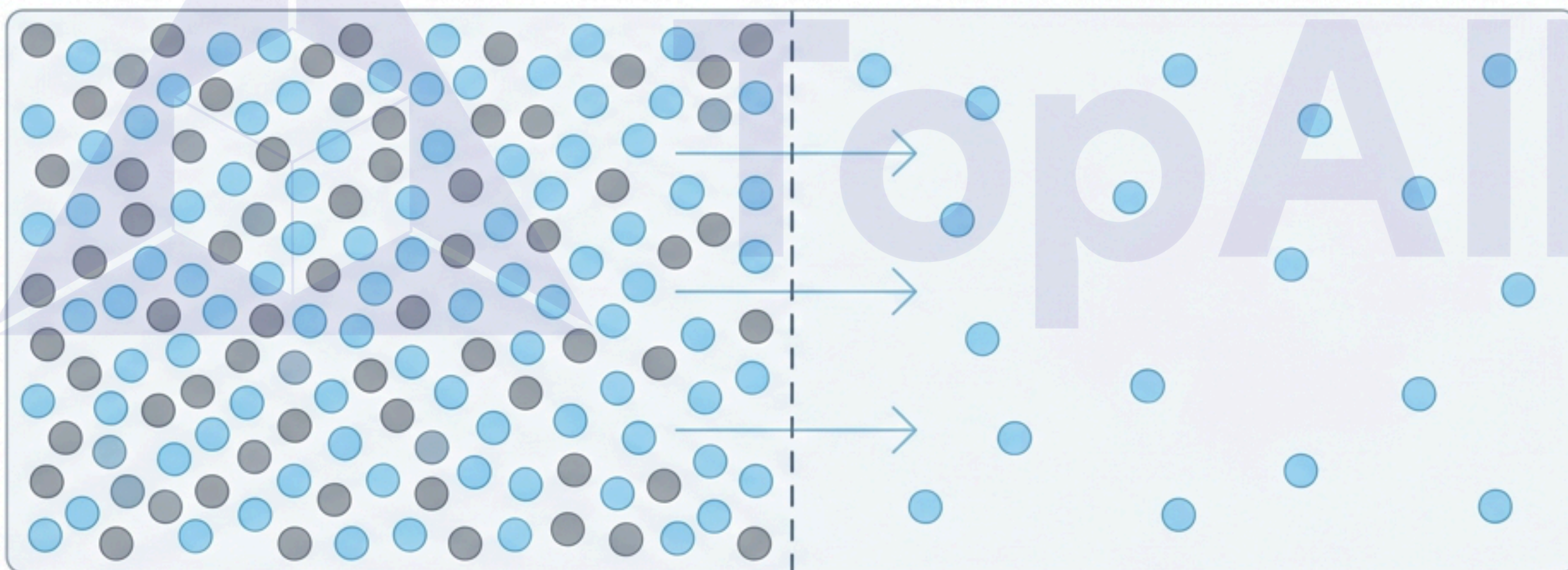
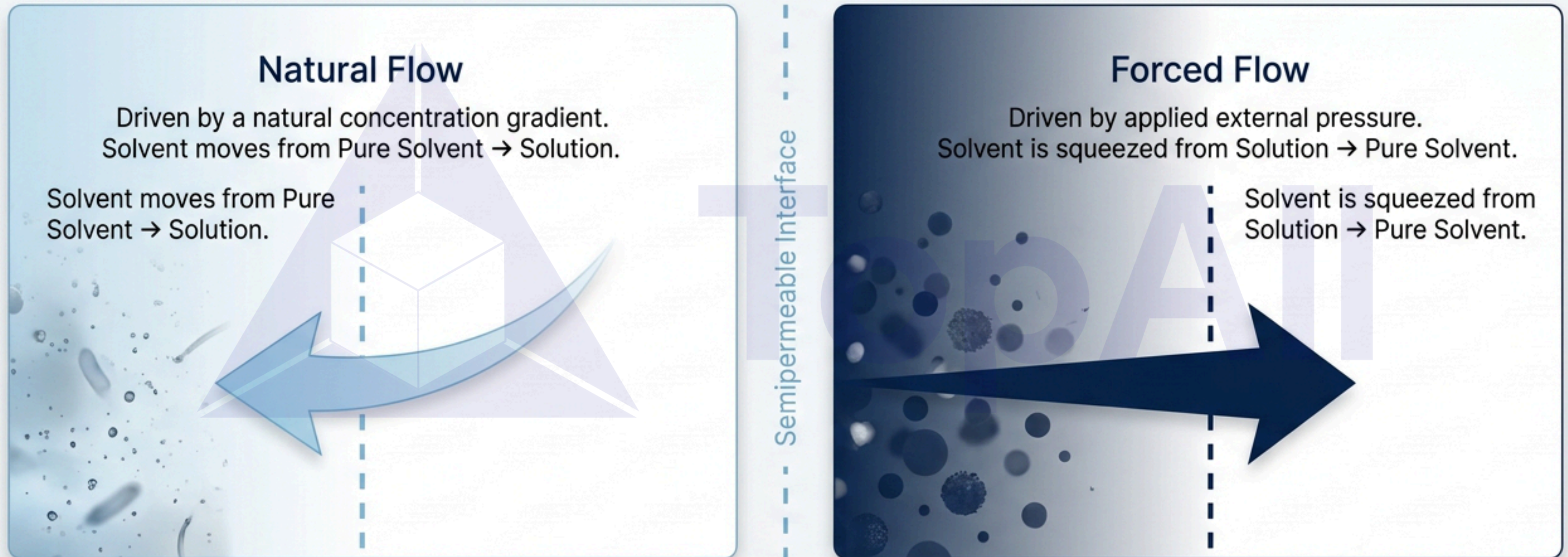


1.6.5 Reverse Osmosis and Water Purification



Natural Osmosis vs. Forced Reversal



Key-Takeaway Box

The semipermeable membrane allows submicroscopic solvent molecules (water) to pass while hindering larger solute impurities.



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Let's Test Them Now.**

$$E=mc^2$$



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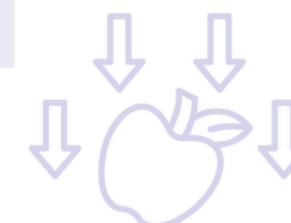
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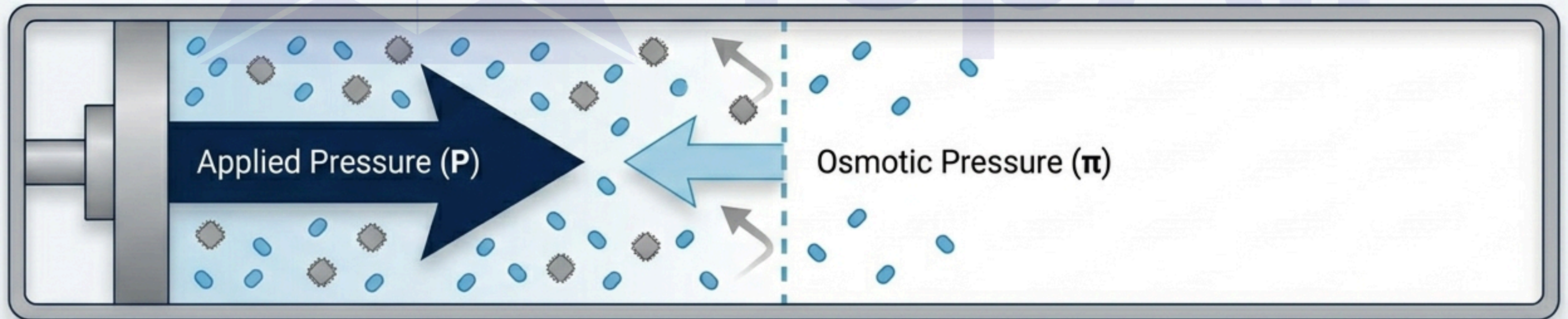


Overcoming the Osmotic Drive

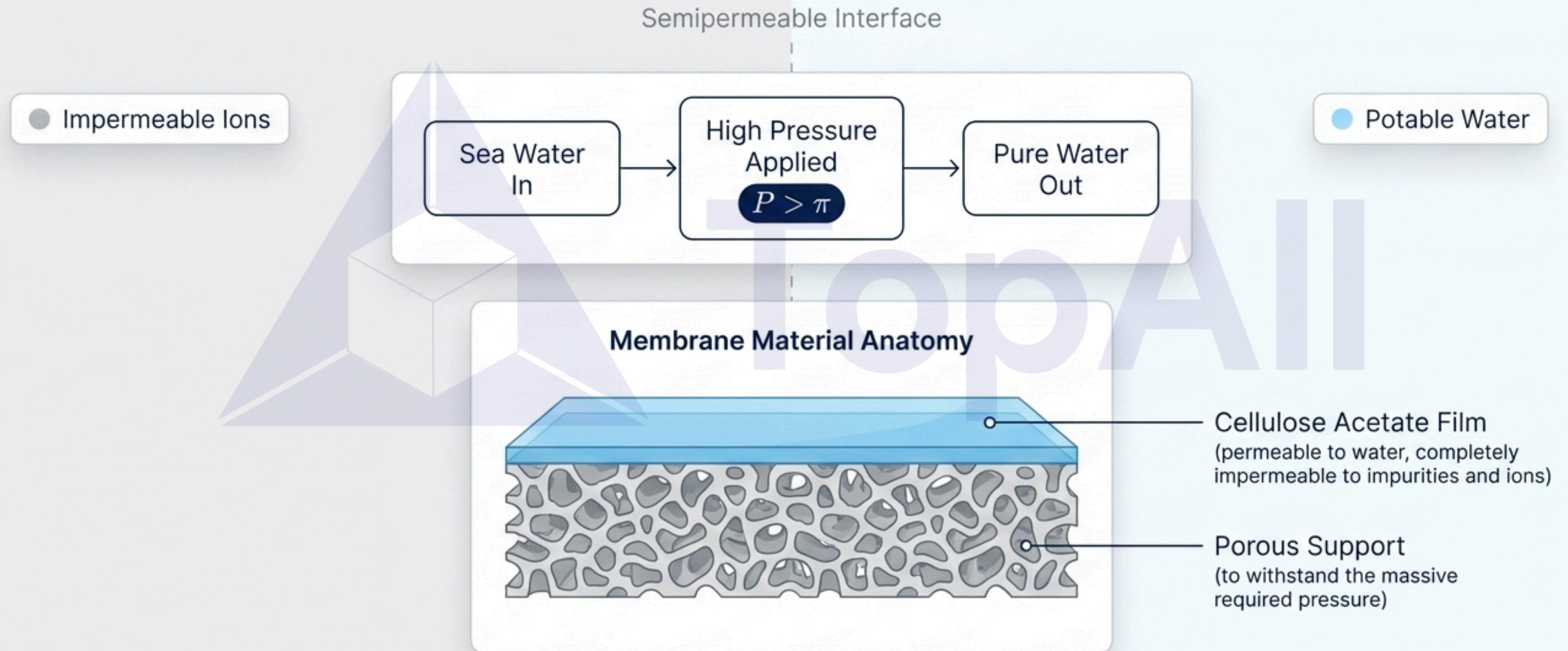
$$P > \pi$$

Mechanical applied pressure (**P**) must exceed the **natural osmotic pressure (π)** to reverse the flow and squeeze pure water out of a concentrated solution.

Opposing Forces Diagram



Engineering Potable Water: Desalination



The Principle-to-Tech Framework

1. The Principle (Chemistry)

Colligative properties dictate natural osmosis across a Semipermeable Membrane.

2. The Action (Physics)

Applying $P > \pi$ on the solution side physically reverses the natural direction of solvent flow.

3. The Result (Engineering)

Cellulose acetate desalination plants extract pure potable water from the sea.

Core Exam Takeaway

In Reverse Osmosis, the solvent flows from the higher concentration side (solution) to the lower concentration side (pure solvent) strictly because applied mechanical pressure **overcomes natural osmotic pressure**.



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