Thus, there is a need to develop processes that allow for the isolation of water miscible compounds that have boiling points higher than water from microbial fermentations, while bearing in mind the environmental and cost benefit of recycling other fermentation components. The present invention satisfies this need and provides related advantages as well.

SUMMARY OF THE INVENTION

In a first aspect, the present invention refers to a process of isolating 1,4-butanediol (1,4-BDO) from a fermentation broth

comprising separating a liquid fraction enriched in 1,4-BDO from a solid fraction comprising cells, removing water from said liquid fraction, removing salts from said liquid fraction, and purifying 1,4-BDO.

In a second aspect, the present invention refers to a process of isolating 1,4-BDO from a fermentation broth comprising

removing a portion of solids by disc stack centrifugation to provide a liquid fraction, removing a further portion of solids from the liquid fraction by ultrafiltration, removing a portion of salts from the liquid fraction by evaporative crystallization, removing a further portion of salts from the liquid fraction by ion exchange, and distilling 1,4-BDO.

In a third aspect, the present invention refers to a process of isolating 1,4-BDO from a fermentation broth comprising

removing a portion of solids by disc stack centrifugation to provide a liquid fraction, removing a further portion of solids from the liquid fraction by ultrafiltration, removing a portion of salts from the liquid fraction by nanofiltration, removing a further portion of salts from the liquid fraction by ion exchange, evaporating a portion of water, and distilling 1,4-BDO.

In a fourth aspect, the present invention refers to a process for producing 1,4-BDO comprising:

culturing a 1,4-BDO-producing microorganism in a fermentor for a sufficient period of time to produce 1,4-BDO, said 1,4-BDO producing microorganism comprising a microorganism having a 1,4-BDO pathway comprising one or more exogenous genes encoding a 1,4-BDO pathway enzyme and/or one or more gene disruptions;

isolating 1,4-BDO by a process according to the present invention.

Further examples~~In some aspects, embodiments~~ disclosed herein relate to process of isolating 1,4-butanediol (1,4-BDO) from a fermentation broth that includes separating a liquid fraction enriched in 1,4-BDO from a solid fraction comprising cells, removing water from said liquid fraction, removing salts from said liquid fraction, and purifying 1,4-BDO.

Other examples~~In other aspects, embodiments~~ disclosed herein relate to a process of isolating 1,4-BDO from a fermentation broth that includes removing a portion of solids by disc stack centrifugation to provide a liquid fraction, removing a further portion of solids from the liquid fraction by ultrafiltration, removing a portion of salts from the liquid fraction by evaporative crystallization, removing a further portion of salts from the liquid fraction by ion exchange, and distilling 1,4-BDO.

Further examples~~In still other aspects, embodiments~~ disclosed herein relate to a process of isolating 1,4-BDO from a fermentation broth that includes removing a portion of solids by disc stack centrifugation to provide a liquid fraction, removing a further portion of solids from the liquid fraction by ultrafiltration, removing a portion of salts from the liquid fraction by nanofiltration, removing a further portion of salts from the liquid fraction by ion exchange, evaporating a portion of water, and distilling 1,4-BDO.

Yet other examples~~In yet still other aspects, embodiments~~ disclosed herein relate to a process for producing 1,4-BDO that includes culturing a 1,4-BDO-producing microorganism in a fermentor for a sufficient period of time to produce 1,4-BDO. The 1,4-BDO-producing microorganism includes a microorganism having a 1,4-BDO pathway including one or more exogenous genes encoding a 1,4-BDO pathway enzyme and/or one or more gene disruptions. The process further includes isolating 1,4-BDO according to the described isolation processes.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a block diagram of steps in the process of purifying 1,4-BDO from a fermentation broth.

Figure 2 shows a cross-section view of disc-stack centrifuge.