CLAIMS

What is claimed is:

1. A method comprising :

(a) contacting an organic stream with water and carbon dioxide, whereby sodium is extracted from the organic stream; and

(b) separating an aqueous sodium salt-containing slurry phase from an organic phase comprising a reduced sodium content relative to the organic stream,

wherein the organic stream and the water are present at a volumetric ratio in the range of from 1:1 to about 10:1.

2. The method of claim 1, wherein the organic stream is a heavy residue formed in the co-production of propylene oxide and styrene.

3. The method of claim 1, wherein the contacting in (a) comprises combining the carbon dioxide with the water to form a CO_2-saturated water stream, and contacting the CO_2-saturated water stream with the organic stream.

4. The method of claim 3 further comprising controlling the concentration of carbon dioxide in the CO_2-saturated water stream by controlling the temperature, the pressure, or both.

5. The method of claim 4, wherein the pressure is in the range of from about atmospheric pressure to about 500 psi.

6. The method of claim 4, wherein the temperature is in the range of from about 5°C to about 90°C.

7. The method of claim 1 , wherein the contacting in (a) comprises combining the organic stream and the water to form a mixture, and injecting the carbon dioxide as a gas thereinto.

8. The method of claim 7, wherein the carbon dioxide gas is injected at a flow rate in the range of from about 1 wt% to about 90 wt % of the combined mass of the organic and aqueous phases.

9. The method of claim 7, wherein the contacting in (a) is performed at a pressure of greater than or equal to about atmospheric pressure.

10. The method of claim 1, wherein the separating in (b) further comprises separating a gas comprising carbon dioxide, a carrier gas, or both; recycling at least a portion of the separated gas to the contacting of (a); or both.

11. The method of claim 1, wherein (a) and (b) are performed in a single apparatus.

12. The method of claim 1 further comprising:

repeating (a) and (b) one or more times on the organic phase; subjecting the organic phase to ion exchange; or both, to obtain an organic phase having a further reduced sodium content.

13. The method of claim 12, wherein the further reduced sodium content comprises a sodium content of less than about 100 ppm sodium.

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14. The method of claim 1, wherein the reduced sodium content comprises a sodium content of less than about 250 ppm sodium,

15. The method of claim 1, wherein the contacting of (a), the separating of (b), or both are performed continuously.

16. The method of claim 1, wherein the separating of (b) is performed at a temperature in the range of from about 15°C to about 85°C.

17. The method of claim 1, wherein the carbon dioxide is provided by a gas selected from the group consisting of pure carbon dioxide, other gases comprising greater than about 50 volume percent carbon dioxide, and combinations thereof.

18. The method of claim 1, wherein at least a portion of the contacting of (a) occurs in a liquid-liquid contactor.

19. A method comprising:

(a) contacting a mixture comprising an organic stream and water with carbon dioxide gas; and

(b) separating an aqueous sodium salt-containing phase from an organic phase comprising a reduced sodium, content relative to the organic stream,

wherein the organic stream is a heavy residue formed in the co-production of propylene oxide and styrene.