

## Technology

### Activated carbon and membrane filters from sugarcane bagasse ash for the recovery of phenolics/pigments from molasses distillery wastewater

#### Research organization



The Energy and Resources Institute (TERI), established in 1974, is an Indian research institute focusing its research activities in the fields of energy, environment, resources and sustainable development. TERI is based in New Delhi but has also established a presence in North America and Europe as well as in Japan, Malaysia and the Persian Gulf.

#### Description of the technology being developed

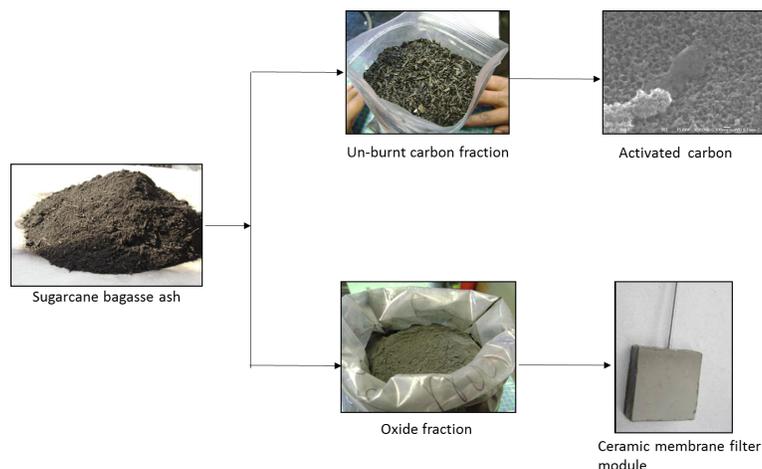
Activated carbon adsorbent and ceramic membrane filters are prepared from different fractions of waste bagasse ash. These are used for recovery of melanoidins/polyphenols (which are recalcitrant compounds with antioxidant and antimicrobial properties) from sugarcane molasses distillery wastewater.

Bagasse, the residue generated by crushing of sugarcane, is used as a fuel in sugar industries. The resulting sugarcane bagasse ash is rich in unburnt carbon due to incomplete combustion.

Unburnt carbon from sugarcane bagasse ash is activated under various conditions to obtain highest surface area which can adsorb around 40% of the low molecular weight (< 10 kD) components in distillery wastewater.

The oxide fraction of the sugarcane bagasse ash is mixed with suitable additives and shaped into flat sheet ceramic membranes by pressing and sintering. The membrane properties are being modified using suitable coatings for increasing melanoidins retention.

Mixed matrix membranes are prepared by incorporating nanocomposites in a polysulphone matrix and sealing the surface with polyvinyl alcohol (PVA). Almost complete retention (~98%) of melanoidins is obtained using PVA coated mixed matrix membranes.



#### Benefits

- Utilization of industrial waste (sugarcane bagasse ash, distillery wastewater) to obtain value added products (activated carbon adsorbent, ceramic membrane filters, melanoidins and polyphenols)
- The ceramic membrane is a very high potential product. Such membranes are currently not produced in India and are imported.
- The recovery of melanoidins and polyphenols from distillery wastewater is

	<p>interesting since these compounds have high antioxidant activity. Further, removal of melanoidins/polyphenols (that are difficult to biodegrade) may improve the conventional biological (anaerobic) treatment of the distillery effluent.</p>
<b>Financial viability</b>	<p>Flat sheet ceramic membranes from sugarcane bagasse ash can be produced in local industries with suitable facilities (e.g. tile manufacturing) and has the potential to be customized to a variety of solid-liquid / solid-gas separation applications. The cost per unit is expected to be low and can be offset by the large number of filters that would be used in wastewater treatment applications.</p> <p>The recovery of valuable products (melanoidins and polyphenols with antioxidant properties) could lead to financial viability, once the market for such products is established.</p>
<b>Potential users</b>	Sugar industries, distilleries, wastewater treatment industries
<b>Contact person</b>	<p>Dr. Malini Balakrishnan (TERI)  Senior Fellow, TERI  New Delhi, India  Tel: +91 11 24682100  E mail: <a href="mailto:malinib@teri.res.in">malinib@teri.res.in</a></p>