

CLAIMS

What is claimed is:

- 5 1. A conduit contactor for conducting chemical reactions or chemical extractions between immiscible liquids comprising:
a conduit having a hollow interior, a first open end, and a second open end
opposite the first open end;
a separator in fluid communication with and proximate the second open end; and
10 a plurality of fibers disposed within the conduit,
wherein a total surface area of the fibers per volume of the hollow interior of the conduit is from $100 \text{ cm}^2/\text{cm}^3$ to $490 \text{ cm}^2/\text{cm}^3$.
2. The conduit contactor of claim 1, wherein a total surface area of the fibers per
15 volume of the hollow interior of the conduit is from $125 \text{ cm}^2/\text{cm}^3$ to $450 \text{ cm}^2/\text{cm}^3$.
3. The conduit contactor of claim 1, wherein a total surface area of the fibers per
volume of the hollow interior of the conduit is from $150 \text{ cm}^2/\text{cm}^3$ to $435 \text{ cm}^2/\text{cm}^3$.
- 20 4. The conduit contactor of claim 1, wherein a length of the conduit and the fibers is from 0.25 m to 10 m.
5. The conduit contactor of claim 1, wherein an average diameter of the hollow
interior of the conduit is from 0.5 cm to 3 m.
- 25 6. The conduit contactor of claim 1, wherein an average diameter of the fibers is from $5 \text{ }\mu\text{m}$ to $150 \text{ }\mu\text{m}$.
7. A method of conducting chemical reactions or chemical extractions between
30 immiscible liquids comprising:
providing a conduit contactor comprising:
a conduit having a hollow interior, a first open end, and a second open end
opposite the first open end;

- a separator in fluid communication with and proximate the second open end; and
- a plurality of fibers disposed within the conduit,
- wherein a total surface area of the fibers per volume of the hollow interior of the conduit is from $100 \text{ cm}^2/\text{cm}^3$ to $490 \text{ cm}^2/\text{cm}^3$;
- introducing a first liquid into the conduit and onto the fibers;
- introducing a second liquid into the conduit such that the second liquid contacts the first liquid, wherein the second liquid is immiscible with the first liquid;
- (i) extracting at least one component from the first liquid into the second liquid,
- (ii) extracting at least one component from the second liquid into the first liquid, or (iii) reacting at least one component from the first liquid with at least one component from the second liquid; and
- receiving the first and second liquids into the separator.
8. The method according to claim 7, wherein a total surface area of the fibers per volume of the hollow interior of the conduit is from $125 \text{ cm}^2/\text{cm}^3$ to $450 \text{ cm}^2/\text{cm}^3$.
9. The method according to claim 7, wherein a total surface area of the fibers per volume of the hollow interior of the conduit is from $150 \text{ cm}^2/\text{cm}^3$ to $435 \text{ cm}^2/\text{cm}^3$.
10. The method according to claim 7, further comprising pre-heating the conduit contactor to a temperature of 15°C to 100°C prior to introducing the first liquid.
11. The method according to claim 7, wherein a length of the conduit and the fibers is from 0.25 m to 10 m.
12. The method according to claim 7, wherein an average diameter of the hollow interior of the conduit is from 0.5 cm to 3 m.
13. The method according to claim 7, wherein an average diameter of the fibers is from $5 \text{ }\mu\text{m}$ to $150 \text{ }\mu\text{m}$.

14. The method according to claim 7, wherein the first liquid is introduced at a first rate and the second liquid is introduced at a second rate, wherein a ratio of the first rate to the second rate is from 2:1 to 1:10.
- 5 15. The method according to claim 14, wherein the ratio of the first rate to the second rate is from 1:1 to 3:1.
16. A system for facilitating chemical reactions or chemical extractions between immiscible liquids comprising:
- 10 a conduit having a hollow interior, a first open end, and a second open end opposite the first open end;
- a separator in fluid communication with and proximate the second open end; and
- a plurality of fibers disposed within the conduit,
- wherein a total surface area of the fibers per volume of the hollow interior
- 15 of the conduit is from $100 \text{ cm}^2/\text{cm}^3$ to $490 \text{ cm}^2/\text{cm}^3$;
- a first fluid supply for introducing a first liquid into the conduit and onto the fibers; and
- a second fluid supply for introducing a second liquid into the conduit such that the second liquid contacts the first liquid;
- 20 wherein the first liquid and the second liquid are immiscible.
17. The system according to claim 16, wherein a total surface area of the fibers per volume of the hollow interior of the conduit is from $125 \text{ cm}^2/\text{cm}^3$ to $450 \text{ cm}^2/\text{cm}^3$.
- 25 18. The system according to claim 16, wherein a total surface area of the fibers per volume of the hollow interior of the conduit is from $150 \text{ cm}^2/\text{cm}^3$ to $435 \text{ cm}^2/\text{cm}^3$.
19. The system according to claim 16, wherein the first fluid supply is configured to introduce the first liquid into the conduit at a first rate and the second fluid supply
- 30 is configured to introduce the second liquid into the conduit at a second rate, wherein a ratio of the first rate to the second rate is from 2:1 to 1:10.

20. The system according to claim 19, wherein the ratio of the first rate to the second rate is from 1:1 to 3:1.