

SEPARATION OF BUTANOL ISOMERS FROM MULTICOMPONENT MIXTURE

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The aim of this work is to propose a technology for effective separation of two isomers of butanol (3-methyl butan-1-ol and 2-methyl butan-1-ol) from the multi-component mixture called „fusel oil“, which is a byproduct of ethanol production via fermentation. Requirements for this separation are to achieve high degree of purity (99%+) and the highest reasonably possible yield. Additionally, it is necessary to avoid the use of any additional substances, as the final product is supposed to be natural aromatic compounds.

Our proposed technology is based on the physical-chemical properties of some compounds in fusel oil. Multiple substances present in fusel oil create azeotropic mixtures with water, isomers of butanol too. This azeotropic mixture has boiling point 95°C at atmospheric pressure, whereas boiling point of pure butanol isomers is around 130°C. The main idea of separation butanol isomers is to add sufficient amount of water into fusel oil to create azeotropic mixture, because original fusel oil contains only small amount of water. Then fusel oil is rectified and we take only fraction with temperature 95°C on the top of the distillation column. This is azeotropic mixture of butanol isomers with water of sufficient purity. After cooling this distillate to 20°C we obtain two phase liquid mixture – water and butanol phase with appropriate concentration of the organic phase. Whereas azeotropic mixture contains 50.4 % by weight of butanol isomers, water phase contains only 3% and butanol phase 91% respectively. It is easy to separate butanol and water phases in decanter and after that follows rectification. The rest of butanol phase distillation is a pure mixture of butanol isomers and distillate is azeotropic mixture which is recycling to decanter. Similarly, water phase produces distillate azeotropic mixture (back to decanter) and the rest of distillation is water. By this way we can separate the butanol isomers from fusel oil with high yield and purity.

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