TEAM 51

Extracting Valuable Minerals from Seawater and Desalination Brine Using Advanced Filtration Process

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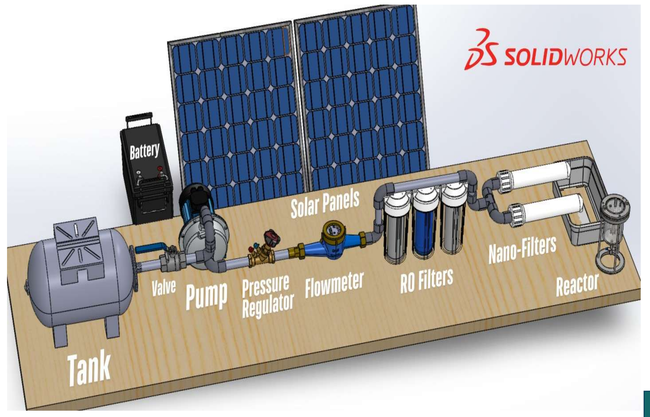
Problem Statement

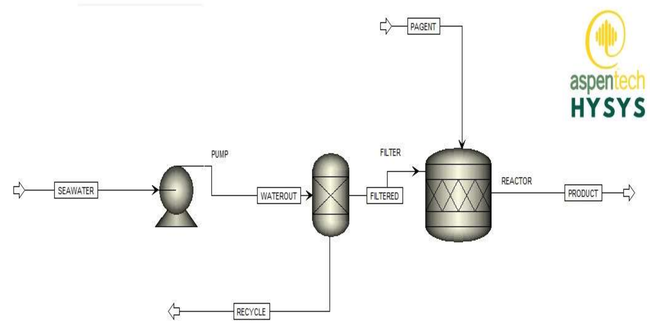
Introducing an advanced filtration system designed to extract lithium from seawater and desalination brine in an environmentally friendly way. This solution offers a sustainable alternative to conventional mining, integrating easily into existing infrastructure while supporting the growing demand for clean energy materials.

Background

Our project develops a sustainable system to extract lithium from seawater and desalination brine using nanofiltration. It offers a cleaner alternative to traditional methods by separating lithium from other ions and using solar energy to reduce carbon emissions. This helps meet growing lithium demand while minimizing environmental impact.

Simulated and Prototype Design





Project Statement

This project aims to develop a sustainable, low-emission lithium extraction system using nanofiltration technology on seawater and desalination brines, delivering a functional prototype powered 25% by renewable energy to support clean energy demand and environmentally responsible practices.

Target Specifications

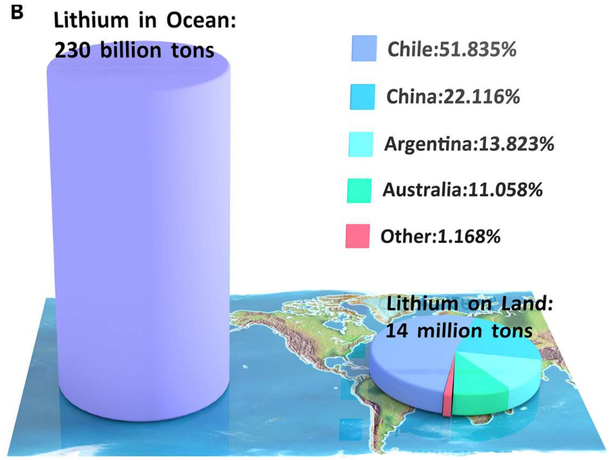
Table of Integrated Specification

Time	**30**	**min**
Purity	**80**	**%**
Efficiency	**40**	**%**

Constrains

- Concentration of Lithium 170-250 ppm
- Raspberry Pi 5 with 4 or 8GB of RAM
- Seawater temperature <35℃
- Operated at 230Vac, 60Hz

lithium reserve in the ocean and on land



Testing & Validation

	Minutes	Purity	Efficiency
Aspen Data Sheet	**33**	**77%**	**41.443%**

- **The processing time around 30 minutes, meeting the target of 30 minutes**
- **Average purity is 77%, almost meeting the target of 80%**
- **The extraction efficiency is 41.443%, meeting the target of 40%**

Conclusion

In conclusion, our senior design project focuses on developing a sustainable lithium extraction system using seawater and desalination brines. By combining advanced nanofiltration with renewable energy, the project offers an eco-friendly alternative to conventional methods. It aims to support clean energy demands, reduce environmental impact, and promote the efficient use of untapped resources for a more sustainable future.