Application of Enzyme Booster Ecozyme-M for Sugar Distilleries

The final molasses is a byproduct in the sugar mill and contains residual sugar (sucrose), glucose and fructose. Two basic unit operations are done during production of alcohol from molasses viz. Fermentation and distillation.

Fermentation process:

Initially 3 to 4 tons of molasses is taken in pre-fermenter of capacity 50 KL through diluter to set up gravity 1. 050.Then added 10 Kg of yeast, 10 kg of urea and 100 grams of enzyme. In this process Yeast propagation is allowed for 8 hours and yeast cell count reaches to about 350 to 400 x106 cells/ml

About 265 to 400 KL capacity 5 to 6 No's fermenters are installed and fermentation is carried out batch wise in each fermenter. Initially 25 % of the fermenter is filled up with diluted molasses media and grown yeast culture from pre-fermenter is transferred in to main fermenter. Then chemicals urea 25kg, enzyme 900 grams, sulphuric acid 20 Kg and biocide (Sodium meta bisulphite) 10 kg are added. The molasses and water is pumped in to the fermenter through diluter in such a way to reach specific gravity of 1.090. When the specific gravity starts to fall, the predetermined quantity of molasses with water will be pumped and wash preparation is completed. The filling up process will be completed within 8 hours and then allowed to complete the fermentation reaction. The temperature in the fermenters is maintained to an optimum level (32 to 34 deg C) and pH is maintained between 4 to 4.5. Once the specific gravity of wash reaches 1.040 to 1.045, which indicates the completion of fermentation. During fermentation, initially the sucrose is converted in to glucose and fructose by enzyme invertase. Then glucose and fructose are converted in to ethyl alcohol. The whole main fermentation process will take about 24 hours.

Distillation Process:

The fermented wash with an alcohol of about 9.0% to 10.0 % is taken out from the fermenter and is passed through sludge settling tank where sludge is collected from the cone portion of the tank and is pumped to decanter to separate thick sludge and clear wash. Thick sludge mass is collected, dried and composted with press mud and sold as manure.

The fermented wash use to contain 9.0 % to 10.0 % of alcohol is pre-heated in two stages in the beer heater by using the rectifier vapors and then in the PHE using spent wash. The preheated wash then fed to the degasifying column to remove residual volatiles. The wash then flows to analyzer column and alcohol is separated from the mother liquor wash by distillation process. Analyzer cum degasser column which operated under vacuum where in alcohol is separated and the vapor consisting of 45% v/v alcohol is transferred to pre-rectifier

where in the alcohol is concentrated to 95 % v/v. Part of the liquid from degasifying column is transferred to aldehyde column. The alcoholic vapors apart from the ethyl alcohol, also contains higher alcohol, esters, aldehydes and ketones. These impurities are separated through Hydro extractive column, aldehyde column and defusel column through distillation. Finally, the alcohol is concentrated to 96 % in the rectifier II column, ENA is drawn and transferred to refining column. In refining column traces of sulphur compounds are removed and final alcohol is cooled in a condenser and stored as Extra Neutral Alcohol.

Role of Enzyme Booster for distillery fermentation:

- Eliminates bacterial contaminants.
- Converts non-fermentable carbohydrates in to fermentable sugar.
- Provides vital elements and growth factors for yeast growth.
- Prevents bad effects of yeast inhibitors.

ECOZYME - M is the solution to achieve high yielding stable fermentation process. The product is a combination of specific micro-elements and enzymes. The product is formulated after careful study of the parameters and requirements of the process.

Benefits of Enzyme Booster (Ecozyme-M) for Distillery Fermentation:

- Increase in efficiency and alcohol yield by 5 to 10 liters /MT of molasses.
- Increased alcohol concentration in mash thereby reduction in spent wash quantity.
- Possibilities of spent wash recycle in fermentation.
- High rate of yeast growth and metabolism.
- Low residual sugar.
- Prevention of bacterial contamination & reduction in the mash volatile acidity.
- Low by-products in mash.
- Highly improved neutral spirit quality.
- Reduction in the fermentation hold up time due to quick reaction.
- Longer duration of continuous fermentation operations without reduction in performance.

Application of Enzyme Booster (Ecozyme-M) for Distillery Fermentation:

1. Add 5 ppm of working volume of molasses in pre fermenter.
    - The quantity of calculated Ecozyme-M should be mix with molasses in bucket, mix it properly and directly dosed in pre fermenter.

2. Add 5 ppm of working volume of main fermenter.
    - The calculated quantity of Ecozyme-M should be mixed with media of main fermenter.

How to measure efficiency of Ecozyme-M:

With and Without dosage of Enzyme booster following parameters are measured to evaluate efficiency of Ecozyme-M, the trial will be carried out for 3 days without dosage and 2 to 4 days with chemical.

- IG-Initial Gravity
- FG-Final Gravity
- RS-Resistant starch
- VA-Volatile Acidity
- % of Alcohol

With the usage of Ecozyme-M % of Alcohol Yield will be increased drastically which is directly increase production of alcohol with the same amount of fermented wash feed.

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