

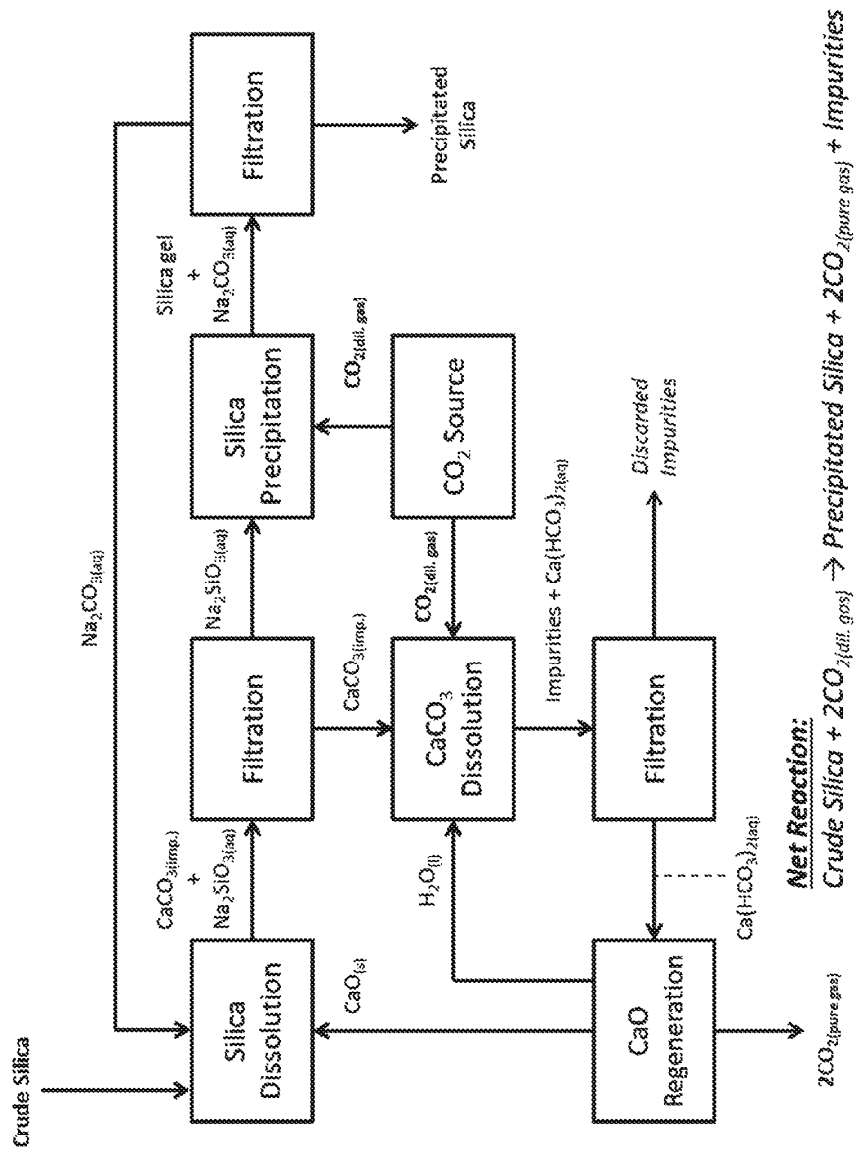
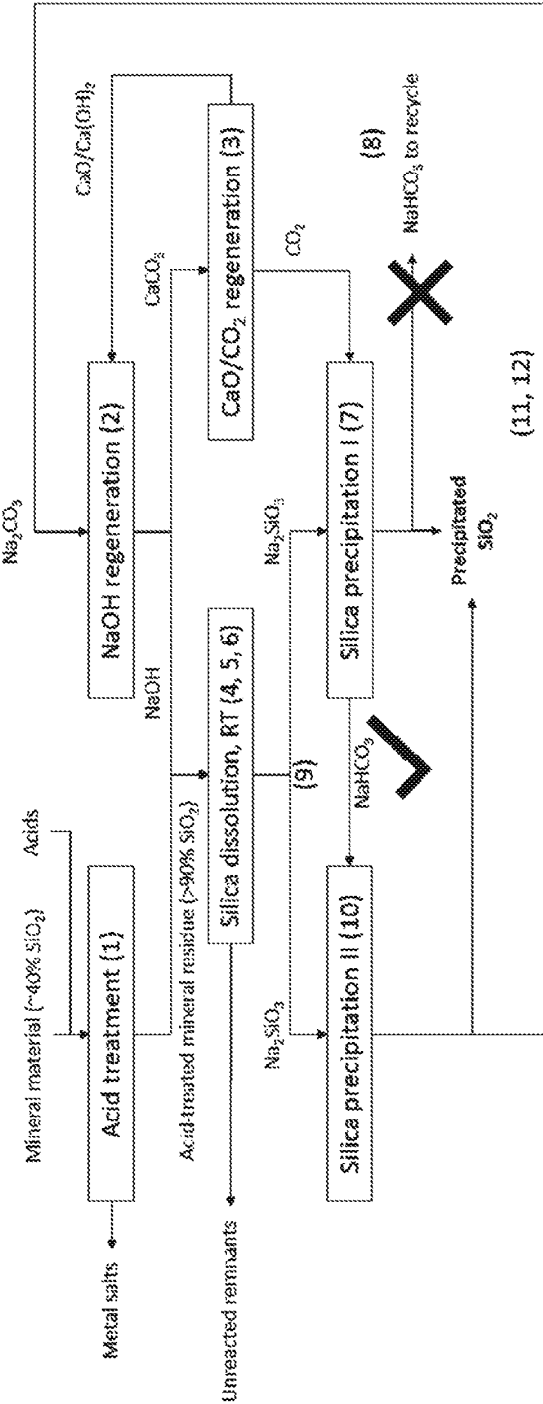


FIG. 1



Reactions involved (some examples, mole balanced):

- (1) $MSiO_{3(s)} + 2HCl_{(aq)} \rightarrow MCl_{2(aq)} + SiO_{2(s, crude)}$
- (2) $Na_2CO_{3(aq)} + Ca(OH)_{2(s)} \rightarrow CaCO_{3(s)} + 2NaOH_{(aq)}$
- (3) $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$
- (4) $2NaOH_{(aq)} + SiO_{2(s, crude)} \rightarrow Na_2SiO_{3(aq)} + H_2O_{(l)}$
- (7) $Na_2SiO_{3(aq)} + 2CO_{2(g)} + H_2O_{(l)} \rightarrow 2NaHCO_{3(aq)} + SiO_{2(s, pptd)}$
- (8) $2NaHCO_{3(aq)} + 2Ca(OH)_{2(s)} \rightarrow 2NaOH_{(aq)} + 2CaCO_{3(s)} + 2H_2O_{(l)}$ - Undesired
- (10) $Na_2SiO_{3(aq)} + 2NaHCO_{3(aq)} \rightarrow 2Na_2CO_{3(aq)} + SiO_{2(s, pptd)} + H_2O_{(l)}$

FIG. 2

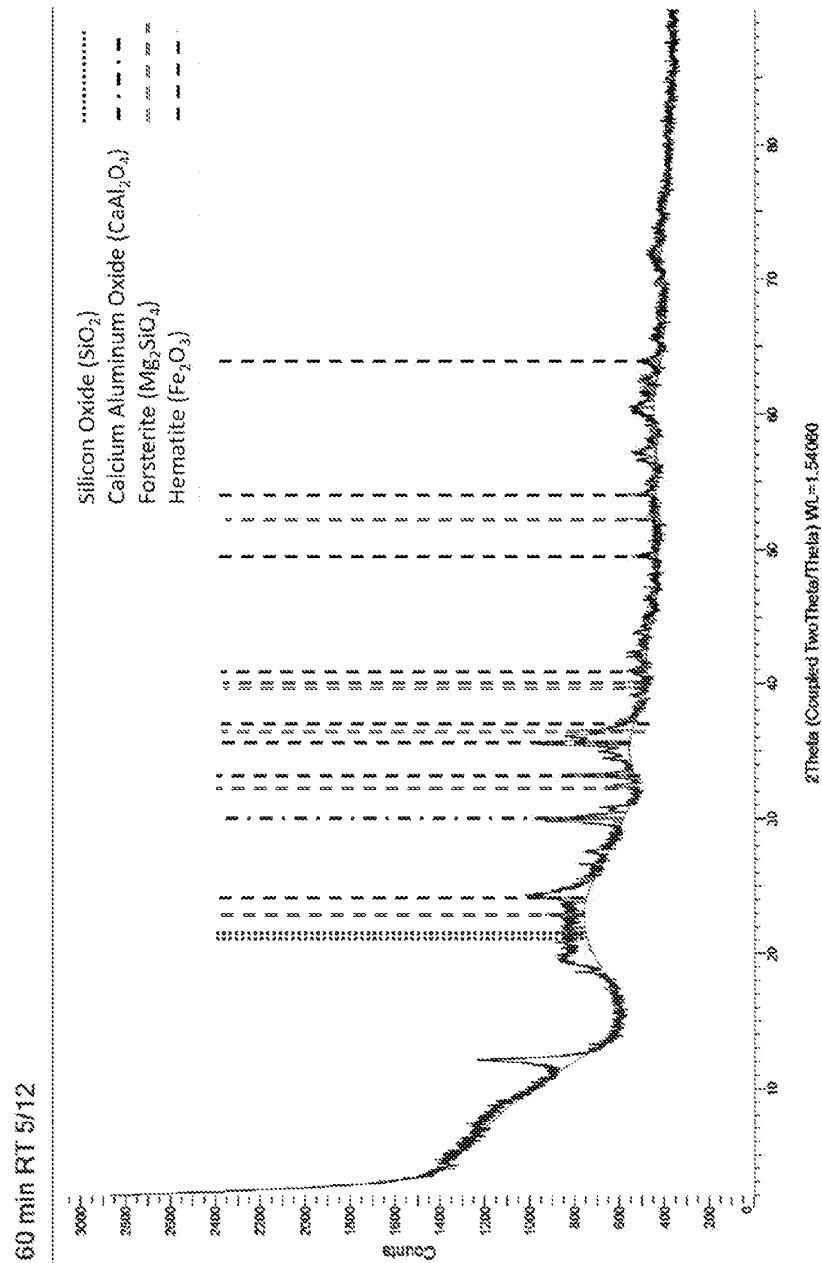


FIG. 3

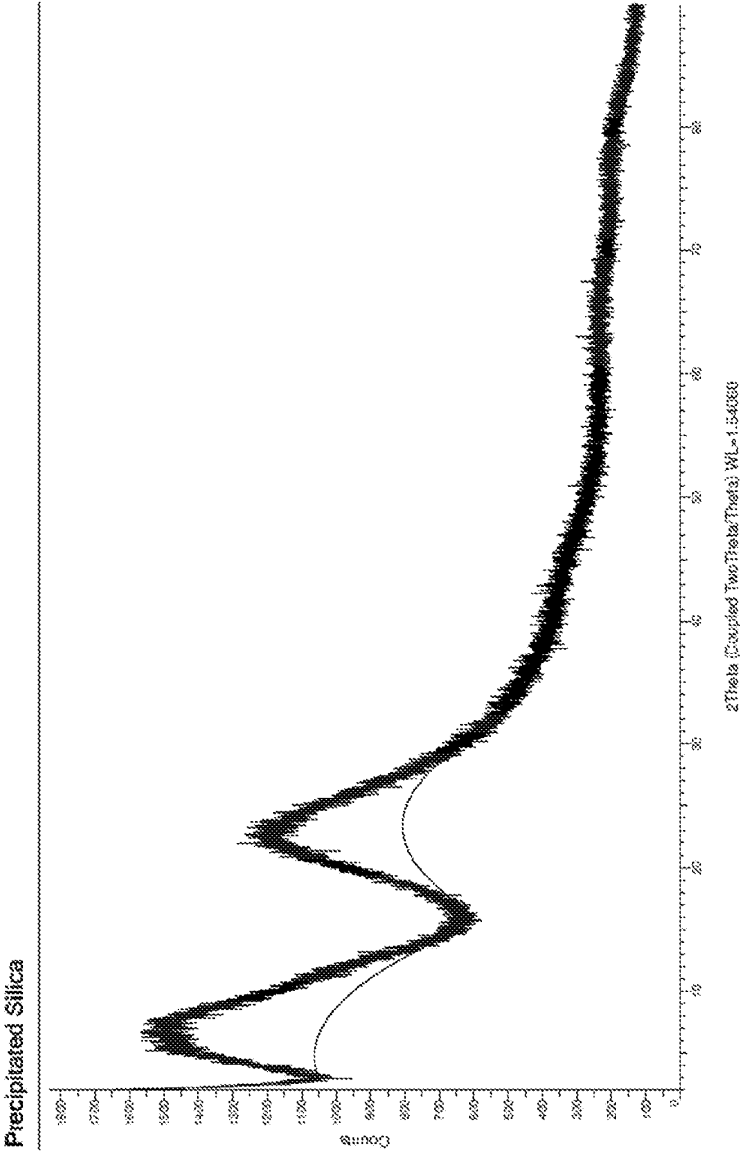


FIG. 4

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Surface Area
Single point surface area at $P/P_o = 0.248996499$: $513.5637 \text{ m}^2/\text{g}$
BET Surface Area: $529.3937 \text{ m}^2/\text{g}$
Langmuir Surface Area: $735.8580 \text{ m}^2/\text{g}$
t-Plot Micropore Area: $34.7303 \text{ m}^2/\text{g}$
BJH Adsorption cumulative surface area of pores between $17.000 \text{ \AA}$ and $3000.000 \text{ \AA}$ diameter: $511.391 \text{ m}^2/\text{g}$
BJH Desorption cumulative surface area of pores between $17.000 \text{ \AA}$ and $3000.000 \text{ \AA}$ diameter: $562.1168 \text{ m}^2/\text{g}$
Pore Volume
Single point adsorption total pore volume of pores less than $1811.524 \text{ \AA}$ diameter at $P/P_o = 0.989310323$: $0.787232 \text{ cm}^3/\text{g}$
BJH Adsorption cumulative volume of pores between $17.000 \text{ \AA}$ and $3000.000 \text{ \AA}$ diameter: $0.765935 \text{ cm}^3/\text{g}$
BJH Desorption cumulative volume of pores between $17.000 \text{ \AA}$ and $3000.000 \text{ \AA}$ diameter: $0.786867 \text{ cm}^3/\text{g}$
Pore Size
Adsorption average pore width ($4V/A$ by BET): $59.4817 \text{ \AA}$
BJH Adsorption average pore diameter ($4V/A$): $59.910 \text{ \AA}$
BJH Desorption average pore diameter ($4V/A$): $55.993 \text{ \AA}$

FIG. 5