SCOPE OF THE PRESENT INVESTIGATION
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Leonardo Davinci once described “Water” as “the driver of nature”. The population explosion coupled with industrialization and agricultural development has resulted in deterioration of the quality and reduction in quantity of water resources.

During the last few decades the impact of human utilities on the environment has become more accelerated and pronounced. Pressures from rapid growth, uncontrolled urbanization, industrial expansion and higher amount of energy utilization have caused changes leading to serious environment problems and energy crisis. One such environmental problem is water pollution. Though industrialization has its own merits and demerits, industrial effluent is found to be the main reason for water pollution.

Significance of the study

Both energy production and utilization are the indicators of a country’s progress. Population explosion has accelerated the energy crisis. When it gets coupled with industrialization, the crisis for energy increases. At this juncture, if such condition prevails, our future generation may see coal in museum only, and might face many health problems resulting in a search to find a suitable planet for living.
One such industry, which generates wastewater, is the distillery industry. Distillery products are largely used in medical field, laboratories, cosmetics and chemicals manufacturing industries etc., Due to the stringent pollution control norms laid by the government, many of the distilleries are being closed. Hence, the treatment of spent wash as well as its positive utilization becomes essential for the sustainable development of the economy of a nation such as India.

**Origin of the research problem**

Distillery is recognized as one of the most polluting industries, and distillery waste in the form of spent wash is amongst the worst pollutants produced by industries both in magnitude and strength. Spent wash is otherwise known as stillage, slops, vinasse or dunder (Kaul *et al.* 1995).

In the production of alcohol from molasses, 3-10 kg of molasses are used for producing 1 litre of alcohol. The distillery spent wash is hot, highly acidic and coloured and also contains higher percentage of dissolved organic and inorganic matter. (Deshanada *et al.* 1993). It has been reported that Indian spent wash has the highest BOD (30000 – 60000 mg/l) than the Australian (48000 mg/l) and Cuban spent wash (20000 mg/l). Such high BOD was found to cause many problems in aquatic ecosystems.

Daryapurkar and Chakrapani, (1999) have reported some places of Indogangetic plains to be contaminated with spent wash. Hence many
distilleries have faced closer or threat of its imposition (Srivastava and Pathak, 1998). Hence treatment of spent wash becomes a must.

Berchmans and Vijayavalli (1989) have reported that biological treatment is inefficient to remove the colour and was found to take long duration thereby producing odour pollution too. They have suggested chemical and electrochemical oxidation as the effective technologies available for the reduction of colour, TDS and COD. Patil and Kapadnis (1995) have proved the colour, TDS and COD removal efficiency of CaO and H$_2$O$_2$.

Though there are a few chemical, biological adsorbents and membrane technologies available for the removal of colour, COD and TDS from the spent wash, no suitable low cost and economic technology is available currently.

Hence, an attempt was made to remove the colour, COD and TDS using chemicals combined with biological material and adsorbent. Such treated effluent was further neutralized and used to grow the horticultural plant, *Tagetes erecta* L.

**The objectives of the study:**

Scarcity of water resources makes us to concentrate on recycling and reuse the wastewater generated. From the literature, it is clear that the chemical treatment is the more versatile treatment than the microbial treatment. The present investigation was aimed as follows:
i. To characterise the spent wash and sugar effluent

ii. To dilute 50% of spent wash with 50% sugar effluent to obtain sugar wash

iii. To study the physico-chemical characteristics of the sugar wash

iv. To conduct the batch type experiments to predict the effect of individual chemicals such as coagulating agent (CaO), oxidizing agent (H₂O₂) and adsorbent (Commercial activated carbon) on colour, TDS and COD removal from the sugar wash.

v. To evaluate the potential of combined effect of coagulating, oxidizing agent and adsorbent on the removal of colour, TDS and COD from the sugar wash.

vi. To check the treatment efficiency of plant material *Strychnos potatorum* L., and its potential when combined with chemical agent and adsorbent.

vii. To characterize the adsorbent CAC and *Strychnos potatorum* L.
viii. To assess the effect of individual bacterial strains and microbial consortia on the removal of colour, TDS and COD from the sugar wash.

To analyze the phytochemical properties of *Strychnos potatorum* L., the plant material used for the treatment of sugar wash.

To evaluate the effect of treated sugar wash on seed germination, growth parameters and flowering capacity of horticultural plant namely, *Tagetes erecta* L.,

To find out the physico-chemical characteristics of the soil before and after irrigation with treated sugar wash.

To subject the solid waste obtained from the treatment for the process of composting.

To analyze the manural value of the compost.