The routes of producing ethanol from sugar beet

Science, Biology

Ethanol preparation from sugar beet affiliation Ethanol production Most of ethanol production in USA relies on processing starch and sugars found in sugarcane and corn (Singh, 2013, pg. 408). This involves fermenting the sugars. Ethanol can be made from the sugar beet or simply the sugar beet pulp.

The extracted sugars from the sugar beets are henceforth fermented to produce ethanol (Singh, 2013, pg. 408).

The beets are cut into small pieces that are called cossettes and by counter-current flow of water they are washed. The clean cossettes are pressed in order to remove remaining water in them and sugars.

From the pressing action, sucrose rich water is obtained. This water has impurities therefore; cleaning of impurities in the water is by use of lime and filtration. The cleaned sucrose water is through a fermentation step (Halford & Karp, 2011, pg. 409).

After fermentation has been achieved, the mixture content has to undergo distillation. Distillation process is used to separate two or more compounds that have different boiling points and volatility.

There is numerous process that is adopted to distillate the contents; this includes pressure-swing distillation, simple distillation, Reactive Distillation, molecular sieve adsorption distillation and salt separation (Halford & Karp, 2011, pg. 409).

In simple distillation, the mixture content is put into a distillation chamber where heating is done causing the mixture to vaporize. The distillation chambers allow the vapor move up the chamber as the liquid travels down the chamber.

The more volatile liquid is in the vapor phase and is collected at the cold end as the distillate. The distillate is condensed, and part of it is recycled into the chamber as reflux.

The less volatile liquid becomes concentrated in the bottom of the chamber. The bottom remains are then run through a boiler and recycled as boil-up. The boil- up and reflux allows greater separation to occur (Halford & Karp, 2011, pg. 409).

When it is ethanol- water separation, this distillation does not give a good separation because of the mixture forming an azeotrope at 95. 6 mass percent ethanol.

Azeotropic state occurs when the boiling point of the mixture drops below the boiling point of both components in the mixture.

DISTILLATE

Chopped Reflux

Washed & squeezed

BOTTOM

Schematic presentation of Distillation

References

Halford, N. G., & Karp, A. (2011). Energy crops. Cambridge, Royal Society of Chemistry. Pg. 110-115

Singh, B. P. (2013). Biofuel crop sustainability. Ames, Iowa, Wiley-Blackwell. pg. 408-411