

High-Pressure Polymeric Membrane for Sea Water Desalination

Prelims: Current events of national and international importance | General science

Why in news?

Recently Defence Research & Development Organisation (DRDO) has successfully developed an indigenous nano porous multi-layered polymeric membrane for high-pressure seawater desalination.

- **Desalination** - It is the process of removing dissolved salts and other impurities from saline water to produce fresh, drinkable water suitable for human consumption, agriculture, or industrial use.
- **Types**
 - **Reverse Osmosis (RO)** - Membrane-based filtration.
 - **Thermal Desalination** - Heating saline water to produce water vapor, which is then condensed to obtain fresh water.

Reverse Osmosis (RO) is a membrane-based water purification process in which saline water is forced through semi-permeable membranes under high pressure, allowing only water molecules to pass through while blocking dissolved salts, minerals, and impurities.

- **High-Pressure Polymeric Membrane** - This membrane is designed for use in high-pressure seawater desalination, aimed particularly at meeting the needs of the Indian Coast Guard (ICG).
- **Features** - The Nanoporous architecture increases surface area and selectivity.
- Multi-layered design offers improved mechanical strength, salt rejection, and chemical resistance.
- **Improved stability** - The membrane addresses a key operational challenge that is the **instability of conventional membranes** when exposed to chloride ions in saline water.
- The polymeric membrane is engineered to withstand high pressure and chloride-rich conditions, making it suitable for deep sea desalination systems.
- **Developed by** - Defence Materials Stores and Research & Development Establishment (DMSRDE), a Kanpur-based DRDO laboratory.
- It is currently under testing and trials in the existing desalination plant.
- **Strategic Utility** - it enhances self-reliance (Aatmanirbhar Bharat) in maritime technologies, reducing dependence on imported desalination systems.
- **Defense Capability** - It strengthens the operational sustainability of Indian Coast

Guard ships during long missions.

- It can support coastal desalination needs, helping address water scarcity.
- **Technological Milestone** - It demonstrates India's growing expertise in advanced polymer and membrane technology within a short R&D cycle.

Reference

[PIB| High-Pressure Polymeric Membrane](#)

