

New way to extract lithium from seawater

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Why in news?

Recently, scientists at the Bhabha Atomic Research Centre (BARC) have developed a chemical technique that can extract nearly 90% of the lithium dissolved in natural seawater.

- **Largest reservoir** - Seawater is the **world's largest reservoir of lithium**, containing an estimated 230 billion tonnes of the metal.
- **Extracting from seawater is challenging** - Lithium occurs at extremely low concentrations—about 0.17 mg per litre—while the ratio of magnesium to lithium exceeds 6,000.
- Processing the enormous volumes of water required also makes material and energy efficiency critical to the process's viability.
- **Need for the new technique**
 - **Rising demand** - The global shift towards electric transport and renewable energy is driving unprecedented demand for lithium (Li).

***Lithium-ion batteries** remain the dominant energy storage technology due to their high energy density, long cycle life and operational reliability.*

- **Import dependence** - India relies entirely on imports for raw lithium and battery-grade lithium-ion cells, leaving its EV and energy storage sectors vulnerable to shifts in global markets.
- **Limitations of existing technology** - Existing methods can suffer from slow extraction rates, structural degradation, complicated regeneration processes, require expensive chemicals, large volumes of solvents and complex processing.
- **New technique's working**
- **Removal of impurities** - Treating seawater with a specialised chemical process using sodium hydroxide and sodium carbonate, helping to remove unwanted elements such as magnesium and calcium.
- The process removed more than 99% of these interfering elements while retaining most of the lithium in the water.
- **Lithium Extraction** - By using dibenzoyl methane (an organic compound), dissolved in a solvent known as methyl isobutyl ketone (MIBK), to help extract the lithium.

- **Lithium Recovery** - By using dilute nitric acid to separate the lithium from the solvent. This transfers the lithium into a separate solution, leaving the organic solvent available for reuse.



- **Advantages**
- **High recovery rate** - Achieved around 90% lithium recovery, suggesting that the solvent can be reused.
- **Low chemical use** - It requires fewer chemicals and additives than many existing methods.
- MIBK serves not only as a solvent but also helps stabilise the chemical complexes formed with lithium, reducing the need for separate additives.
- **Requires low solvent consumption** - They used about 100 ml of organic solvent for every litre of treated water, making the process more economical.
- **Challenges** - Before commercial deployment, researchers will need to assess
 - Its long-term performance,
 - Energy requirements,
 - Chemical costs,
 - Environmental effects on marine ecosystems and
 - Feasibility at industrial scale, and the
 - Foam formation due to prolonged mixing.

Reference

[Down to Earth | Indian scientists develop new way to extract lithium from seawater](#)