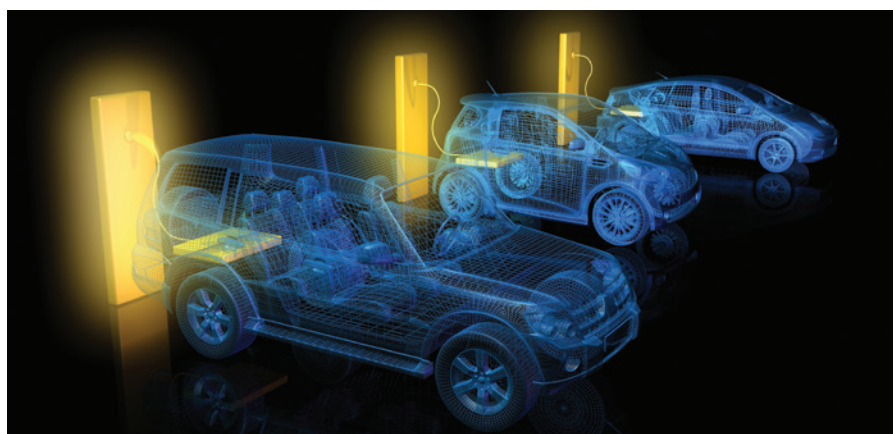


## FACT SHEET

# LITHIUM ANALYSIS

**Lithium demand has soared in the last decade principally due to its use in storage batteries in electric motor vehicles and electrical goods.**



### Challenges

Aspiring lithium producers face numerous challenges meeting this demand and delivering the requisite product grade in an environment characterised by volatile commodity prices and uncertain future-supply fundamentals. Lithium resources are currently confined to lithium brine solutions and the less common lithium-bearing pegmatites which may host other valuable commodities. The discovery, exploration, resource definition and extraction of lithium and other associated commodities from hard rock silicate ores with diverse mineralogy as well as complex brine solutions, requires a laboratory group with focus, dedication and proven track record in this regard.

### Our Expertise

Our global reach and expertise in the spectroscopic analysis of complex ores and solutions makes Intertek an ideal laboratory partner for lithium producers. Our team of analysts and chemists can draw on extensive experience to offer expert advice on the complete mineralogical and chemical characterisation of lithium bearing ores, concentrates and brine solutions. Our Perth facility is ISO 17025 accredited for the principal methods used in lithium analysis.

### Testing for Lithium Ores, Solutions and Other Pegmatite Minerals

Brines are underground reservoirs that contain high concentrations of dissolved salts, which may include lithium in economic concentrations and quantities. Salar brines are those encountered under dried lakes and are important sources of lithium. Brines are routinely analysed using ICP-OES (inductively coupled plasma optical emission spectrometry) and ICP-MS (inductively coupled plasma mass spectrometry) taking cognisance of the saline matrix which is a critical factor in the analysis.

Pegmatites are commonly zoned, coarse-grained intrusive igneous rocks that form in the late stages of magma crystallisation and mostly have an overall granitic composition. Some pegmatites contain lithium minerals such as spodumene, lepidolite and petalite but many are not particularly enriched in lithium compared with other felsic rock types such as granites. Other valuable minerals such as columbite-tantalite, beryl, cassiterite, microcline, wolframite and pollucite are also routinely recovered from certain pegmatites. The coarse-grained, complexly zoned nature of pegmatites can make taking sufficiently representative samples a challenge.

Intertek maintains and operates all the requisite sample preparation equipment for processing pegmatite ores. These processes include drying, crushing, splitting and pulverising.

XRF analysis is ideal for the accurate characterisation of most major elements in pegmatite minerals such as feldspars. Unfortunately X-ray physics, particularly pertinent to light elements, dictate that other methods are used for accurate Li, Be and B analysis.

Both fusion and 4 acid digestions are effective for almost all lithium minerals and the resultant solutions can be read using ICP-OES, ICP-MS and AAS depending on the expected grade and the element suite required. If other elements such as Sn, Ta and Nb are required, a fusion digestion is recommended to ensure complete dissolution of refractory minerals which may host these elements.

### Additional Capabilities

Pegmatites can contain rare minerals such as spodumene, lepidolite, petalite, amblygonite, beryl, garnet, tourmaline, zinnwaldite, cassiterite, wadginitite, wolframite and columbite-tantalite. Some of which can be in a gemological form. X-ray diffraction (XRD) is a useful tool for the identification and quantification of unusual minerals such as those found in pegmatites.

#### 48 Element Lithium Exploration Package

ELEMENT	RANGE PPM	ELEMENT	RANGE PPM	ELEMENT	RANGE PPM
Li	0.1 - 1%	Ge	0.1 - 2000	Sb	0.05 - 1%
Ag	0.05 - 500	Hf	0.05 - 2000	Sc	0.1 - 5000
Al	50 - 15%	In	0.01 - 2000	Se	0.5 - 1%
As	0.5 - 1%	K	20 - 10%	Sn	0.1 - 2000
Ba	0.1 - 5000	La	0.01 - 5000	Sr	0.05 - 1%
Be	0.05 - 2000	Mg	20 - 40%	Ta	0.01 - 2000
Bi	0.01 - 1%	Mn	1 - 5%	Te	0.2 - 2000
Ca	50 - 40%	Mo	0.1 - 1%	Th	0.01 - 5000
Cd	0.02 - 2000	Na	20 - 10%	Ti	5 - 2%
Ce	0.01 - 1%	Nb	0.05 - 2000	Tl	0.02 - 2000
Co	0.1 - 2%	Ni	0.5 - 2%	U	0.01 - 1%
Cr	1 - 2%	P	50 - 5%	V	1 - 2%
Cs	0.05 - 2000	Pb	0.5 - 1%	W	0.1 - 2000
Cu	0.5 - 2%	Rb	0.05 - 2000	Y	0.05 - 2000
Fe	100 - 50%	Re	0.002 - 2000	Zn	1 - 2%
Ga	0.05 - 2000	S	500 - 10%	Zr	0.1 - 2000

Lithium 4 acid digestion/ ICP-MS package

4A-Li/MS48

#### Zirconium Crucible Fusion ICP-MS Individual Element

ELEMENT	DESCRIPTION	RANGE	CODE
Li	Sodium peroxide fusion Zr Crucible	1 - 20%	FP1-Li/MS

#### Brine Analysis

DESCRIPTION	CODE
As, B, Ba, Ca, Co, Cr, Cs, Fe, K, Li, Na, Ni, Mg, Mn, P, Pb, Rb, S, Sc, Se, Sr, Ti, V, Zn	BR-Li01

Detection limits will be dependent on salinity levels. Upper limits may apply for some elements.

DESCRIPTION	RANGE	CODE
Chloride by Colorimetry	5 mg/l	COL03

#### Brine pH, EC, TDS, SO4, Total Alkalinity Package

DESCRIPTION	CODE
pH, EC, TDS, Sulphate (calculated from S), HCO <sub>3</sub> , OH, CO <sub>3</sub> by titration	BR-Li02

#### FOR MORE INFORMATION

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