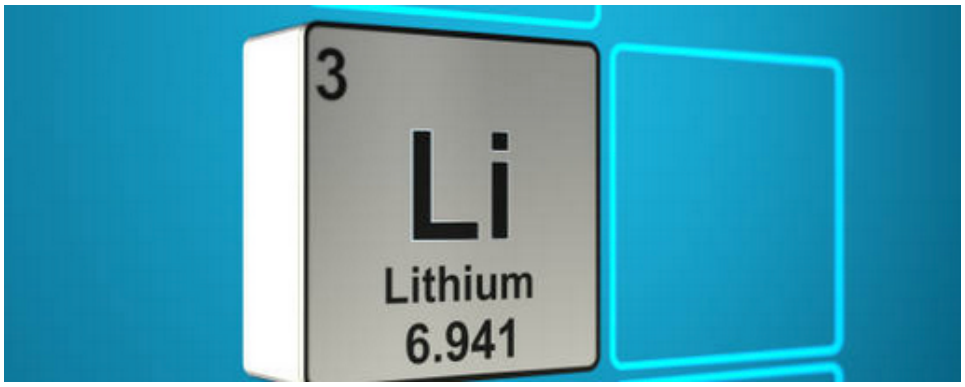
Industry Close Up

Lithium

April 2024



Tony Palermo, VP Commercial for New Castle Stainless Plate recently commented on the United States Department of Energy (DOE) announcement of a $2.26 billion loan for the construction of a lithium mining and lithium carbonate processing facilities in Nevada. Here's what Tony had to say about the opportunities for stainless steel products for these types of facilities.

Question: What is driving demand for lithium?

Answer: The recent government funding and private investments in lithium production are being fueled by the increasing demand in electric vehicles (EVs) which are currently powered by lithium-ion batteries. Lithium-ion batteries have high energy-density and are rechargeable. While electric vehicles are generating most of the increased demand for lithium, batteries used in devices such as e-bikes, smart phones, laptops and digital cameras also require lithium due to their high energy-density requirements.

Q.: What does demand look like for the foreseeable future?

A.: McKinsey & Company put out a report in 2022 addressing lithium use and demand. Their forecasting models at the time projected "the growth of Li-ion batteries at an annual compound rate of approximately 30 percent." In the report, McKinsey expected global Li-ion demand to reach 4,000 to 4,500 gigawatt-hours by 2030. To meet this demand, the McKinsey report projected lithium production will expand by about 20 percent per year

Q: There are two aspects of lithium production: mining/extraction and processing. Can you expand on these corrosive environments?

A: Lithium is found in different types of deposits ranging from hard rock to clay deposits and underground brine pools. The related leaching process of brine pools (like the ones being explored under the Salton Sea in California) as well as other mining/extraction scenarios are performed under highly corrosive conditions. Stainless steel is the ideal material selection for high performance in corrosive environments. Auxilliary equipment, such as sulfuric acid plants, also require stainless steel in their construction.

New Castle Stainless Plate, LLC

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Learn more at the DOE website.

Q: How corrosive are the conditions in which lithium is processed?
A: Processes to produce lithium carbonate or lithium hydroxide vary significantly depending on the nature of the lithium deposit, but most all are highly corrosive. Lithium processing also requires emissions control systems and tail gas scrubbers as well as tanks for mixing sulfuric acid and oxygen. In all these applications, the corrosion conditions vary widely as do the materials required to reliably and economically protect against corrosion.

Q: What stainless steel grades are specified for lithium projects?
A: Grade selection can include 316L and duplex stainless grades as well as nickel alloys. These alloys will be specified in various product forms (plate, sheet, bar, pipe).

Q: What are the benefits of stainless steel for lithium projects?
A: Reducing corrosion rates can help reduce maintenance costs, improve process reliability, increase process up time, and extend facility life in an economical way.

Q: Are there additional considerations relating to lithium production?
A: There are environmental considerations that also must be addressed in both the extraction and processing of lithium. Water used to accomplish these processes, in virtually every case, will need to be recovered, purified, and re-used here in the United States. Zero liquid discharge technologies to address water by-products have been in use for decades, with stainless steel being instrumental in these applications. Stainless steel is specified for the tanks, valves, piping, etc. to purify the water by-product.

Q: What advantages can New Castle Stainless Plate offer to the lithium mining, extraction, and processing sector?
A: We produce stainless plate in wider and longer dimensions than other domestic producers. This translates to fewer welds which can lead to less welding-related time and materials. Fewer welds also reduce related maintenance and repairs in the future. Our stainless plate enables the lithium industry to maximize reliability and longevity.

304L 316L **2205 2304 2507**

Stainless plate is used in every step of the lithium extraction and refining processes —in brine, clay, and hard rock (e.g. spodumene) feedstocks.

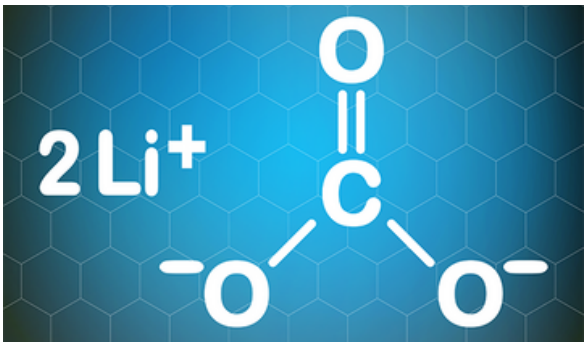
Brine Applications

Precipitation reactors
Dilution clarifiers
Filter tanks
Ion exchange tanks
Vacuum filters
Centrifuge components
Pneumatic transport
Air classifiers

Spodumene Applications

Spodumene Applications
Mining crusher equipment
Cyclone and ball mill components
Classifiers
Flotation cell tanks
Tailing equipment
Concentrate thickeners
Pressure filtration systems
Preheater kilns and gas suspension calciner
Acid roasters
Reactors

Lithium Carbonate vs Lithium Hydroxide



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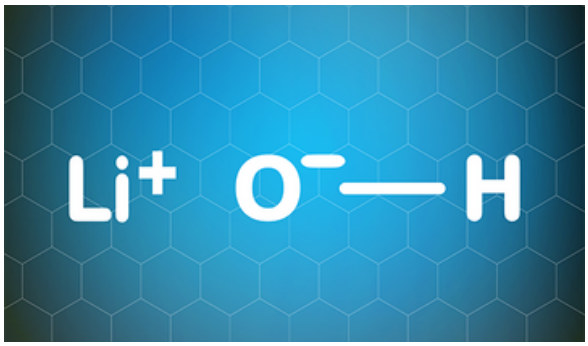

Lithium carbonate (LC) is a compound, mainly produced by extraction from underground brine pools using precipitation and the addition of sodium carbonate. LC is mainly used for producing rechargable batteries.

Lithium hydroxide (LiHO) decomposes at a lower temperature than LC, allowing for the process of producing battery cathodes to be more sustainable and for the final product (EV batteries) to be longer lasting. This can improve the performance of EV batteries for longer range before recharging.