From Zero (Technology) to Zero (Discharge) in Distillery Units in Uttar Pradesh

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The concept of waste wealth brought distillery industries into existence. It also brought some other forms of waste in form of spent wash, which was a cause of concern due to high Biochemical Oxygen Demand (B.O.D.) and colour for water environment. The continued effort of Government, Technologists and Environmentalists brought remarkable improvement in the field of distillery effluent treatment.

Introduction

Cleaner technology adopted in production helped in reducing spent wash generation up to 8 KL/KL of alcohol produced. The concept of waste to wealth helped in adopting Charter on Corporate Responsibility for Environmental Protection (CREP) recommendation of Central Pollution Control Board (CPCB) & MoEF and achieving Zero spent wash discharge into water bodies. The strict compliance of CREP recommendations by the Board in U.P. forced industries to adopt Bio-Composting, Reverse Osmosis, Multi effect evaporation system for the treatment of spent wash in addition to traditional Bioreactors. These Zero discharge systems are a boon in disguise for environment as well as profitable business for distillery industries.

Uttar Pradesh & Maharashtra are the two states in India which are rich in sugar cane crops. There are 138 Sugar Mills and 55 Molasses based distilleries operation in Uttar Pradesh up to 2009. Distillery unit is one such industry of agriculture sector which converts Sugar industry waste molasses into a profitable product of ethyl alcohol. The distillery effluent which is very high in Biochemical Oxygen Demand (B.O.D.) (40,000mg/l to 50,000 mg/l) and having dark brown color with foul and pungent smell, was in the beginning either stored in kuchha lagoons or directly discharged into rivers and this continued up to year 1980. This caused underground pollution and river pollution as well.

Its dark color even after secondary treatment using activated sludge process has been of grave concern to all the Pollution Control Boards of India. This
non-acceptance of the color gave rise to the concept of Bio composting and thus the era of zero discharge began. U.P. Pollution Control Board has since then made its all efforts by making all the distilleries to be zero discharge compliant as per CREP imposed by MoEF and CPCB.

**Zero (Technology) to Zero (Discharge)**

1. During initial days of the formation of U.P. Pollution Control Board the anaerobic lagoons were constructed with 90 days’ detention time or more for the treatment of distillery waste.

2. Then came anaerobic and aerobic lagoon followed by activated sludge process. This could also not treat the waste to desired standards specially the dark brown colour of the effluent.

3. After that, with constant pressure from Pollution Control Board, the industries started construction of Bio methanation plant for primary treatment of industrial effluent. This method of treatment was beneficial for industries also as it produced Biogas, which was used as fuel by the industries.

4. Up to 1990 all the existing industries has installed Bio methanation plant using UASB technology followed by activated sludge process. But his technology also was not sufficient to treat the industrial effluent as per the standard prescribed by the board. So some of the units started using its treated effluent for ferti irrigation & some started discharging it after dilution. This effluent after dilution was as per the standard prescribed by the board but the color of effluent was a cause of concern, so was the concern of groundwater pollution.

5. With the combined effort of MoEF & Central Pollution Control Board, Charter on corporate responsibility for environmental protection (CREP), new technology in the field of effluent treatment as per CREP recommendation were made for improvement in pollution control status of industries. As per the recommendation it was made mandatory for industries to adopt zero effluent discharge. There by, the industries replaced the activated sludge process by Bio Composting of the effluent after Bio
methanation, using press mud as the medium.

6. U.P.P.C.B. made it mandatory for all the distillery units in the state of U.P. to adopt charter recommendation in totality. With the continuous effort of the Board, up to 2005 all the distilleries in the state, adopted zero effluent discharge technology, in the form of Bio-composting plant, Reverse osmosis plant, or Multi effect evaporation followed by incineration or ferti irrigation. Reverse Osmosis helps in reducing the quantity of effluent to be used for Bio Composting since space and availability of press mud was a constraint for total Bio composting. Thus U.P. Pollution Control Board has come long way from lagoon treatment to multi effect evaporator with incineration through boiler technique which has enabled the zero discharge. The end product, thus is steam which can be used in process.

Best Available Technologies- Merits and Demerits

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<tr>
<th>S. No</th>
<th>Technology</th>
<th>Merits</th>
<th>Demerits</th>
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<tbody>
<tr>
<td>1</td>
<td>Bio-composting</td>
<td>Zero effluent discharge, Bio-compost preparation</td>
<td>Land requirement is more, restriction in rainy season, less sale of Bio-compost since nitrogen content is only 2-3% Not successful in stand alone distillery due to non-availability of press mud.</td>
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<td>2</td>
<td>Reverse Osmosis Plant</td>
<td>Up to 50-60 % clear water (in form of permeate) is obtained and is reused thus spent wash quantity is reduced by 40-50%</td>
<td>High maintenance cost. Further management of the reject is required.</td>
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<td>3</td>
<td>Multi Effect Evaporator with Boiler</td>
<td>Zero effluent discharge. Use of concentrate as fuel in Boiler to produce steam thus is a pay back process.</td>
<td>High initial cost.</td>
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