



Lubrizon



Lubrizon® Lithium disperse micronized Solution

**Faster , Safer & Easier way to
produce Li and LiX Greases**

Nov 2022

Why Lithium demand and price have increased?

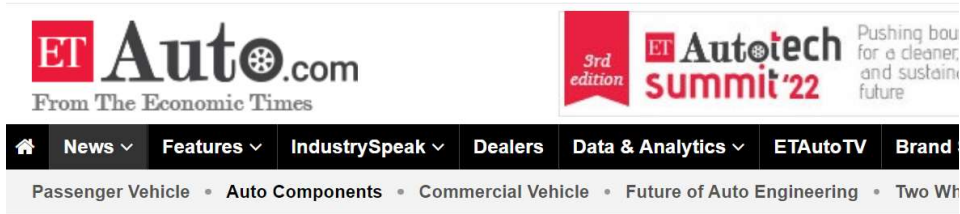
Lithium Demand Growing (Batteries)

End Use	Lithium content (grams)
Mobile phones	1 – 3
Smartphones	2 – 6
Tablets	20 – 30
Laptops	30 – 40
Powertools	40 – 60
Hybrid electric vehicles (HEVs)	800 – 3,600
Plug-in hybrid vehicles (PHEVs)	1,000 – 10,000
Pure electric vehicles (EVs)	8,000 – 63,000

Tesla™ model S with a
70 kWh battery uses
63,000 grams of Li!



10,000



Auto News / Latest Auto News / Auto Components

Elon Musk cautions against rising lithium prices, says Tesla might have to get into large scale mining & refining

New Delhi: Tesla CEO Elon Musk on Saturday took to micro blogging site twitter to voice his concern against rising cost of lithium--a key raw material in batteries that power electric vehicles across the globe, even going on to suggest that the company would have to get into direct mining and refining at scale if costs do not improve.

High demand for electric vehicles globally has created a demand supply mismatch and lithium prices have recorded the steepest rise in a year in 2022 in well over two decades. Prices rose steadily from \$ 4,450 per tonne in 2012 to \$ 17,000 per tonne in 2021 but have risen over four fold to more than \$ 78,000 per tonne so far in 2022.

"Price of lithium has gone to insane levels" Tesla might actually have to get into the mining & refining directly at scale, unless costs improve," Musk tweeted. "There is no shortage of the element itself, as lithium is almost everywhere on Earth, but pace of extraction/refinement is slow."

With such high prices what will be preferential market for Lithium producers?

Source : lithium price hike: Elon Musk cautions against rising lithium prices, says Tesla might have to get into large scale mining & refining, Auto News, ET Auto (indiatimes.com)

DECRETO Nº 11.120, DE 5 DE JULHO DE 2022

- Decree allows foreign trade operations of lithium minerals and their derivatives

Sexta-feira, 08 de julho de 2022

Decreto flexibiliza o comércio exterior de lítio e impulsiona avanços na mineração brasileira



Governo reduz amarras para exportação de lítio, de olho em mercado de baterias

Acabam restrições para venda de lítio, base das baterias de carros elétricos

Com novo decreto do Ministério de Minas e Energia, exportação da matéria-prima não precisa mais de aprovação do órgão competente

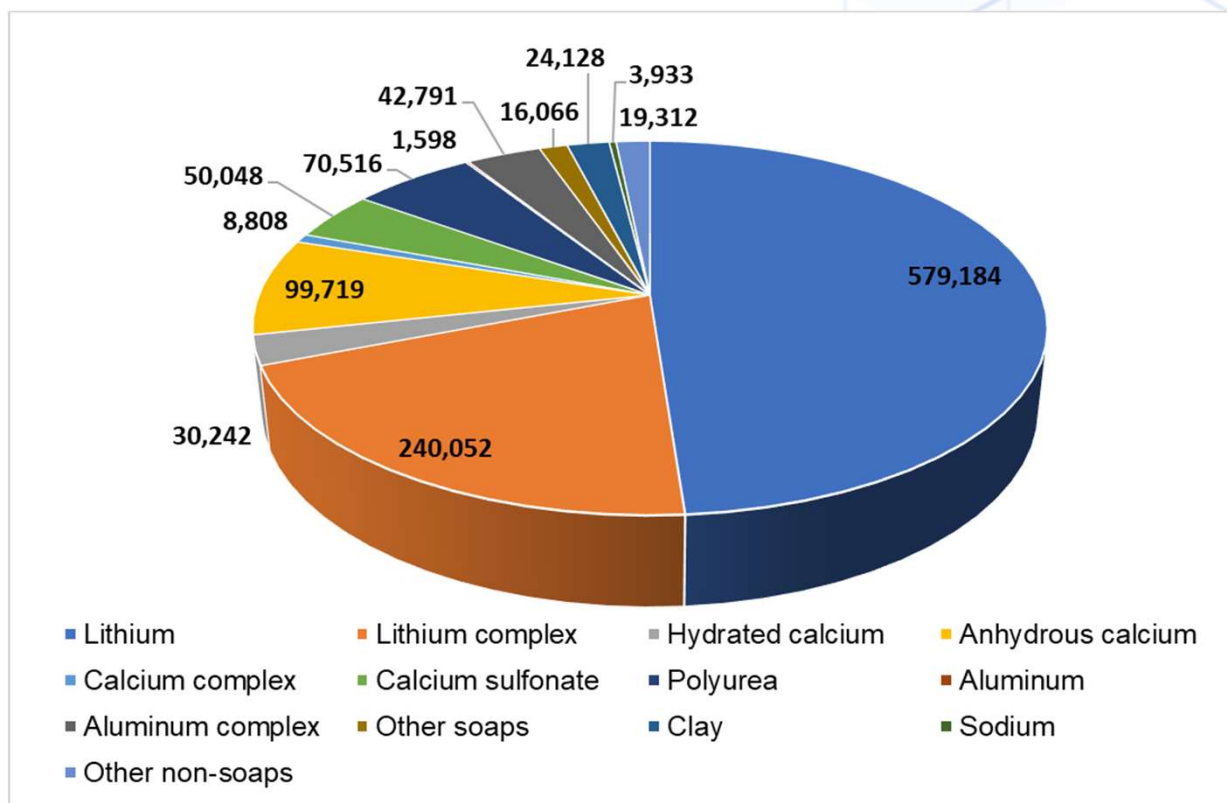
<https://www.cprm.gov.br/publique/Noticias/Decreto-flexibiliza-o-comercio-exterior-de-litio-e-impulsiona-avancos-na-mineracao-brasileira-7455.html>

<https://epbr.com.br/governo-reduz-amarras-para-exportacao-de-litio-de-olho-em-mercado-de-baterias/>

<https://automotivebusiness.com.br/pt/posts/mobility-now/brasil-exportacao-litio-decreto/>

Global Market Data - Volume by Detailed Thickener Type

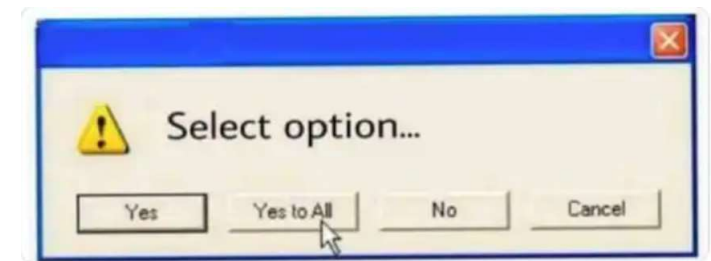
Thickener	MT	wt%
Lithium	579,184	48.82%
Lithium complex	240,052	20.23%
Hydrated calcium	30,242	2.55%
Anhydrous calcium	99,719	8.41%
Calcium complex	8,808	0.74%
Calcium sulfonate	50,048	4.22%
Polyurea	70,516	5.94%
Aluminum	1,598	0.13%
Aluminum complex	42,791	3.61%
Other soaps	16,066	1.35%
Clay	24,128	2.03%
Sodium	3,933	0.33%
Other non-soaps	19,312	1.63%
Total	1,186,397	100.0%



Total 2021 Worldwide Sales: 1.186 million MT

The question is ...

1. Will customers be resilient to stop using Lithium and Lithium complex greases in the *Industrial market*?
2. Will customers be resilient to stop using Lithium and Lithium complex greases in the *Automotive market*?
3. Will customers migrate to *Calcium Sulfonate* grease ?
4. Will customers migrate to *Polyurea* grease ?



The background is a vibrant blue gradient. It features several translucent, light-blue geometric shapes, including cubes and rectangular prisms, arranged in a way that suggests depth and perspective. Faint, white, diagonal lines and rays of light emanate from the top left, creating a sense of motion and technology.

What is Lubrizol® Lithium disperse
micronized solution ?

Lubrizol® Lithium disperse micronized Solution

Ready to Use, Reduced Respiratory Hazard



- Solids Handling
- Hazardous dust



- Fluid liquid dispersion
- Dust-free

Lubrizol® Lithium disperse micronized Solution

Additive summary

- Lubrizol® Lithium disperse micronized Solution is a thickener precursor designed to replace lithium hydroxide monohydrate which will reduce manufacturing time and energy consumption when manufacturing lithium and lithium complex greases



- Fluid liquid dispersion
- Dust-free

Lubrizol® Lithium disperse micronized Solution

- Lubrizol® Lithium Dispersed is an oil-based dispersion of micronized anhydrous lithium hydroxide particles designed to replace lithium hydroxide monohydrate when manufacturing lithium and lithium complex greases.
- Lubrizol® Lithium Dispersed has a particle size that is 100 times smaller than the typical Lithium Hydroxide, exposing a larger total surface area to the solution, for greatly enhanced reactivity
- Lubrizol Lithium Dispersed improve the grease soap-making process by reducing cycle time, improving plant handling and reducing plant environmental

Lubrizol® Lithium Solution transforms the Soap Making Process

The background is a vibrant blue gradient. It features several translucent, overlapping geometric shapes, including cubes and rectangular prisms, some of which are outlined in white. Diagonal lines of varying shades of blue and white create a sense of depth and movement across the slide.

Why Lubrizol® Lithium disperse
micronized solution ?

Grease Processing is Complex & Hazardous

- Complex multiphase batch process
- Slow cycle time
- Environmental hazard



Complex and Unfriendly Process

LiOH typical problems

- HSE hazard
 - Handle bags of $\text{LiOH} \cdot \text{H}_2\text{O}$ solids
 - Slurry $\text{LiOH} \cdot \text{H}_2\text{O}$ solids into water
 - Charge oil and acid(s)
 - Heat to 130C to melt acids
 - Add cooling oil to <100C
 - Add slurry of $\text{LiOH} \cdot \text{H}_2\text{O}$ solids in water
 - Heat to 195C or higher to remove slurry water, water of hydration and reaction
 - Cool and transfer to finishing kettle
-
- *Purity variability of LiOH produced in Brazil (market information)*

Lubrizol® Lithium Dispersed : Process Simplification

Conventional Process

~~Handle bags of $\text{LiOH} \cdot \text{H}_2\text{O}$ solids~~

~~Slurry $\text{LiOH} \cdot \text{H}_2\text{O}$ solids into water~~

Charge oil and acid(s)

Heat to 130C to melt acids

Add cooling oil to <100C

Add slurry of $\text{LiOH} \cdot \text{H}_2\text{O}$ solids in water

Heat to 195C or higher to remove ~~slurry water, water of hydration and~~ water of reaction

Cool and transfer to finishing kettle

Lithium Dispersed Process

Charge oil and acid(s)

Heat to 130C to melt acids

Add cooling oil to <100C

Add Lubrizol® Lithium Dispersed

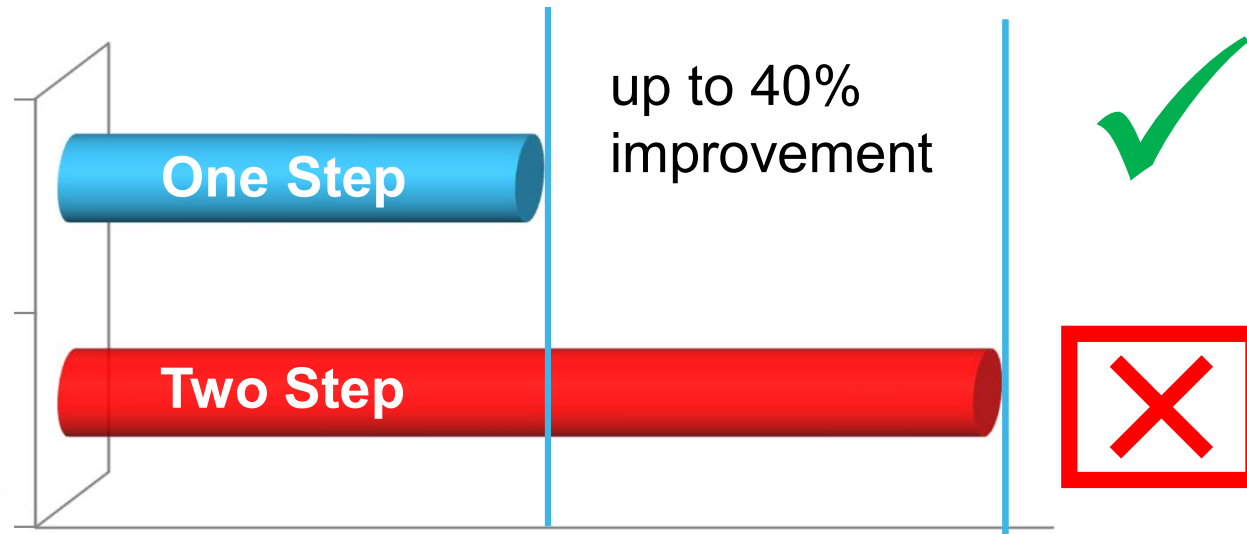
Heat to 195C or higher to remove water of reaction

Cool and transfer to finishing kettle

Lubrizol® Lithium Dispersed : Process Improvements

LZ Lithium
Solution

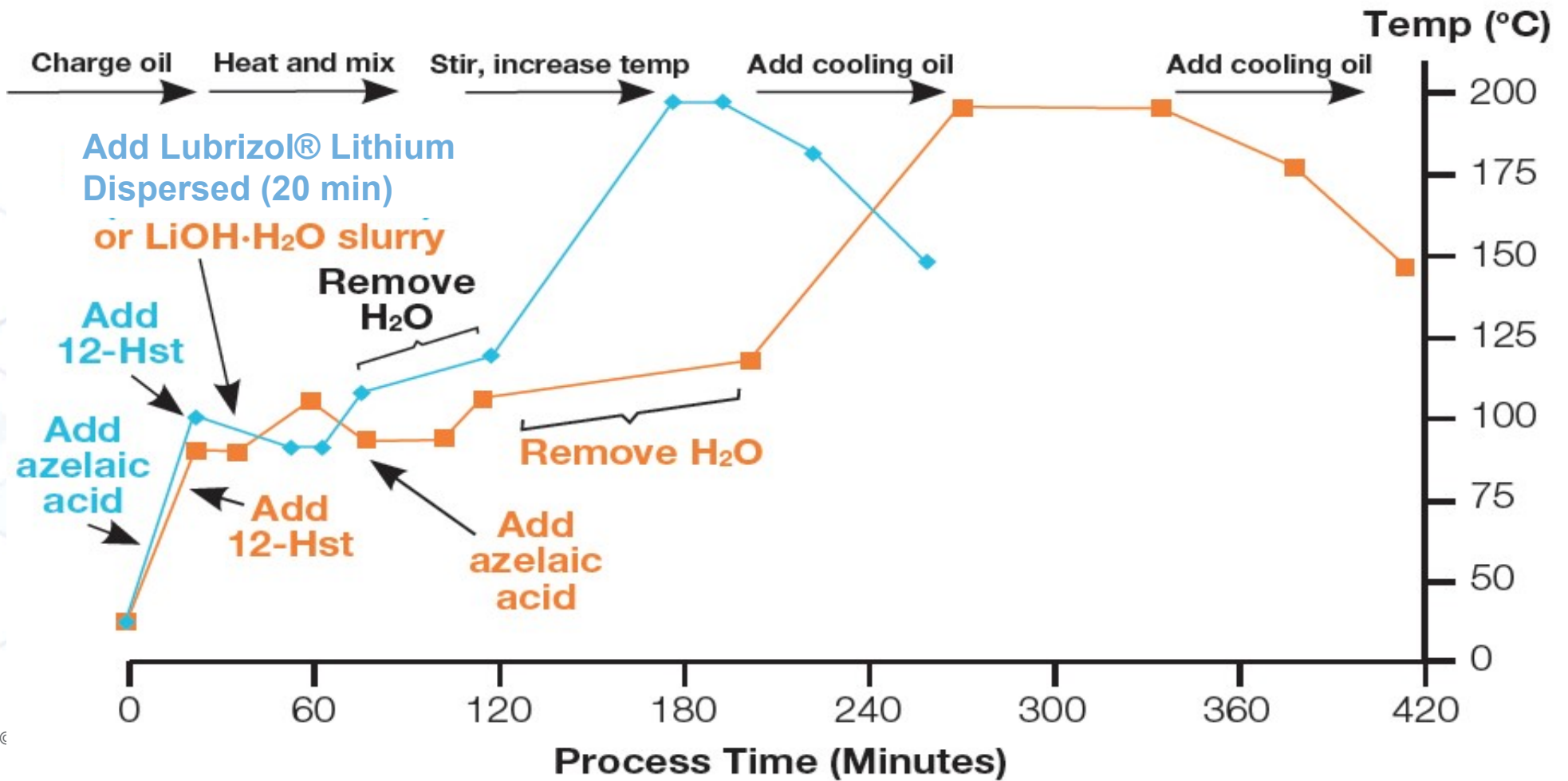
LiOH.H₂O



Process LZ Li Dispersed Offers 40% Time Cycle Reduction Over 2-Step Process

Lithium Complex Grease Process Comparison

■ LiOH monohydrate
 ◆ LZ® Li Dispersed



Lubrizol® Lithium Solution cost savings insight

Two Shifts Production Output Comparison

	LiOH.H2O	Lubrizol® Solution
Batches completed 5 days	4.7	9
5 days production (Kg)	24055	46359

- Much reduced foaming during soap formation and dehydration.
- Largely reduced dehydration phase.
- Optimized soap making reaction

Production output increased >90% with same 2 shifts

Lubrizol Grease Recipe Comparison

Grease Recipe (quantities to make 1 kg of grease)	2-step LOH.H ₂ O process	Lubrizol Lithium Solution
Base oil blend (g)	900.0	882.0
12-Hydroxystearic acid (g)	73.8	86.3
Azelaic acid (g)	22.9	10.7
Lubrizol ® Li Dispersed	-	27.8
Lithium hydroxide monohydrate powder (g)	21.4	-
Soap concentration (%wt)	10.0	10.0
Dropping point (°C)	275	285
Unworked / worked penetration	241/243	239/239
Lithium (metal) (g)	3.54	2.93

Lower Azelaic and Lithium (demand and cost impact)

Lubrizol Lubrizol® Lithium Solution cost savings insight

Works with open Kettle

- Electricity saving up to 26%
- Heating savings up to 47%



Open Kettle brings Energy & Heating savings and so REDUCE COST !!!



Lubrizol® Lithium Solution cost savings insight

Electricity savings

Process Description	Electrical Load (kWh)	LiOH-H ₂ O		Anhydrous LiOH Dispersion	
		Operating Hours	Electrical Consumption (kWh)	Operating Hours	Electrical Consumption (kWh)
Hot Oil System Operation					
Hot Oil Heater	0.3	11.50	3.45	5.50	1.65
Hot Oil Pump	14	11.50	161	5.50	77
Cooking Kettle Operation					
Mixer Drive System	30	13.50	405	7.50	225
Grease Pump 1	20	9.00	180	4.00	80
Oil Addition					
Oil Pump	14	0.75	10.5	0.75	10.5
Transfer Cook to Finish Kettle					
Grease Pump 1	20	0.50	10	0.50	10
Oil Pump	14	0.50	7	0.75	10.5
Finishing Kettle Operation					
Mixer Drive System	50	6.50	325	6.50	325
Grease Pump 2	20	8.50	170	8.50	170
Colloid Mill Motor	50	2.00	100	2.00	100
Total Electrical Consumption (kWh)			1372		1010

Energy Savings up to 26%

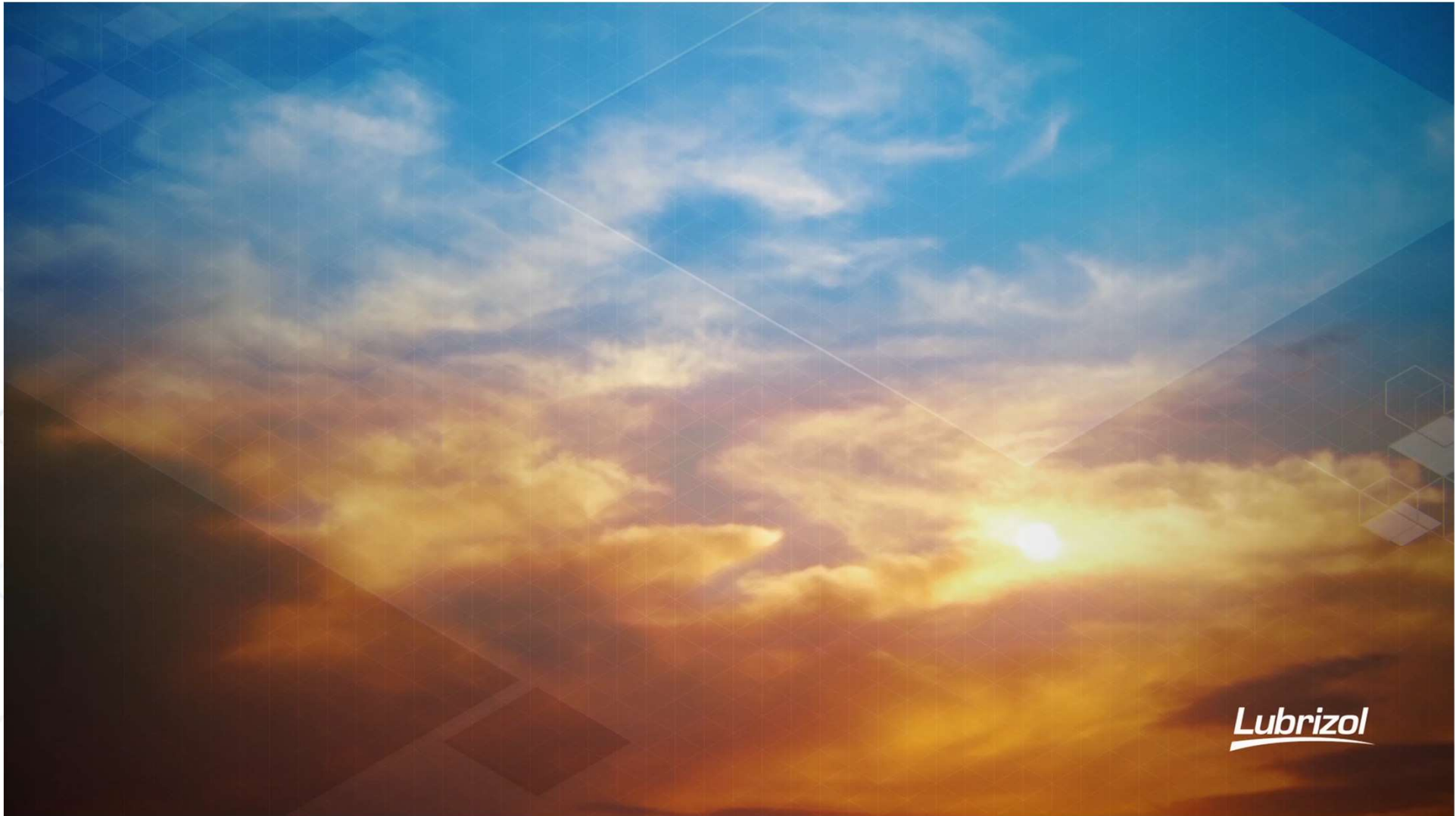
***Lubrizol* Lubrizol® Lithium Solution cost savings insight**

Heating savings

Description	Heating Rate (kJ/kg*K)	LiOH-H ₂ O			Anhydrous LiOH Dispersion		
		Quantity (kg)	Temp. Rise (K)	Total Heat (kJ)	Quantity (kg)	Temp. Rise (K)	Total Heat (kJ)
Water Heating	4.1868	674.1	78.88	222640	52.1	78.88	17203
Water Vaporization (Heat of Vaporization in kJ/kg)	2253	674.1		1518849	52.1		117358
Reactor Heating (Kettle)	0.4605	8167	188.88	710359	8167	188.88	710359
Product Heating (Grease) 1/2 batch size	2.3	2912.5	188.88	1265260	2600.6	188.88	1129741
Total Heating Per Batch (kJ)				3717108			1974661

Heating Savings up to 47%

Lubrizol Lubrizol® Lithium Solution VIDEO





Lubrizol® Lithium disperse micronized Solution Benefits Summary

- Reduced Hazard (HSE)
- No Lithium solids handling
- No Lithium workplace dust hazard
- Pumpability for safer handling
- Reduced foaming
- Reduced waste
- Increased reliability
- Can work with Open or Close Kettle
- Increased manufacturing (5 days / 2 shifts : 4.7 to 9 batches)
- Exceptional grease soap consistency
- Enhanced reactivity
- Elimination of slow dehydration
- Reduced Steam for heating
- Heating Savings up to 47%
- Reduced Energy consumption up to 26%

Lubrizol® Lithium Solution transforms the Lithium Soap Making Process



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lubrizoladditives360.com

