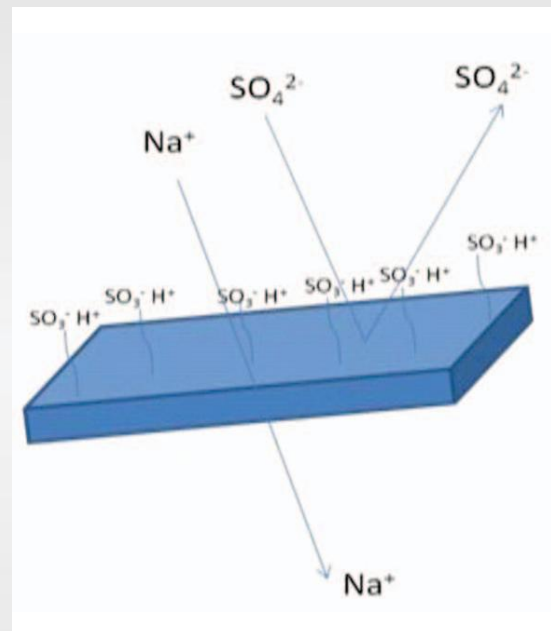


# Water Treatment Using Charged Nanofiltration Membranes

Water management for drinking water, industrial water, effluent water, high purity water has become a challenging subject in recent years. Removal of various contaminants like low dissolved ionic solids, heavy metals, hardness, alkalinity, etc. are important aspects of water management for various domestic uses as well as industrial applications. Nanofiltration, which operates at low pressures, offers a viable alternative to reverse osmosis that requires high energy input. It partially removes dissolved ionic solutes and retains essential minerals in the drinking water. Charged nanofiltration membrane technology developed at BARC have the ability to achieve these goals making water suitable for drinking purpose as well as for various industrial purposes.

- The technology is based on indigenously developed thin film composite (TFC) type charged nanofiltration membranes.
- They contain fixed  $-\text{SO}_3\text{H}^+$  moieties on the surface, making them negatively charged [in aqueous environments].
- Donnan exclusion results in high removal of [ionic] species containing multivalent negative charges such as sulphates and phosphates, etc. by the membranes.
- Simultaneously, passage of monovalent ionic species like  $\text{Na}^+$ ,  $\text{K}^+$  and  $\text{Cl}^-$  through the membrane is quite significant leading to a differential separation of mixed solutes.
- It operates at low pressure and still yields high throughput.



**Separation of ionic solutes by charged nanofiltration membrane**



**Spiral modules of charged nanofiltration membranes**

For further details contact :

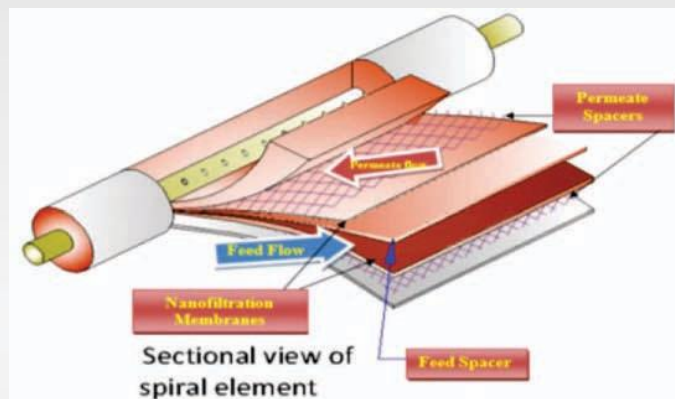
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# Water Treatment Using Charged Nanofiltration Membranes

BARC offers knowhow on charged nanofiltration membrane technology on a non exclusive basis  
Key features of the technology:

- It provides a comprehensive process of preparation of thin film composite type nanofiltration membranes, containing surface negative charge, in flat sheet form.
- No post fabrication modification is required to introduce charge in the membrane.
- Membranes of a range of performances, according to the need of a particular application, can be prepared using this technology.
- The technology also involves details of the process of production of spiral modules, of commercial specifications, using these membranes.



## Potential areas of application:

- Water purification, particularly for production of drinking water and industrial water by removal of hardness, alkalinity and partial removal of salinity from moderately brackish water.
- Fractional separation of mixed feed systems containing monovalent and multivalent ions like mixtures of sulphate and nitrates, sulphate and chlorides, etc.
- Useful in hybrid NF-RO desalination processes, removal of heavy metals from aqueous streams.
- Applicable in aqueous stream separations in pharmaceutical, food and beverage industries, dairy industry, waste water treatment and several other industrial stream processings.
- The membranes are particularly useful in cases where high solute separation of multivalent anions are required.
- Membranes give very high solute rejection (upto 97%) for one component (like  $\text{Na}_2\text{SO}_4$ ) and low solute rejection (20%) for another (like  $\text{NaCl}$ )

The technology has been transferred to one party

- M/s Osmotech Membranes Pvt Ltd. Rajkot, Gujarat

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