WHAT IS CLAIMED IS:

1. Crystalline trofinetide · xH_2O, wherein x is about 2 to about 4, characterized as having:

(i) a powder x-ray diffraction pattern with a peak in the range of 6.6-6.8, a peak in the range of 11.3-11.6, a peak in the range of 12.5-12.7, and a peak in the range of 13.6-13.8 degrees 2Θ using Cu Kα radiation, wherein the 2Θ values are ± 0.2 degrees 2Θ; or

(ii) a powder x-ray diffraction pattern with d-spacings at 13.1, 7.7, 7.0, 6.4, and 5.3 Å using Cu Kα radiation; or

(iii) a FT-Raman spectrum with peaks at 2989, 2934, 2883, 1685, 1637, 1459, and 930 cm-1, wherein the cm-1 values are ± 4 cm-1; or

(iv) a low frequency (LF) Raman spectrum with peaks at 13, 24, 67, and 77 cm-1, wherein the cm-1 values are ± 4 cm-1; or

(v) a 13C solid-state nuclear magnetic resonance spectrum with peaks at 179.7, 177.9, 177.5, 177.2, 177.0, 165.3, 164.9, 164.8, 67.8, 67.4, 58.6, 58.2, 46.8, 40.3, 33.3, 25.3, 23.5, and 21.1 ppm, wherein the ppm values are ± 3 pm; or

(vi) a 13C solid-state nuclear magnetic resonance spectrum with 18 peaks, wherein the Δ from the furthest downfield peak to: (i) the second furthest downfield peak is 1.8 ppm; (ii) the third furthest downfield peak is 2.2 ppm; (iii) the fourth furthest downfield peak is 2.5 ppm; (iv) the fifth furthest downfield peak is 2.7 ppm (v) the sixth furthest downfield peak is 14.4 ppm; (vi) the seventh furthest downfield peak is 14.8 ppm; (vii) the eight furthest downfield peak is 14.9 ppm; (viii) the ninth furthest downfield peak is 111.9 ppm; (ix) the tenth furthest downfield peak is 112.3 ppm; (x) the eleventh furthest downfield peak is 121.1 ppm; (xi) the twelfth furthest downfield peak is 121.5 ppm; (xii) the thirteenth furthest downfield peak is 133.1 ppm; (xiii) the fourteenth furthest downfield peak is 139.4 ppm; (xiv) the fifteenth furthest downfield peak is 146.3 ppm; (xv) the sixteenth furthest downfield peak is 154.6 ppm; (xvi) the seventeenth furthest downfield peak is 156.2 ppm; and/or (xvii) the Δ from the furthest downfield peak to the furthest upfield peak is 158.6 ppm, or any combination thereof; or

(vii) a melting point with an onset temperature of 71.71 ºC and a peak temperature of 72.06 ºC based on differential scanning calorimetry; or

(viii) an infrared (IR) spectrum with peaks at 1678, 1636, 1589, 1525, 1214, and 1196 cm-1, wherein the cm-1 values are ± 4 cm-1; or

(ix) a near-infrared (NIR) spectrum with peaks at 5145, 4630, and 4423 cm-1, wherein the cm-1 values are ± 4 cm-1; or

a combination thereof.

2. The crystalline trofinetide · xH_2O of claim 1, characterized as having a powder x-ray diffraction pattern with peaks at 6.7 or 6.8, 11.4 or 11.5, 12.6, and 13.7 or 13.8 degrees 2Θ using Cu Kα radiation, wherein the 2Θ values are ± 0.2 degrees 2Θ.

3. The crystalline trofinetide · xH_2O of claim 2, characterized as having a powder x-ray diffraction pattern with peaks at 6.7, 11.4, 12.6, 13.7, 22.3, 23.6, 25.3 and 28.1 degrees 2Θ using Cu Kα radiation, wherein the 2Θ values are ± 0.2 degrees 2Θ.

4. The crystalline trofinetide · xH_2O of claim 1, characterized as having a powder x-ray diffraction pattern with d-spacings at 13.1, 7.7, 7.0, 6.4, and 5.3 Å using Cu Kα radiation.

5. The crystalline trofinetide · xH_2O of claim 1, characterized as having an FT-Raman spectrum with peaks at 2989, 2934, 2883, 1685, 1637, 1459, and 930 cm^{-1}, wherein the cm^{-1} values are ± 4 cm^{-1}.

6. The crystalline trofinetide · xH_2O of claim 1, characterized as having a low frequency (LF) Raman spectrum with peaks at 13, 24, 67, and 77 cm^{-1}, wherein the cm^{-1} values are ± 4 cm^{-1}.

7. The crystalline trofinetide · xH_2O of claim 1, characterized as having a ^{13}C solid-state nuclear magnetic resonance spectrum with peaks at 179.7, 177.9, 177.5, 177.2, 177.0, 165.3, 164.9, 164.8, 67.8, 67.4, 58.6, 58.2, 46.8, 40.3, 33.3, 25.3, 23.5, and 21.1 ppm, wherein the ppm values are ± 3 pm.

8. The crystalline trofinetide · xH_2O of claim 1, characterized as having a melting point with an onset temperature of 71.71 ºC and a peak temperature of 72.06 ºC based on differential scanning calorimetry.

9. The crystalline trofinetide · xH_2O of claim 1, characterized as having an infrared (IR) spectrum with peaks at 1678, 1636, 1589, 1525, 1214, and 1196 cm^{-1}, wherein the cm^{-1} values are ± 4 cm^{-1}.

10. The crystalline trofinetide · xH_2O of claim 1, characterized as having a near-infrared (NIR) spectrum with peaks at 5145, 4630, and 4423 cm^{-1}, wherein the cm^{-1} values are ± 4 cm^{-1}.

11. The crystalline trofinetide · xH_2O of claim 1, wherein x is about 2.5 to about 3.5.

12. The crystalline trofinetide · xH_2O of claim 1, wherein x is about 3.

13. A pharmaceutical composition comprising the crystalline trofinetide · xH_2O of claim 1 and a pharmaceutically acceptable excipient.

14. An aqueous pharmaceutical formulation comprising the crystalline trofinetide · xH_2O of claim 1 dissolved in water.

15. A method of making the aqueous pharmaceutical formulation of claim 1, the method comprising admixing the crystalline trofinetide · xH_2O and water.

16. A kit comprising the crystalline trofinetide · xH_2O of claim 1 and instructions for dissolving crystalline trofinetide · xH_2O in a water to provide an aqueous pharmaceutical formulation.

17. A method of making the crystalline trofinetide · xH_2O of claim 1, the method comprising i) adding ethanol to an aqueous solution of trofinetide at about 25 °C; ii) cooling the solution to about 0 °C; and iii) isolating the solid thus obtained to give crystalline trofinetide · xH_2O.