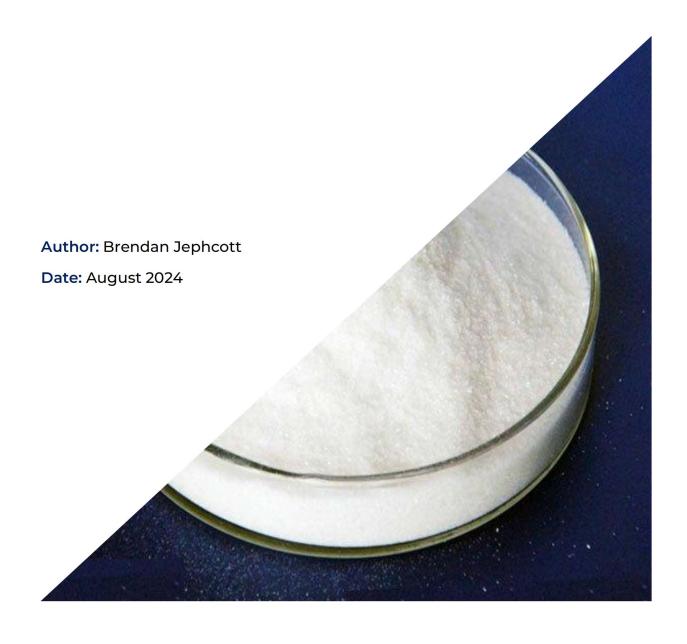
# LITHIUM HEXAFLUOROPHOSPHATE

#### **Market Research Report**



#### **Table of Contents**

Execut	ive Summary	2
1.0	Introduction	11
1.1	Physical and Chemical Properties	11
1.2	Uses for Lithium Hexafluorophosphate	12
1.3	Principal Theory of Electrolyte	12
1.3	.1 Solvents	16
1.3	.2 Additives	18
1.3	.3 Lithium salts	19
1.3	.4 Electrolyte Costing	22
2.0	Preparation Technology of Lithium Hexafluorophosphate	23
2.1	Hydrogen Fluoride Solvent Method	24
2.2	Organic Fluoride Solvent Method	27
2.3	Gas-Solid Reaction Method	28
2.4	Ion Exchange Method	29
3.0	Chinese Lithium Hexafluorophosphate Standards	31
3.1	HG/T 4066-2015 Lithium Hexafluorophosphate	31
3.2	HG/T 4067-2015 Lithium Hexafluorophosphate Electrolyte	31
3.3	Impurity Factors of Electrolyte	32
3.3	3.1 Metal Cation Impurities	32
3.3	3.2 Anionic Impurities	32
3.3	3.3 Hydrogen Fluoride and Moisture	33
3.3	Organic Acids, Alcohols, Aldehydes, Ketones Amines and Amides	33
4.0	Cash Cost Analysis	33
4.1	Lithium Hexafluorophosphate	33
4.2	Lithium Hexafluorophosphate Electrolyte	35
5.0	Commercialisation	37
5.1	Lithium Hexafluorophosphate	37
5.2	Electrolyte	42
6.0	Market Prices (1 USD ~ 7 CNY)	45
7.0	Future Development Trends	49
7.1	Lithium Bis(fluorosulfonyl)imide	49
8.0	Market Forecast	51
Refere	nces	54
Appen	dix 1: Guangzhou Tinci Materials Technology Co., Ltd	55
1.0	Guangzhou Tinci Materials Technology Co., Ltd	56
1.1	Corporate Overview	56
1.2	Battery Materials Business	58
1.2	.1 Electrolyte Business	59

1.2.2	Lithium Hexafluorophosphate Business	6
1.2.3	Lithium Bis(fluorosulfonyl)imide Business	63
1.2.4	Additives Business	64
1.3	Financials (1 USD ~ 7 CNY)	64
Disclaim		72

#### **Figures**

Figure 1: Lithium hexafluorophosphate white crystalline powder	11
Figure 2: Schematic diagram of lithium hexafluorophosphate crystal structure	11
Figure 3: Lithium-ion battery components and theoretical working principal	12
Figure 4: Principle of electrolyte affecting the performance of lithium-ion batterybattery	14
Figure 5: Lithium-ion battery electrolyte composition	15
Figure 6: Example electrolyte raw material composition	16
Figure 7: Various types of solvents	
Figure 8: Lithium-ion battery cost ratio of each component material	22
Figure 9: Cost ratio of each raw material of electrolyte	23
Figure 10: Principal flowsheets of mainstream lithium hexafluorophosphate production methods	24
Figure 11: Lithium hexafluorophosphate Morita Chemical hydrogen fluoride solvent method	25
Figure 12: Lithium hexafluorophosphate Do-Fluoride hydrogen fluoride solvent method	26
Figure 13: Lithium hexafluorophosphate Tinci Materials organic solvent methodmethod	28
Figure 14: Lithium hexafluorophosphate gas-solid reaction methodmethod	29
Figure 15: Lithium hexafluorophosphate ion exchange method	
Figure 16: Cost structure of electrolyte in LFP batteries (blue: Li salt, yellow: solvent, red: additive)	36
Figure 17: Cost structure of electrolyte in ternary batteries (blue: Li salt, yellow: solvent, red: additive)	36
Figure 18: Global lithium hexafluorophosphate production (2021)(2021)	
Figure 19: Lithium hexafluorophosphate production in China (2015-2022)	38
Figure 20: Lithium hexafluorophosphate China production market share by Company (2021)(2021)	38
Figure 21: Non-China lithium hexafluorophosphate production market share by Company (2021)	
Figure 22: Lithium hexafluorophosphate Demand in China (2015-2022)	
Figure 23: Export and import quantities of lithium hexafluorophosphate in China (2015 to 2022)	
Figure 24: China's lithium hexafluorophosphate import market in 2021-2022	
Figure 25: China's lithium hexafluorophosphate export market in 2021-2022	
Figure 26: Global electrolyte production (2023)	
Figure 27: China electrolyte production and growth rate (2015 to 2023)	43
Figure 28: Competitive landscape of China electrolyte industry (2023)(2023)	
Figure 29: Competitive landscape of global electrolyte companies (2023)(2023)	
Figure 30: The price trend of lithium hexafluorophosphate (blue line) 2011 to 2024	45
Figure 31: Electrolyte, LiPF6 and Li2CO3 prices trend 2016 to 2022 (unit: 10,000 CNY per tonne)	
Figure 32: Price of liithium hexafluorophosphate (blue), lithium carbonate (red) and price difference (	
June 2021 to June 2024 (10,000 CNY/t)	
Figure 33: Average market prices of battery electrolyte – LFP(Blue), Ternary (Red)(Red)	
Figure 34: Global electrolyte demand forecast (2018 to 2026E)	
Figure 35: Global lithium hexafluorophosphate demand forecast (2018 to 2026E)	53
Figure 36: Global LIFSI demand forecast (2018 to 2026E)	53

#### **Tables**

Table 1: Lithium hexafluorophosphate physical and chemical specifications	12
Table 2: Electrolyte performance requirements	13
Table 3: Mainstream electrolyte composition	
Table 4: Organic solvent performance requirements	16
Table 5: Commonly used solvents in lithium-ion battery electrolyte	17
Table 6: Comparison of additives used in lithium-ion battery electrolyte	18
Table 7: Common additives used in lithium-ion battery electrolyte	
Table 8: Main types and product characteristics of new additives	19
Table 9: Comparison of lithium hexafluorophosphate to other lithium salts used in lithium-ion ba	ittery
Table 10: Properties of lithium salts used in lithium-ion battery electrolyte	22
Table 11: Comparison of mainstream lithium hexafluorophosphate production methods	30
Table 12: Lithium hexafluorophosphate Chinese product standard HG/T4066-2015 (1 mg/kg = 1 ppm)	
Table 13: Lithium hexafluorophosphate electrolyte Chinese product standard HG/T4067-2015 (1 mg/k ppm)	_
Table 14: Lithium hexafluorophosphate (liquid) production process cash cost analysis (1 USD: 7 CNY)	33
Table 15: Lithium hexafluorophosphate (solid) production process cash cost analysis (1 USD: 7 CNY)	34
Table 16: Capital cost comparison of the lithium hexafluorophosphate solid and liquid production pro	ocess
	34
Table 17: Cost structure comparison of electrolyte in LFP and ternary lithium-ion batteries	35
Table 18: Major Chinese lithium hexafluorophosphate producers and capacity (2023)	41
Table 19: Major Chinese electrolyte producers actual and planned capacity (2022 to 2025)	43
Table 20: Comparison of LiFSI and LiPF <sub>6</sub> product performance	49
Table 21: Global lithium bis(fluorosulfonyl)imide production forecast (2020 to 2024e)	50
Table 22: Tinci Materials — Lithium bis(fluorosulfonyl)imide production cash cost analysis	51
Table 23: Global demand forecast 2024 to 2026 for electrolyte, lithium hexafluorophosphate and litl	hium
bis(fluorosulfonyl)imide	52