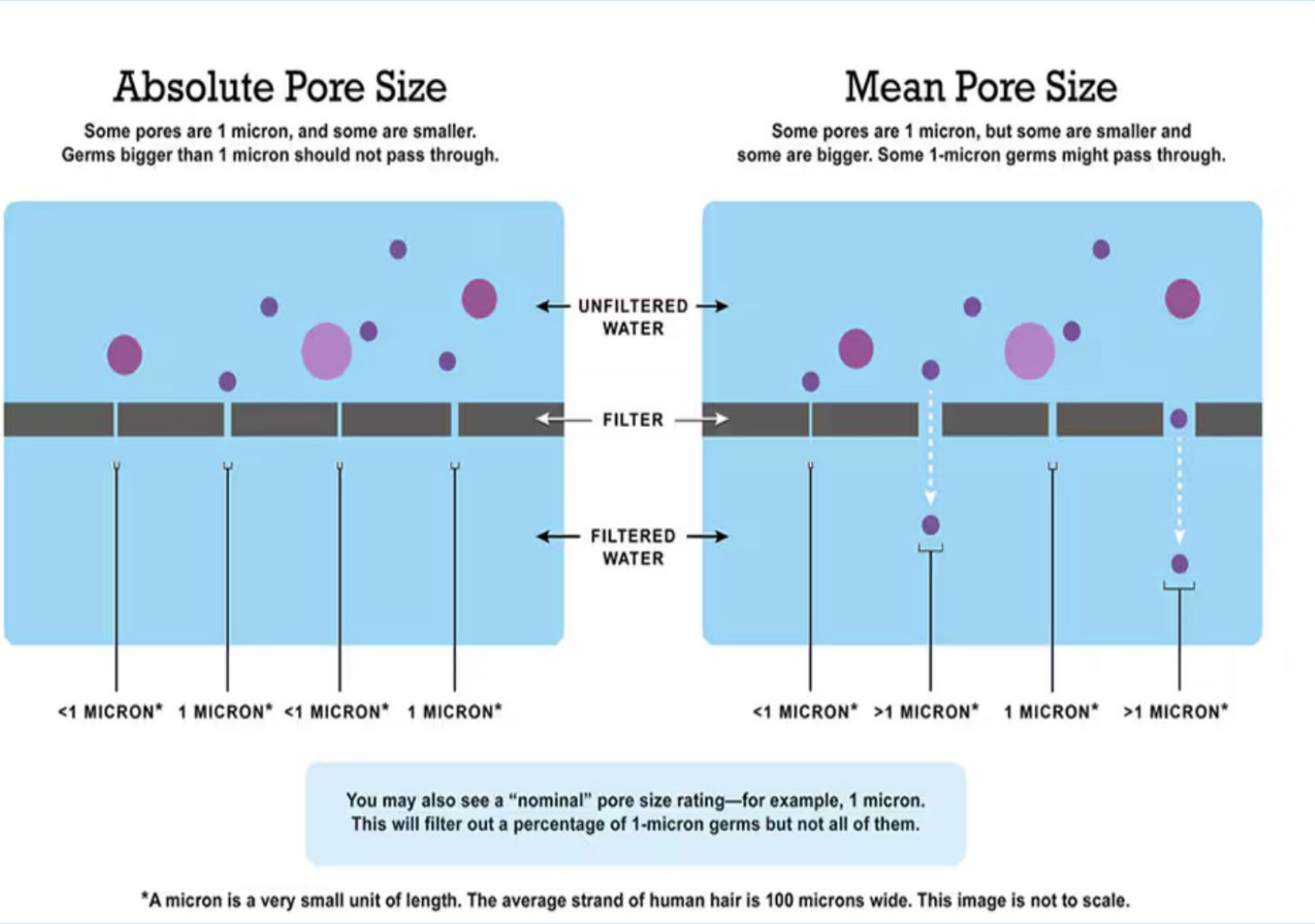
Things to think about as you design your prototype!

Pore Size

- Size of tiny holes in filter that allow water to flow

- Smaller pores inhibit smaller contaminants

From CDC:


Absolute Pore Size
Some pores are 1 micron, and some are smaller.
Germs bigger than 1 micron should not pass through.
Mean Pore Size
Some pores are 1 micron, but some are smaller and
some are bigger. Some 1-micron germs might pass through.
UNFILTERED WATER
FILTER
FILTERED WATER
<1 MICRON*
1 MICRON*
<1 MICRON*
1 MICRON*
<1 MICRON*
>1 MICRON*
1 MICRON*
>1 MICRON*
You may also see a "nominal" pore size rating—for example, 1 micron.
This will filter out a percentage of 1-micron germs but not all of them.
*A micron is a very small unit of length. The average strand of human hair is 100 microns wide. This image is not to scale.

General Ways of Filtering Water

Activated Carbon Filter

- Traps chlorine and volatile organic (VOCs)
- Can also remove some pesticides, fertilizers, and heavy metals
- May improve water’s smell and taste
- Doesn’t work on minerals, microbes, or salt
- Typically an early stage in a multi-stage filtration system

Boiling/ Heat

- Important for removing microbial contaminants
- On a stovetop/ hot plate, must be a rolling boil for 1 minute (3 min at elevations over 6500 ft)
- If not boiling, can use sun to sterilize water (takes longer 6 hours- 48 hours depending on ambient conditions)

Mechanical filtration

- Uses a mesh barrier, screen or porous material
- Improves water clarity
- Doesn’t get rid of chemicals
- Typically doesn’t remove microorganisms
- Typically an early stage in a multi-stage filtration system

Microfiltration

- Water flows through a porous membrane
- Captures large particles and some microorganisms
- Does not remove chemicals or dissolved contaminants