Orbital Biosciences®

# USER GUIDE

## *Apollo® 20 mL PES & PP .45μm*
## High-Performance Centrifugal Microfilters

***Note: This product is offered for research use only. Not for clinical use, diagnostic procedures, or for preparation of fluids to be used for human injection. This is not a sterilizing filter. This is a pilot production product that is in final development. Preliminary applications data are available, and a Quality Control System is in place for this product.***

Apollo 20 mL MF PES and PP concentrators are disposable single-use microfiltration devices for the removal, concentration or purification of suspended particulates and colloids. They are far superior to alternatives in combined simplicity, speed, capacity and recovery. This is due to their unique conical design (US Patent 6,269,957, US Patent 6,357,601, PCT patents pending), providing a high ratio of membrane area to sample size. This, in turn, provides a high degree of concentration in a single spin as well as better control of polarization and fouling at the membrane surface. Apollo has the largest available sample volumes for a given centrifuge tube size.

**SPECIFICATIONS**

**Volumes**

| | Maximum Sample |
|---|---|
| 34° angle rotor: | 13.5 mL |
| With swing-head rotor: | 20 mL |

**Total Volume In Concentrator & Filtrate Tube**

| Swing Head | 34° Angle | Resulting Deadstop |
|---|---|---|
| NA | <= 14 mL | 13μL* / 28 μL** |
| <= 20.0 mL | 20.6 mL | 67 μL |
| 20.6 mL | 21.3 mL | 100 μL |
| 22.0 mL | 22.4 mL | 200 μL |
| 24.7 mL | 24.4 mL | 500 μL |
| 27.2 mL | 26.2 mL | 1 mL |
| 28.9 mL | 27.4 mL | 1.5 mL |
| 30.2 mL | 28.5 mL | 2 mL |

* With any port oriented outboard
** With any port oriented inboard

**Dimensions**
Active membrane area=12 $cm^2$
Collection tube: OD=29.2 mm,
Length (incl. cap)=118.2 mm
Filter: Length (filter tip to top flange)= 68 mm OD (below top flange)=26.8 mm

**Maximum Centrifugal Force**
With swing-head rotor: 500 to 2000 rcf
typical rotor speed, not to exceed 4500 rcf

**Materials**
Membrane: PES=Hydrophilic polyethersulfone, PP=polypropylene
Concentrator, collection tube and cap: Polypropylene

**Environmental Resistance**
Temperature: 34.7 °C, 120 °F, max.
Do not autoclave
Limit of pH: 1 to 14

**HOW TO USE THIS PRODUCT**

**Preparations**

***Make sure it will fit in your centrifuge***
Prepare a 50 mL carrier accepting a 118 mm length tube in centrifuge. Either fixed angle or swing head rotors can be used, although performance is better in a swing head. Check clearance of tube to both swing mechanism and rotor cover or centrifuge lid.

***Suggested protocol if removal of trace metals is required***
Rinse inside surface with a squirt bottle of 1% nitric acid and pour out. Fill device with ~20 mL 1% nitric acid and spin for 2 to 3 minutes to flush down to a retentate volume <0.1 mL (see figure). Pour out dilute acid from tube and filter. Rinse and empty tube and filter device 2 to 3 times with deionized water. Shake out water droplets and add sample.

**Operation**

1. ***Add sample and cap tube snugly.***
   An internal vent hole near the lip permits air from the collection tube to pass into the concentrator to maintain maximal flow without release of aerosols. *Avoid scraping membrane when filling.*
2. ***Place assembly into rotor.*** Counterbalance with a similar device or tube of the same weight and spin. *Note specified centrifugal force limits and observe maximum relative centrifugal force rating for the rotor.*
3. ***Spin for the required time (see typical performance graph for PES)***
   Spin at the suggested speed to achieve the desired concentration factor. Exceeding the maximum centrifugal force limits, specified above, may cause retentate leakage. *Avoid excessive rcf, improved selectivity maybe achieved by avoiding excessive rcf.*
4. ***Harvest retentate or filtrate***
   For best recovery, remove retentate in <10 min. Upon standing, wicking by the spun, partly desiccated membrane can cause continued filtration, further reducing retentate volume. For retentate volumes <50 μL, mass recovery is improved by adjusting volume with buffer to about 50 μL before recovery, and/or by subsequently adding 50-200 μL of buffer to the device, mixing by vortexing or aspirating into and out of the tip several times and recovering the wash as well.

**Chemical Compatibility** for Common chemicals (√ = acceptable; ***X = not recommended,*** ? = insufficient data)

**Acids and Bases**

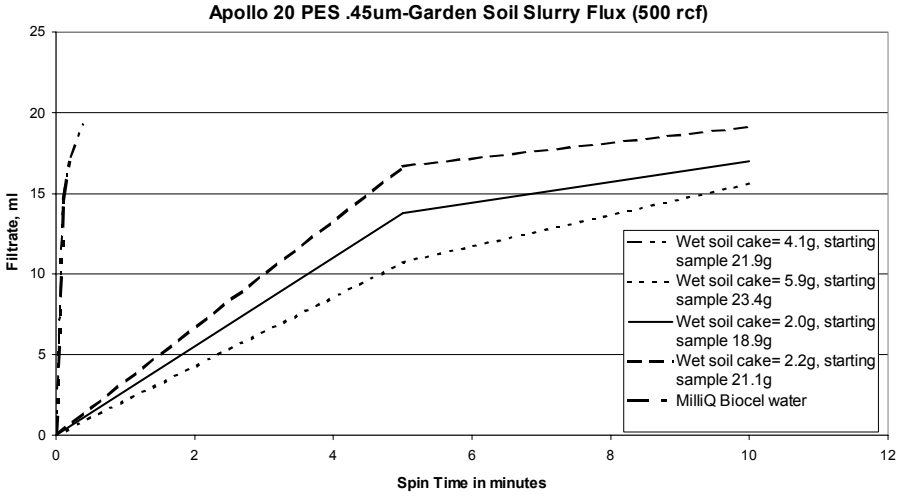
| | PES | PP | | PES | PP | | PES | PP |
|---|---|---|---|---|---|---|---|---|
| Acetic acid 10% | √ | √ | Hydrochloric acid 35% | √ | √ | Ammonium hydroxide 11.4% | √ | √ |
| Acetic acid 30% | √ | √ | Nitric acid 27 | ? | √ | Potassium hydroxide 15% | √ | √ |
| Acetic acid 90% | √ | √ | Nitric acid 67% | X | √ | Sodium hydroxide 11% | √ | √ |
| Glacial acetic acid | √ | √ | Sulfuric acid 16% | ? | √ | Sodium hydroxide 22% | √ | √ |
| Hydrochloric acid 3.3% | √ | √ | Sulfuric acid 96% | X | √ | | | |
| Hydrochloric acid 20% | √ | √ | Ammonium hydroxide 5.7% | √ | √ | | | |

**Organic Solvents, Miscellaneous Chemicals**

| | PES | PP | | PES | PP | | PES | PP |
|---|---|---|---|---|---|---|---|---|
| Acetone | X | √ | Dimethyl sulfoxide | X | √ | Methanol | √ | √ |
| Acetonitrile | √ | √ | Ethanol | √ | √ | Methyl acetate | X | √ |
| Amyl acetate | √ | √ | Ethyl acetate | X | √ | Methylene chloride | X | √ |
| Amyl alcohol | X | √ | Ethyl ether | √ | √ | Methyl ethyl ketone | X | √ |
| Benzene | √ | √ | Ethylene dichloride | X | √ | Methyl isobutyl ketone | √ | √ |
| Benzyl alcohol | X | √ | Ethylene glycol | √ | √ | Peanut oil | √ | √ |
| Butanol | √ | √ | Formaldehyde 4% | √ | √ | Propylene glycol | √ | √ |
| Butyl acetate | √ | √ | Formaldehyde 37% | √ | √ | Pyridine | X | √ |
| Carbon tetrachloride | √ | √ | Glycerol | √ | √ | Tetrachloroethylene | √ | √ |
| Cellosolve acetate | √ | √ | Hexane, dry | X | √ | Toluene | √ | √ |
| Chloroform | X | √ | Isopropanol | √ | √ | Tetrahydrofuran | X | √ |
| Cotton seed oil | √ | √ | Isopropyl acetate | √ | √ | Tetrahydrofuran/water 50%v | ? | √ |
| Cyclohexanone | X | √ | Kerosene | √ | √ | Xylene | √ | √ |
| Dimethyl formamide | X | √ | | | | | | |

Some of the recommended chemicals listed above may affect membrane performance, thereby altering the recoveries, passage, and /or spin times.

**TYPICAL PERFORMANCE** (Actual conditions will vary with details of initial solution temperature, concentration, and sample characteristics.)




**Note:** Apollo 20 PP .45$\mu$m is a hydrophobic membrane and will normally require a minimum 2000 rcf to overcome the breakthrough pressure and develop a reasonable flow for most aqueous samples. (spun 5 minutes @ 2000rcf with MilliQ Biocel water = ~ 18 mL of filtrate) Reasonable flows can be achieved using lower rcf if the membrane is pre-wet with an organic solvent such as isopropyl alcohol.

**Technical Assistance**

Call, fax, or e-mail us at the numbers below for help. You can also visit us on the Internet www.orbio.com for the most up-to-date technical information on the Apollo family of products.

To reorder, please refer to Product Numbers below.

| Product Name | Rating | Identification | Qty/Pk | Order No. |
|---|---|---|---|---|
| Apollo 20 mL PES .45$\mu$m | .45$\mu$m | Sample pack, sealed devices and User Guide | 2 ea. | AP20PS4500 |
| Apollo 20 mL PES .45$\mu$m | .45$\mu$m | Rack of filters in capped 50 mL tubes | 25 ea. | AP20PS4510 |
| Apollo 20 mL PES .45$\mu$m | .45$\mu$m | 10 racks, bulk bags of filters, 50 mL tubes, caps | 250 ea. | AP20PS4520 |
| Apollo 20 mL PP .45$\mu$m | .45$\mu$m | Sample pack, sealed devices and User Guide | 2 ea. | AP20PP4500 |
| Apollo 20 mL PP .45$\mu$m | .45$\mu$m | Rack of filters in capped 50 mL tubes | 25 ea. | AP20PP4510 |
| Apollo 20 mL PP .45$\mu$m | .45$\mu$m | Rack of filters in capped 50 mL tubes | 250 ea. | AP20PP4520 |
| 50 mL tubes and cap | - | Rack of 25 ea tubes and caps for Apollo 20 mL | 1 ea. | AP2000000 |
| 50 mL tubes and cap | - | Case of tubes & caps for Apollo 20 mL | 500 ea. | 3191-870-00 |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