**Supplemental Figure 1. System boundary for life cycle assessment of hemodialysis.**

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**Supplemental Table 1. Composition, weight, and ecoinvent manufacturing unit process inputs of supplies used in hemodialysis treatment.**

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| --- | --- | --- | --- |
| **Item and Components** | **Composition** | **Weight**  **(g)** | **ecoinvent Unit Process**1 |
| Acid concentrate, 1 L  Sodium chloride  Potassium chloride  Calcium chloride  Magnesium chloride  Acetate  Citrate  Dextrose  Acid concentrate bottle | Sodium chloride  Potassium chloride  Calcium chloride  Magnesium chloride  Acetate  Citrate  Dextrose  High density polyethylene | 263.00  10.10  6.24  2.14  1.11  6.92  45.00  30.58 | Sodium chloride, brine solution {GLO}| market for | Cut-off, U  Potassium chloride {RoW}| market for potassium chloride | Cut-off, U  Calcium chloride {RoW}| market for calcium chloride | Cut-off, U  Magnesium sulfate {GLO}| market for | Cut-off, U2  Acetic acid, without water, in 98% solution state {GLO}| market for | Cut-off, U3  Citric acid {GLO}| market for | Cut-off, U  Glucose {GLO}| market for glucose | Cut-off, U  Polyethylene, high density, granulate {GLO}| market for | Cut-off, U  Blow moulding {GLO}| market for | Cut-off, U |
| Adhesive bandage  Adhesive strip  Pad  Peel-off backing  Packaging | Polyvinyl chloride  Woven cotton  Coated paper  Coated paper | 0.37  0.05  0.09  0.52 | Polyvinylchloride, bulk polymerised {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Textile, woven cotton {GLO}| market for | Cut-off, U  Paper, wood free, coated {RoW}| market for | Cut-off, U  Paper, wood free, coated {RoW}| market for | Cut-off, U |
| Bicarbonate concentrate, 1 L  Sodium bicarbonate  Bicarbonate concentrate bottle | Sodium bicarbonate  High density polyethylene | 81.25  30.37 | Sodium bicarbonate {GLO}| market for sodium bicarbonate | Cut-off, U  Polyethylene, high density, granulate {GLO}| market for | Cut-off, U  Blow moulding {GLO}| market for | Cut-off, U |
| Blood tubing set A  Tubing  Drip chamber  Clamps, caps, and joints  Medication ports  Outer plastic wrapper | Polyvinyl chloride  Polyvinyl chloride  Polypropylene  Silicone  Polyethylene film | 184.50  44.72  43.93  11.47  5.82 | Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Silicone product {RoW}| market for silicone product | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Blood tubing set B  Tubing  Drip chamber  Clamps, caps, and joints  Outer plastic wrapper | Polyvinyl chloride  Polyvinyl chloride  Polypropylene  Polyethylene film | 132.42  12.53  45.75  4.10 | Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Chair drape | Kraft paper | 64.72 | Kraft paper {RoW}| market for kraft paper | Cut-off, U |
| Cleansing towelette  Towelette  Wrapper | Cellulose fiber  Aluminum foil, paper, and polyethylene terephthalate | 2.79  0.70 | Cellulose fiber {RoW}| market for cellulose fiber | Cut-off, U  Aluminum, primary, cast alloy slab from continuous casting {GLO}| market for | Cut-off, U  Kraft paper {RoW}| market for kraft paper | Cut-off, U  Polyethylene terephthalate, granulate, amorphous {GLO}| market for | Cut-off, U |
| Dialyzer A  Fibers  Potting material  Housing  Caps  Outer wrap | Polysulfone  Polyurethane  Polycarbonate  Polyethylene  Polyethylene film | 20.65  3.98  136.91  7.11  10.80 | Polysulfone {GLO}| market for | Cut-off, U  Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U  Polycarbonate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Dialyzer B  Fibers  Potting material  Housing  Caps  Outer wrap | Polysulfone  Polyurethane  Polycarbonate  Polyethylene  Polyethylene film | 24.40  4.70  169.23  7.29  11.22 | Polysulfone {GLO}| market for | Cut-off, U  Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U  Polycarbonate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Dialyzer C  Fibers  Potting material  Housing  Caps  Outer wrap | Polysulfone  Polyurethane  Polycarbonate  Polyethylene  Polyethylene film | 28.83  5.56  163.77  7.10  10.80 | Polysulfone {GLO}| market for | Cut-off, U  Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U  Polycarbonate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Dialyzer D  Fibers  Potting material  Housing  Caps  Outer wrap | Polysulfone  Polyurethane  Polypropylene  Polyethylene  Polyethylene film | 27.67  5.33  107.78  8.39  25.54 | Polysulfone {GLO}| market for | Cut-off, U  Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Dialyzer E  Fibers  Potting material  Housing  Caps  Outer wrap | Polysulfone  Polyurethane  Polypropylene  Polyethylene  Polyethylene film | 31.15  6.00  112.54  8.36  25.01 | Polysulfone {GLO}| market for | Cut-off, U  Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Dialyzer F  Fibers  Potting material  Housing  Caps  Outer wrap | Polysulfone  Polyurethane  Polypropylene  Polyethylene  Polyethylene film | 35.07  6.76  119.95  8.38  25.28 | Polysulfone {GLO}| market for | Cut-off, U  Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U |
| Disinfecting wipe  Wipe  Alcohol  Wrapper | Woven cotton  Isopropyl alcohol  Aluminum foil, paper, and polyethylene terephthalate | 0.19  0.62  0.58 | Textile, woven cotton {GLO}| market for | Cut-off, U  Isopropanol {RoW}| market for isopropanol | Cut-off, U  Aluminum, primary, cast alloy slab from continuous casting {GLO}| market for | Cut-off, U  Kraft paper {RoW}| market for kraft paper | Cut-off, U  Polyethylene terephthalate, granulate, amorphous {GLO}| market for | Cut-off, U |
| Disposable gloves | Latex | 4.21 | Latex {RoW}| market for latex | Cut-off, U |
| Fistula needle  Metal needle  Needle cap  Butterfly wings  Clamp  Safety cover  Tubing  Luer connector  Outer plastic wrap  Outer paper wrap | Steel  Polycarbonate  Polyvinyl chloride  Polyoxymethylene4  Polyoxymethylene4  Polyvinyl chloride  Polycarbonate  Polyethylene film  Kraft paper | 0.54  0.39  0.55  1.18  2.23  3.54  1.13  1.98  1.77 | Steel, chromium steel 18/8 {GLO}| market for | Cut-off, U  Polycarbonate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Tetrafluoroethylene {GLO}| market for | Cut-off, U  Tetrafluoroethylene {GLO}| market for | Cut-off, U  Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polycarbonate {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Packaging film, low density polyethylene {GLO}| market for | Cut-off, U  Kraft paper {RoW}| market for kraft paper | Cut-off, U |
| Gauze pad | Woven cotton | 0.28 | Textile, woven cotton {GLO}| market for | Cut-off, U |
| Normal saline, small bag  Bag  Outer plastic wrapper  250 mL saline | Polyvinyl chloride  Polypropylene film  Water, sodium chloride | 24.42  5.76  260.87 | Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion, plastic film {GLO}| market for | Cut-off, U  Sodium chloride, powder {GLO}| market for | Cut-off, U  Water, unspecified natural origin, GLO |
| Normal saline, large bag  Bag  Outer plastic wrapper  1000 mL saline | Polyvinyl chloride  Polypropylene film  Water, sodium chloride | 40.00  14.88  1050.00 | Polyvinylchloride, bulk polymerized {GLO}| market for | Cut-off, U  Injection moulding {GLO}| market for | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion, plastic film {GLO}| market for | Cut-off, U  Sodium chloride, powder {GLO}| market for | Cut-off, U  Water, unspecified natural origin, GLO |
| Paper tape roll  Paper tape  Cardboard roll | Kraft paper  Core board paper | 1.53  1.67 | Kraft paper {RoW}| market for kraft paper | Cut-off, U  Core board {GLO}| market for | Cut-off, U |
| Pillow case | Kraft paper | 21.35 | Kraft paper {RoW}| market for kraft paper | Cut-off, U |
| Skin cleanser  Skin cleanser bottle  Liquid skin cleanser | High density polyethylene  Sodium hypochlorite | 60.00  580.00 | Polyethylene, high density, granulate {GLO}| market for | Cut-off, U  Blow moulding {GLO}| market for | Cut-off, U  Sodium hypochlorite, without water, in 15% solution state {RoW}| market for sodium hypochlorite, without water, in 15% solution state | Cut-off, U |
| Surgical mask  Fabric  Ear loops | Polypropylene textile  Polyester yarn | 2.79  0.30 | Textile, non-woven polypropylene {GLO}| market for textile, non woven polypropylene | Cut-off, U  Fiber, polyester {GLO}| market for fiber, polyester | Cut-off, U |
| Syringe, 3cc  Syringe body and plunger  Plunger seal  Outer plastic wrap  Outer paper wrap | Polypropylene  Polyisoprene  Polyethylene  Kraft paper | 3.37  0.45  0.44  0.34 | Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Synthetic rubber {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Kraft paper {RoW}| market for kraft paper | Cut-off, U |
| Syringe, 10cc  Syringe body and plunger  Plunger seal  Outer plastic wrap  Outer paper wrap | Polypropylene  Polyisoprene  Polyethylene  Kraft paper | 7.10  0.83  0.93  0.48 | Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion of plastic sheets and thermoforming, inline {GLO}| market for | Cut-off, U  Synthetic rubber {GLO}| market for | Cut-off, U  Polyethylene, low density, granulate {GLO}| market for | Cut-off, U  Kraft paper {RoW}| market for kraft paper | Cut-off, U |
| Technician gown | Polypropylene textile | 73.09 | Textile, non-woven polypropylene {GLO}| market for textile, non woven polypropylene | Cut-off, U |
| Tourniquet | Polyisoprene | 5.92 | Synthetic rubber {GLO}| market for | Cut-off, U |
| Waterproof absorbent pad  Absorbent top layer  Waterproof backing | Super absorbent polymer  Polypropylene | 7.35  7.95 | Polyacrylamide {GLO}| market for | Cut-off, U  Polypropylene, granulate {GLO}| market for | Cut-off, U  Extrusion, plastic film {GLO}| market for | Cut-off, U |

1. Cut-off refers to omission of de minimis life cycle stages; GLO refers to global manufacturing processes; market refers to all steps necessary to get a product to market, including infrastructure and transportation; RoW refers to non-global processes (“rest of the world”); and U refers to unit processes.

2. Additional unit processes included to convert magnesium sulfate to magnesium chloride.

3. Acetate unit processes from Jungbluth N. Life Cycle Inventory of Sodium Acetate and Expanded Graphite: Short Report. 15 January 2008. Available at <https://www.osti.gov/etdeweb/servlets/purl/22119615> Accessed March 8, 2022.

4. Emission factor for polyoxymethylene not available. Substituted emission factor for another thermoplastic (polytetrafluoroethylene).

**Supplemental Table 2. Other input ecoinvent unit processes.**\*

|  |  |
| --- | --- |
| Electricity | Electricity, low voltage {RFC}| market for | Cut-off, U |
| Natural gas | Heat, central or small-scale, natural gas {RoW}| market for heat, central or small-scale, natural gas | Cut-off, U |
| Water | Tap water {RoW}| market for | Cut-off, U |
| Transportation | Transport, passenger car {RoW}| market for | Cut-off, U  Transport, regular bus {GLO}| market for | Cut-off, U  Transport, van {RoW}| market for | Cut-off, U |
| Biohazard waste | Hazardous waste, for incineration {RoW}| market for hazardous waste, for incineration | Cut-off, U |
| Landfill waste | Disposal, municipal solid waste, to US sanitary landfill/US US-EI, U |

\*Cut-off refers to omission of de minimis life cycle stages; GLO refers to global manufacturing processes; market refers to all steps

necessary to get a product to market, including infrastructure and transportation; RoW refers to non-global processes (“rest of the world”);

and U refers to unit processes.