the feedstock. Phosphate in the feedstock at about 2700 ppm was found to be absent, <1 ppm, following the processing.

A 9.5-hour run was completed with the solids from wheat millfeed which had the starch extracted from it. The test was ended when the catalyst was showing significant deactivation. The liquid hourly space velocity was 1.5 L/L/hr and the conversion of COD was 99.9% through most of the test. Gas yield was 0.80 L/g dry solids with a composition of 56% methane, 42% carbon dioxide and 2% hydrogen. Other hydrocarbon gas products amounted to less than 1% and the carbon monoxide was undetectable at less than 100 ppm. The mineral recovery system recovered a solid with 70 to 80% ash content and which accounted for 1 to 2% of the carbon in the feedstock. Phosphate in the feedstock at about 940 ppm was found to be absent, <1 ppm, following the processing. Sulfate was also present in the feed at 35 ppm but was found in the range of 2 to 10 ppm in the effluent.

In a separate experiment, a feed comprising sulfate and a feed comprising sulfate along with calcium ascorbate as a calcium material were compared to specifically determine the effectiveness of reducing sulfate contaminants from a wet biomass feedstock. Using a similar bench-scale reactor system the solutions of sodium sulfate and calcium ascorbate were brought to 350 C in a stirred tank reactor and the solid precipitate (calcium sulfate) separated by settling in a subsequent vessel. Referring to Table 1, the sulfate content in the remaining liquid solution was monitored as a function of time. At 240 minutes the source was switched to the feed comprising calcium ascorbate. 3.5 hours after initiation of the feed having calcium cations, the sulfate content drops from a value greater than 300 ppm to a value of about 20 ppm.

TABLE 1

A summary of sulfate content in a feedstock with and without calcium ascorbate providing Ca cations.

Source	Time (min)	Sulfate Content (ppm)
Feed	0	263.3
	30	172
	60	239.2
	120	289.4
	150	294.4
	180	303.8
Feed + Ca-Ascorbate	240	307.7
	270	310.5
	300	150.8
	330	150.4
	360	89
	390	39.2
	420	37.3
	450	22

In some instances, cations are present in the feedstock without having added a salt. In such cases, salt addition may not be needed because there are sufficient cations present such that a stoichiometric amount can react with the soluble sulfate contaminants and form insoluble sulfate precipitates. If there is an insufficient amount of cations, then a salt can be added to the feedstock.

While a number of embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the invention in its broader aspects. The appended claims, therefore, are intended to cover all such changes and modifications as they fall within the true spirit and scope of the invention.

We claim:

1. A hydrothermal process for treating a wet biomass feedstock comprising biomass, inorganic contaminants, soluble sulfate contaminants, and sub-critical liquid water, the process operated at temperatures and pressures that maintain the wet biomass feedstock in liquid phase without forming a supercritical fluid and characterized by:

heating under pressure the wet biomass feedstock to a pre-treatment temperature sufficient for organic constituents in the feedstock to decompose, for precipitates of inorganic wastes to form, and for preheating the wet feedstock in preparation for removal of the soluble sulfate contaminants;

reacting the soluble sulfate contaminants with cations present in the feedstock to yield a sulfate-containing precipitate; and

separating the precipitates of inorganic wastes and the sulfate-containing precipitates out the wet biomass feedstock to yield a liquid of the wet biomass feedstock having a decreased sulfate content.

2. The process of claim **1**, wherein the biomass comprises the cations.

3. The process of claim **1**, further comprising sadding cations to the feedstock as a salt.

4. The process of claim **3**, wherein the salt comprises a compound selected from the group consisting of calcium oxide, calcium hydroxide, calcium carbonate, and combinations thereof.

5. The process of claim **3**, wherein the salt is substantially soluble at temperatures below the pre-treatment temperature.

6. The process of claim **5**, wherein the salt comprises calcium ascorbate.

7. The process of claim **1**, wherein the cation is calcium.

8. The process of claim **1**, wherein the cation is barium.

9. The process of claim **1**, wherein the decreased sulfate content is less than 20 ppm.

10. The process of claim **1**, wherein the pre-treatment temperature is at least 300° C.

11. The process of claim **1**, wherein the wet biomass feedstock further comprises soluble, reduced sulfur contaminants and wherein the process further comprises capturing the soluble, reduced sulfur contaminants in an adsorbent bed by reaction with a metal or a metal oxide.

12. The process of claim **1**, wherein the wet biomass feedstock is selected from the group consisting of high-moisture biomass slurries, biosludge from wastewater treatment systems, sewage sludge from municipal treatment systems, wet byproducts from biorefinery operations, wet byproducts/residues from food processing, animal waste and waste from centralized animal raising facilities, organic chemical manufacturing wastewater streams, industrial wastewater contaminated with organics, and combinations thereof.

13. The process of claim **1**, further comprising exposing the liquid of the wet biomass feedstock to a heterogeneous metal catalyst and gasifying at least a portion of the organic constituents after said separating, wherein the heterogeneous metal catalyst comprises Ru, Ni or Ni with Na added.

14. The process of claim **1**, further comprising exposing the liquid of the wet biomass feedstock to a heterogeneous metal catalyst and gasifying at least a portion of the organic constituents after said separating, wherein the heterogeneous catalyst comprises Ru on a carbon support.

15. The process of claim **1**, further comprising exposing the liquid of the wet biomass feedstock to a heterogeneous metal catalyst and gasifying at least a portion of the organic constituents after said separating, wherein the exposing the wet biomass feedstock to a heterogeneous catalyst comprises pro-