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Claim

1. A method comprising:
    a) providing a solvent and a reactant comprising at least one member selected from the group consisting of an α-hydroxycarboxylic acid, an α-hydroxycarboxylic acid ester, a β-hydroxycarboxylic acid, a β-hydroxycarboxylic acid ester, a cyclic ester thereof, and acetoxylated acid or ester thereof;
    b) providing a porous aluminosilicate material having surface acidity;
    c) treating said porous aluminosilicate material with an inorganic salt to reduce said surface acidity at least by 50%, wherein said decrease in surface acidity of porous aluminosilicate material is measured by temperature programmed desorption technique;
    d) performing a dehydration reaction at above ambient temperature to produce α, β-unsaturated carboxylic acid and/or an α, β-unsaturated carboxylic acid ester with a minimum selectivity of 70%, acetaldehyde with a maximum selectivity of 20%, 2,3-pentadione with a maximum selectivity of less than 1.0%; and propionic acid with a maximum selectivity of less than 1.0%.

2. The method of claim 1, wherein said porous aluminosilicate material comprises aluminum and silicon in the ratio 1:1 to 1:150.

3. The method of claim 1, wherein said inorganic salt is selected from a group consisting of at least one selected from a phosphate, a, sulfate, a nitrate, a carbonate, a halide, a molybdate, a tungstate, a stanate, an antimonite, any combination thereof.

4. The method of claim 1, wherein said porous aluminosilicate material is treated with said inorganic salt through an incipient impregnation process.

5. The method of claim 1, wherein said porous aluminosilicate material is treated with said inorganic salt through a wet impregnation process.

6. The method of claim 1, wherein said inorganic salt is selected from a group consisting of a monosodium phosphate, disodium phosphate, a trisodium phosphate, a potassium phosphate, a sodium aluminum phosphate compound, and any combination thereof.

7. The method of claim 1, wherein a part of said surface acidity of porous aluminosilicate material is BrΘnsted acidity.

8. The method of claim 1, wherein a part of said surface acidity of porous aluminosilicate material is Lewis acidity.

9. The method of claim 1, wherein said dehydration reaction is carried in the temperature range of 250ºC to 400ºC.

10. The method of claim 1, wherein said dehydration reaction is carried with gas hourly space velocity in the range of 0.4000 – 40,000/hour.

11. The method of claim 1, wherein said porous aluminosilicate material is a zeolite selected from a group consisting of Zeolite A, Zeolite B, Zeolite L, Zeolite X, Zeolite Y, Zeolite ZK-4, mordenite, beta and Zeolite ZSM-5.

12. The method of claim 1, wherein said porous aluminosilicate material is ZSM-5.

13. The method of claim 1, wherein said porous aluminosilicate material has undergone at least one ion exchange.

14. The method of claim 1, wherein said porous aluminosilicate material has associated therewith at least one ion selected from the group consisting of H^+, Li^+, Na^+, K^+, Cs^+, Mg^{2+}, Ca^{2+}, Ba^{2+}, La^{2+}, La^{3+}, Ce^{2+}, Ce^{3+}, Sm^{2+}, Sm^{3+}, Eu^{2+}, Eu^{3+}, and any combination thereof.

15. The method of claim 1, wherein the dehydration reaction occurs in the presence of a carrier gas selected from a group consisting of carbon dioxide, helium, and nitrogen and any combination thereof.

16. The method of claim 1, wherein the dehydration reaction is performed in a reactor vessel comprising a reactor material comprising at least on selected from the group consisting of titanium, silanized stainless steel, quartz, and any combination thereof.

17. A method for controlling the surface acidity of a porous aluminosilicate material to a desired level wherein said process comprising:

(a) obtaining a temperature programmed desorption profile of said porous aluminosilicate material and calculating surface acidity of said porous aluminosilicate material;

(b) subjecting said porous aluminosilicate material to an ion exchange reaction using an inorganic salt, obtaining a temperature programmed desorption profile and calculating surface acidity of said porous aluminosilicate material after ion-exchange reaction;

(c) optionally subjecting porous aluminosilicate material from step (b) to salt impregnation, obtaining a temperature programmed desorption profile and calculating surface acidity of said porous aluminosilicate material after salt impregnation; and

(e) optionally repeating the step (a) through (c) with a different salt concentration or different kind of salt to attain desired level of surface acidity.