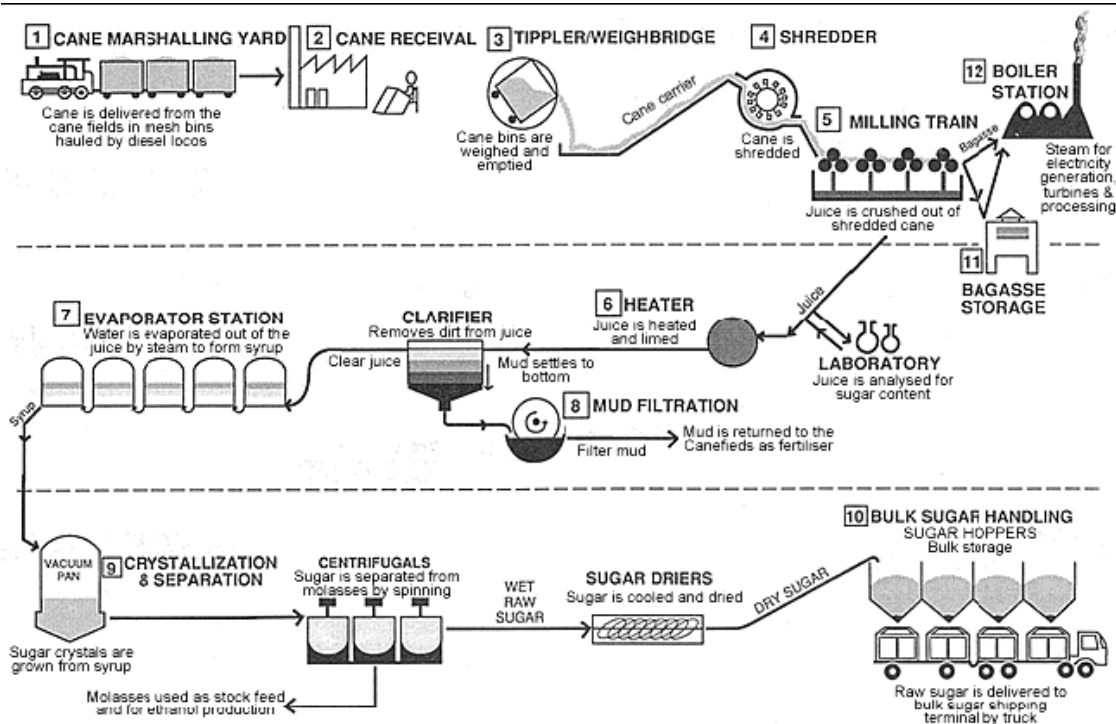


CSR Distilleries Operations Pty Limited produces ethanol by the fermentation of sugars in molasses, which is a by-product of the sugar milling process. The sugars are converted to alcohol using yeast. The alcohol is then separated from the fermented wash and is processed and purified through a series of distillation columns to produce ethanol with a strength of approximately 96% by volume (95SG).

The information below describes this process.

Molasses Production:



Ethanol Production:

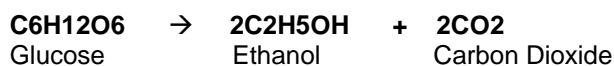
FERMENTATION

CSR Ethanol is produced by the fermentation of the sugars in molasses.

Sucrose (disaccharide) is first converted to glucose or fructose (monosaccharides) through the following hydrolysis reaction:

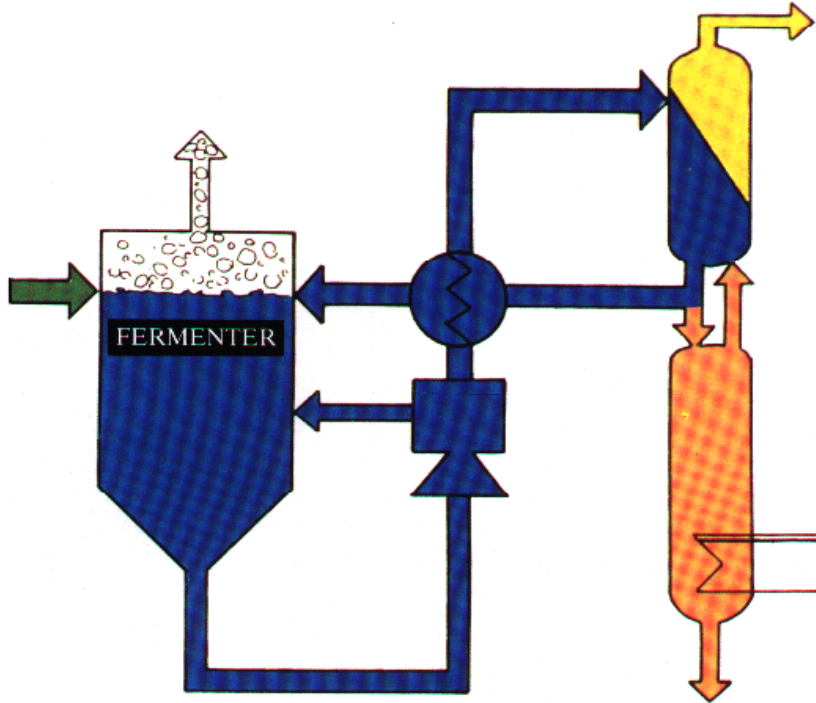


The Ethanol is then produced by the fermentation of these monosaccharide sugars according to the following reaction:

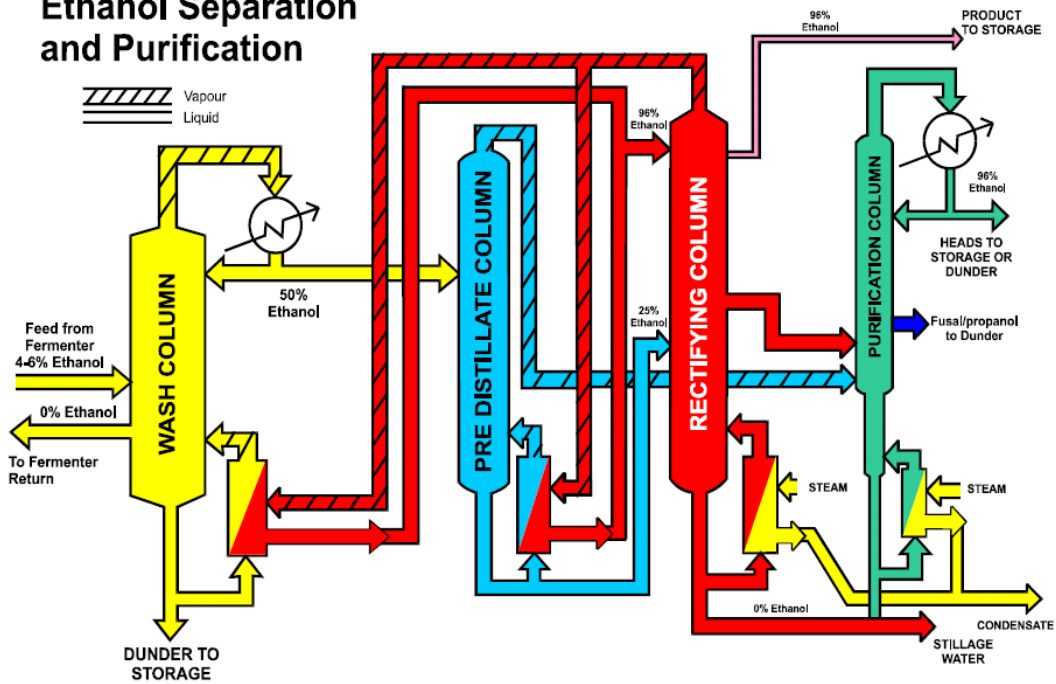


The reaction is exothermic and liberates 1200 kJ/kg of ethanol.

Fermentation



Ethanol Separation and Purification





ETHANOL MANUFACTURE Process Description



DUNDER

The concentrated effluent removed from the base of the wash column is called Dunder. This is transferred to storage at Onooie for use as a fertilizer. At Onooie the Dunder is loaded into trucks for irrigation of sugar cane crops. It may be nutrient enriched by the addition of urea and sulphuric acid to produce Liquid One Shot.

PRE-DISTILLATION COLUMN

The dilute ethanol condensed from the wash column is then introduced to a pre-distillation column. Here the ethanol is further diluted to ~ 15% v/v and many of the volatile impurities are removed (eg aldehydes and ketones). The vapour from the top of this column is then fed into the purification column and the dilute ethanol from the base of the column is fed to the rectifying column.

PURIFICATION COLUMN

The purification column concentrates the ethanol and impurities to ~ 95 - 96% v/v Ethanol. This product is referred to as 'heads'. Any excess ethanol from this column is fed back into the pre-distillation column for reprocessing to minimise production of low grade heads.

RECTIFYING COLUMN

The rectifying column concentrates the ethanol to ~96% v/v Ethanol. Lower volatile impurities such as propanol and fusel oils are removed from this column. For the purpose of this exercise, this product is referred to as 95SG.