

CLAIMS

What is claimed is:

1. A continuous process having a control system to control one or more operating parameters based on one or more inputs for the catalytic conversion of a carbohydrate feed containing at least aldose-yielding or ketose-yielding carbohydrate to lower glycol of at least one of ethylene glycol and propylene glycol in an unmodulated reaction zone by sequential retro-aldol catalytic conversion under retro-aldol conditions, including the presence of a retro-aldol catalyst providing retro-aldol catalytic activity in a liquid medium in the unmodulated reaction zone, to intermediates and catalytic hydrogenation of intermediates under hydrogenation conditions, including the presence of hydrogen and hydrogenation catalyst providing hydrogenation catalytic activity, to lower glycol, in the unmodulated reaction zone, and withdrawing continuously or intermittently from said unmodulated reaction zone, a raw product, said process comprising controlling at least one operating parameter of the process using at least the concentration of acetol in the raw product is an input to the control system for the process.
2. The process of claim 1 wherein the carbohydrate comprises aldose and the lower glycol comprises ethylene glycol.
3. The process of claim 2 wherein in response to an increase in acetol concentration, at least one of (i) the hydrogenation catalytic activity is increased and (ii) at least one of the rate of supply of the carbohydrate feed and the concentration of carbohydrate in the feed is decreased.
4. The process of claim 2 wherein the retro-aldol catalyst is homogeneous and the hydrogenation catalyst is heterogeneous.
5. The process of claim 2 wherein the concentration of acetol is compared with concentrations of at least one of itol, 1,2-butanediol, and pH in the raw product for purposes of process control.

6. The process of claim 5 wherein in response to an increase in acetol concentration and an increase in the concentration of at least one of sorbitol, 1,2-butanediol, and glycerol in the raw product, the retro-aldol catalytic activity is increased.
7. The process of claim 2 wherein the hydroxyacetone concentration is maintained less than about 0.15 mass percent of the raw product.
8. The process of claim 2 wherein in response to an increase in acetol accompanied by an increase in at least one of mannitol and glycerol, at least one of the rate of supply of the carbohydrate feed and the concentration of the carbohydrate in the feed, is decreased until retro-aldol catalytic activity is increased.
9. The process of claim 1 wherein the reaction zone is a cascade reaction zone.
10. A continuous process having a control system to control one or more operating parameters based on input for the catalytic conversion of a carbohydrate feed containing at least aldose-yielding or ketose-yielding carbohydrate to lower glycol of at least one of ethylene glycol and propylene glycol in an unmodulated reaction zone by sequential retro-aldol catalytic conversion under retro-aldol conditions, including the presence of a retro-aldol catalyst providing retro-aldol catalytic activity in a liquid medium in the unmodulated reaction zone, to intermediates and catalytic hydrogenation of intermediates under hydrogenation conditions, including the presence of hydrogen and hydrogenation catalyst providing hydrogenation catalytic activity, to lower glycol, in the unmodulated reaction zone, supplying a tracer precursor comprising a ketone of 3 to 6 carbons to the reaction zone from which at least one tracer is produced under conditions in the reaction zone and withdrawing continuously or intermittently from said unmodulated reaction zone, a raw product, said process comprising controlling at least one operating parameter of the process using at least the concentration of at least one component of the tracer in the raw product is an input to the control system for the process.
11. The process of claim 10 wherein where the tracer in the raw product indicates a change in the portion of the tracer precursor hydrogenated, then at least one of (i) the absolute amounts of

catalytically active species and relative amounts of each of the retro-aldol catalytic activity and hydrogenation catalytic activity, and (ii) at least one of the rate of feed and concentration of carbohydrate in the feed to the reaction zone are adjusted.

12. The process of claim 11 where the concentration of a tracer in the raw product indicates that a greater portion of the tracer precursor is hydrogenated, either or both the rate of feed to the reaction zone is increased or the hydrogenation catalyst activity in the reaction zone is decreased.

13. The process of claim 11 where the concentration of a tracer in the raw product indicates that a lesser portion of the tracer precursor is hydrogenated, either or both of (i) the hydrogenation catalyst activity in the reaction zone is increased and (ii) at least one of the rate of feed and the concentration of carbohydrate in the feed to the reaction zone is decreased.

14. The process of claim 10 wherein the retro-aldol catalyst is homogeneous and the hydrogenation catalyst is heterogeneous.

15. The process of claim 10 wherein the carbohydrate comprises aldose and the lower glycol comprises ethylene glycol, concentrations of at least one component of the tracer is compared with concentrations of at least one of itol, 1,2-butanediol, acetol and pH in the raw product for purposes of process control.

16. The process of claim 15 where the tracer in the raw product indicates a substantially constant in the portion of the tracer precursor being hydrogenated and an increase in the concentration of at least one of sorbitol and glycerol in the raw product, the retro-aldol catalytic activity is increased.

17. The process of claim 15 where the tracer in the raw product indicates a decrease in the portion of the tracer precursor being hydrogenated and no increase in the concentration of at least one of sorbitol, 1,2-butanediol, and glycerol in the raw product, one or both of (i) the hydrogenation catalytic activity is increased and (ii) at least one of the feed rate and the concentration of the carbohydrate in the feed is decreased.

18. The process of claim 10 wherein the process uses hydrogenation catalyst withdrawn from or intended to be used in a larger reaction zone for evaluating hydrogenation catalytic activity.
19. The process of claim 10 wherein the tracer precursor is added to trouble shoot the process.
20. The process of claim 10 wherein the tracer precursor comprises methylethylketone and the tracers comprise methylethylketone and iso-butanol.