

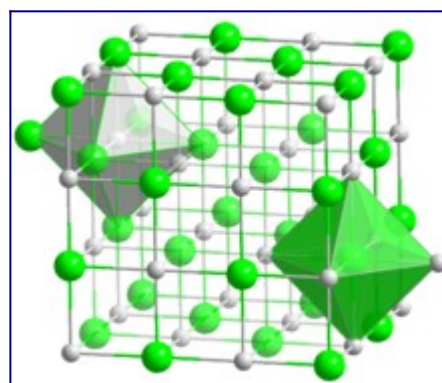
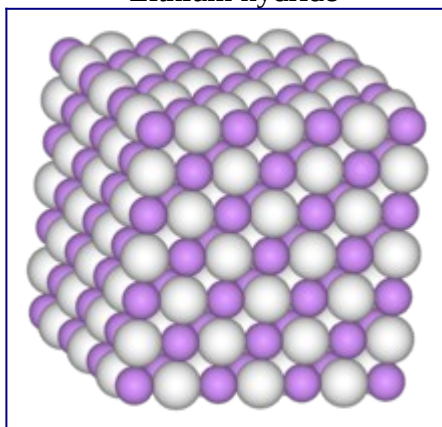
# Lithium hydride

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(Redirected from [Lithium deuteride](#))

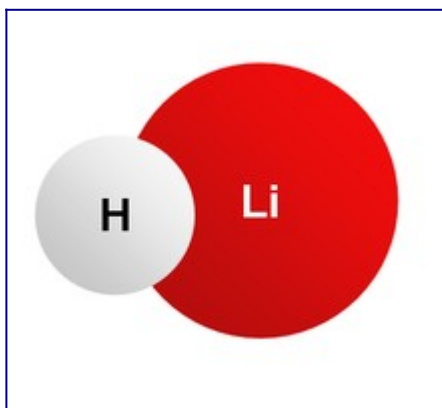
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Lithium hydride



■ Li<sup>+</sup> ■ H<sup>-</sup>

Structure of Lithium hydride.



## Identifiers

- [CAS Number](#) • [7580-67-8](#) <sup>Y</sup>
- 3D model ([JSmol](#)) • [Interactive image](#)
- [ChemSpider](#) • [56460](#) <sup>Y</sup>
- [ECHA InfoCard](#) [100.028.623](#)
- [PubChem](#) CID • [62714](#)
- [RTECS number](#) • OJ6300000
- [UNII](#) • [68KF447EX3](#) <sup>Y</sup>
- [CompTox Dashboard](#) (EPA) • [DTXSID80893078](#)
- show
- [InChI](#)
- 
- InChI=1S/Li.Hssss <sup>N</sup>
- 
- Key: SIAPCJWMELPYOE-UHFFFAOYSA-N <sup>N</sup>
- 
- InChI=1/Li.H/q+1;-1
- 
- Key: SRTHRZWAMDZJOS-UHFFFAOYAZ
- show
- [SMILES](#)
- 
- [H-].[Li+]

## Properties

- [Chemical formula](#) LiH
- [Molar mass](#) 7.95 g/mol

<u>Appearance</u>	colorless to gray solid[1]
<u>Density</u>	0.78 g/cm <sup>3</sup> [1]
<u>Melting point</u>	688.7 °C (1,271.7 °F; 961.9 K)[1]
<u>Boiling point</u>	900–1,000 °C (1,650–1,830 °F; 1,170–1,270 K) (decomposes)[2]
<u>Solubility in water</u>	reacts
<u>Solubility</u>	slightly soluble in <u>dimethylformamide</u> reacts with <u>ammonia</u> , <u>diethyl ether</u> , <u>ethanol</u>
<u>Magnetic susceptibility</u> ( $\chi$ )	$-4.6 \cdot 10^{-6}$ cm <sup>3</sup> /mol
<u>Refractive index</u> ( $n_D$ )	1.9847[3]:43

### Structure

<u>Crystal structure</u>	<u>fcc</u> ( <u>NaCl-type</u> )
<u>Lattice constant</u>	$a = 0.40834$ nm[3]:56
<u>Dipole moment</u>	6.0 D[3]:35

### Thermochemistry

<u>Heat capacity</u> ( $C$ )	3.51 J/(g·K)
<u>Std molar entropy</u> ( $S^{\ominus}_{298}$ )	170.8 J/(mol·K)
<u>Std enthalpy of formation</u> ( $\Delta_f H^{\ominus}_{298}$ )	-90.65 kJ/mol
<u>Gibbs free energy</u> ( $\Delta_f G^{\ominus}$ )	-68.48 kJ/mol

### Hazards

#### Occupational safety and health (OHS/OSH):

Main hazards extremely strong irritant, highly toxic, highly corrosive

**NFPA 704** (fire diamond) W

[Autoignition temperature](#) 200 °C (392 °F; 473 K)

**Lethal dose** or concentration (LD, LC):

LD<sub>50</sub> ([median dose](#)) 77.5 mg/kg (oral, rat)[\[5\]](#)

LC<sub>50</sub> ([median concentration](#)) 22 mg/m<sup>3</sup> (rat, 4 h)[\[6\]](#)

**NIOSH** (US health exposure limits):

[PEL](#) (Permissible) TWA 0.025 mg/m<sup>3</sup>[\[4\]](#)

[REL](#) (Recommended) TWA 0.025 mg/m<sup>3</sup>[\[4\]](#)

[IDLH](#) (Immediate danger) 0.5 mg/m<sup>3</sup>[\[4\]](#)

[Safety data sheet](#) (SDS) [ICSC 0813](#)

### Related compounds

Other [cations](#)  
[Sodium hydride](#)  
[Potassium hydride](#)  
[Rubidium hydride](#)  
[Caesium hydride](#)

Related compounds  
[Lithium borohydride](#)  
[Lithium aluminium hydride](#)

Except where otherwise noted, data are given for materials in their [standard state](#) (at 25 °C [77 °F], 100 kPa).

N [verify](#) ([what is](#) <sup>Y</sup> N ?)

### [Infobox references](#)

Chemical compound

**Lithium hydride** is an [inorganic compound](#) with the formula [LiH](#). This [alkali metal hydride](#) is a colorless solid, although commercial samples are grey. Characteristic of a salt-like (ionic) hydride, it has a high melting point, and it is not soluble but reactive with all [protic](#) organic solvents. It is soluble and nonreactive with certain [molten salts](#) such as [lithium fluoride](#), [lithium borohydride](#), and [sodium hydride](#). With a molecular mass of slightly less than 8.0, it is the lightest [ionic compound](#).

## Contents

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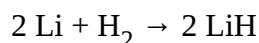
## Physical properties[[edit](#)]

LiH is a [diamagnetic](#) and an ionic conductor with a conductivity gradually increasing from  $2 \times 10^{-5} \Omega^{-1} \text{cm}^{-1}$  at 443 °C to  $0.18 \Omega^{-1} \text{cm}^{-1}$  at 754 °C; there is no discontinuity in this increase through the melting point.[3]:36 The [dielectric constant](#) of LiH decreases from 13.0 (static, low frequencies) to 3.6 (visible-light frequencies).[3]:35 LiH is a soft material with a [Mohs hardness](#) of 3.5.[3]:42 Its compressive creep (per 100 hours) rapidly increases from < 1% at 350 °C to > 100% at 475 °C, meaning that LiH can't provide mechanical support when heated.[3]:39

The [thermal conductivity](#) of LiH decreases with temperature and depends on morphology: the corresponding values are 0.125 W/(cm·K) for crystals and 0.0695 W/(cm·K) for compacts at 50 °C, and 0.036 W/(cm·K) for crystals and 0.0432 W/(cm·K) for compacts at 500 °C.[3]:60 The linear [thermal expansion coefficient](#) is  $4.2 \times 10^{-5} / ^\circ\text{C}$  at room temperature.[3]:49

## Synthesis and processing[[edit](#)]

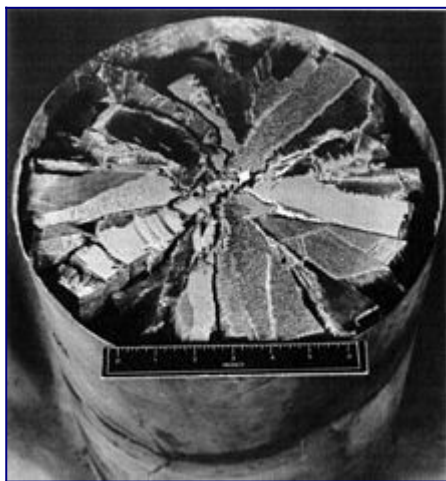
LiH is produced by treating [lithium](#) metal with [hydrogen](#) gas:



This reaction is especially rapid at temperatures above 600 °C. Addition of 0.001–0.003% carbon, or/and increasing temperature or/and pressure, increases the yield up to 98% at 2-hour residence time.[3]:147 However, the reaction proceeds at temperatures as low as 29 °C. The yield is 60% at 99 °C and 85% at 125 °C, and the rate depends significantly on the surface condition of LiH.[3]:5

Less common ways of LiH synthesis include thermal decomposition of [lithium aluminium hydride](#) (200 °C), [lithium borohydride](#) (300 °C), [n-butyllithium](#) (150 °C), or [ethylolithium](#) (120 °C), as well as several reactions involving lithium compounds of low stability and available hydrogen content.[3]:144–145

Chemical reactions yield LiH in the form of lumped powder, which can be compressed into pellets without a binder. More complex shapes can be produced by casting from the melt.[3]:160 ff. Large single crystals (about 80 mm long and 16 mm in diameter) can be then grown from molten LiH powder in hydrogen atmosphere by the [Bridgman–Stockbarger technique](#). They often have bluish color owing to the presence of colloidal Li. This color can be removed by post-growth annealing at lower temperatures (~550 °C) and lower thermal gradients.[3]:154 Major impurities in these crystals are Na (20–200 parts per million, ppm), O (10–100 ppm), Mg (0.5–6 ppm), Fe (0.5–2 ppm) and Cu (0.5–2 ppm).[3]:155



Cracking in cast LiH after machining with a [fly cutter](#). Scale is in inches.

Bulk cold-pressed LiH parts can be easily machined using standard techniques and tools to [micrometer](#) precision. However, cast LiH is brittle and easily cracks during processing.[\[3\]](#):171

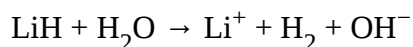
A more energy efficient route to form lithium hydride powder is by ball milling lithium metal under high hydrogen pressure. A problem with this method is the cold welding of lithium metal due to the high ductility. By adding small amounts of lithium hydride powder the cold welding can be avoided.[\[7\]](#)

## Reactions[\[edit\]](#)

LiH powder reacts rapidly with air of low humidity, forming [LiOH](#), [Li<sub>2</sub>O](#) and [Li<sub>2</sub>CO<sub>3</sub>](#)

[3](#). In moist air the powder ignites spontaneously, forming a mixture of products including some nitrogenous compounds. The lump material reacts with humid air, forming a superficial coating, which is a viscous fluid. This inhibits further reaction, although the appearance of a film of "tarnish" is quite evident. Little or no nitride is formed on exposure to humid air. The lump material, contained in a metal dish, may be heated in air to slightly below 200 °C without igniting, although it ignites readily when touched by an open flame. The surface condition of LiH, presence of oxides on the metal dish, etc., have a considerable effect on the ignition temperature. Dry oxygen does not react with crystalline LiH unless heated strongly, when an almost explosive combustion occurs.[\[3\]](#):6

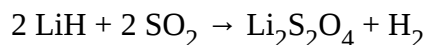
LiH is highly reactive toward water and other protic reagents:[\[3\]](#):7



LiH is less reactive with water than Li and thus is a much less powerful reducing agent for water, alcohols, and other media containing reducible solutes. This is true for all the binary saline hydrides.[\[3\]](#):22

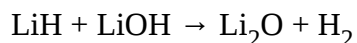
LiH pellets slowly expand in moist air, forming LiOH; however, the expansion rate is below 10% within 24 hours in a pressure of 2 [Torr](#) of water vapor.[\[3\]](#):7 If moist air contains carbon dioxide, then the product is lithium carbonate.[\[3\]](#):8 LiH reacts with ammonia, slowly at room temperature, but the reaction accelerates significantly above 300 °C.[\[3\]](#):10 LiH reacts slowly with higher alcohols and [phenols](#), but vigorously with lower alcohols.[\[3\]](#):14

LiH reacts with sulfur dioxide:

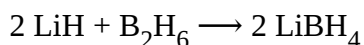
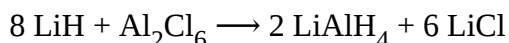


though above 50 °C the product is lithium dithionite.[\[3\]](#):9

LiH reacts with acetylene to form lithium carbide and hydrogen. With anhydrous organic acids, phenols and acid anhydrides LiH reacts slowly, producing hydrogen gas and the lithium salt of the acid. With water-containing acids, LiH reacts faster than with water.[\[3\]](#):8 Many reactions of LiH with oxygen-containing species yield LiOH, which in turn irreversibly reacts with LiH at temperatures above 300 °C:[\[3\]](#):10



Lithium hydride is rather unreactive at moderate temperatures with O<sub>2</sub> or Cl<sub>2</sub>. It is, therefore, used in the synthesis of other useful hydrides,[\[8\]](#) e.g.,



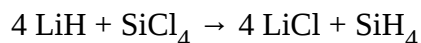
## Applications[\[edit\]](#)

### Hydrogen storage and fuel[\[edit\]](#)

With a hydrogen content in proportion to its mass three times that of NaH, LiH has the highest hydrogen content of any hydride. LiH is periodically of interest for hydrogen storage, but applications have been thwarted by its stability to decomposition. Thus removal of H<sub>2</sub> requires temperatures above the 700 °C used for its synthesis, such temperatures are expensive to create and maintain. The compound was once tested as a fuel component in a model rocket.[\[9\]](#)[\[10\]](#)

### Precursor to complex metal hydrides[\[edit\]](#)

LiH is not usually a hydride-reducing agent, except in the synthesis of hydrides of certain metalloids. For example, [silane](#) is produced in the reaction of lithium hydride and [silicon tetrachloride](#) by the Sundermeyer process:



Lithium hydride is used in the production of a variety of reagents for [organic synthesis](#), such as [lithium aluminium hydride](#) (LiAlH<sub>4</sub>) and [lithium borohydride](#) (LiBH<sub>4</sub>). [Triethylborane](#) reacts to give [superhydride](#) (LiBHEt<sub>3</sub>).[\[11\]](#)

### In nuclear chemistry and physics[\[edit\]](#)

Lithium hydride (LiH) is sometimes a desirable material for the shielding of [nuclear reactors](#), with the isotope [lithium-7](#) (Li-7), and it can be fabricated by casting.[\[12\]](#)[\[13\]](#)

### Lithium deuteride[\[edit\]](#)

Lithium deuteride, in the form of [lithium-7](#) deuteride, is a good [moderator](#) for [nuclear reactors](#), because [deuterium](#) (<sup>2</sup>H) has a lower [neutron](#) absorption cross-section than ordinary hydrogen (<sup>1</sup>H) does, and the

cross-section for  $^7\text{Li}$  is also low, decreasing the absorption of neutrons in a reactor.  $^7\text{Li}$  is preferred for a moderator because it has a lower neutron capture cross-section, and it also forms less [tritium](#) ( $^3\text{H}$ ) under bombardment with neutrons.[\[14\]](#)

The corresponding [lithium-6 deuteride](#),  $^6\text{Li}^2\text{H}$ , or  $^6\text{LiD}$ , is the primary [fusion](#) fuel in [thermonuclear weapons](#). In hydrogen warheads of the [Teller–Ulam design](#), a [nuclear fission](#) trigger explodes to heat and compress the lithium-6 deuteride, and to bombard the  $^6\text{LiD}$  with [neutrons](#) to produce  $^3\text{H}$  ([tritium](#)) in an [exothermic](#) reaction:  $^6\text{Li}^2\text{H} + \text{n} \rightarrow ^4\text{He} + ^3\text{H} + ^2\text{H}$ . The deuterium and tritium then fuse to produce [helium](#), one neutron, and 17.59 MeV of free energy in the form of [gamma rays](#), [kinetic energy](#), etc. The helium is an inert byproduct.

Before the [Castle Bravo nuclear weapons test](#) in 1954, it was thought that only the less common isotope  $^6\text{Li}$  would breed tritium when struck with fast neutrons. The Castle Bravo test showed (accidentally) that the more plentiful  $^7\text{Li}$  also does so under extreme conditions, albeit by an [endothermic](#) reaction.

## Safety[\[edit\]](#)

LiH reacts violently with water to give hydrogen gas and LiOH, which is caustic. Consequently, LiH dust can explode in humid air, or even in dry air due to static electricity. At concentrations of 5–55 mg/m<sup>3</sup> in air the dust is extremely irritating to the mucous membranes and skin and may cause an allergic reaction. Because of the irritation, LiH is normally rejected rather than accumulated by the body.[\[3\]](#):157,182

Some lithium salts, which can be produced in LiH reactions, are toxic. LiH fire should not be extinguished using carbon dioxide, carbon tetrachloride, or aqueous fire extinguishers; it should be smothered by covering with a metal object or graphite or [dolomite](#) powder. Sand is less suitable, as it can explode when mixed with burning LiH, especially if not dry. LiH is normally transported in oil, using containers made of ceramic, certain plastics or steel, and is handled in an atmosphere of dry argon or helium.[\[3\]](#):156 Nitrogen can be used, but not at elevated temperatures, as it reacts with lithium.[\[3\]](#):157 LiH normally contains some metallic lithium, which corrodes steel or [silica](#) containers at elevated temperatures.[\[3\]](#):173–174,179

## References[\[edit\]](#)

- <sup>^</sup> [Jump up to:](#) <sup>a</sup> <sup>b</sup> <sup>c</sup> *Lide, D. R., ed. (2005). CRC Handbook of Chemistry and Physics (86th ed.). Boca Raton (FL): CRC Press. p. 4.70. ISBN 0-8493-0486-5.*
- <sup>^</sup> [David Arthur Johnson; Open University \(12 August 2002\). \*Metals and chemical change\*. Royal Society of Chemistry. pp. 167–. ISBN 978-0-85404-665-2. Retrieved 1 November 2011.](#)
- <sup>^</sup> [Jump up to:](#) <sup>a</sup> <sup>b</sup> <sup>c</sup> <sup>d</sup> <sup>e</sup> <sup>f</sup> <sup>g</sup> <sup>h</sup> <sup>i</sup> <sup>j</sup> <sup>k</sup> <sup>l</sup> <sup>m</sup> <sup>n</sup> <sup>o</sup> <sup>p</sup> <sup>q</sup> <sup>r</sup> <sup>s</sup> <sup>t</sup> <sup>u</sup> <sup>v</sup> <sup>w</sup> <sup>x</sup> <sup>y</sup> <sup>z</sup> <sup>aa</sup> <sup>ab</sup> <sup>ac</sup> <sup>ad</sup> *Smith, R. L.; Miser, J. W. (1963). [Compilation of the properties of lithium hydride](#). NASA.*
- <sup>^</sup> [Jump up to:](#) <sup>a</sup> <sup>b</sup> <sup>c</sup> *NIOSH Pocket Guide to Chemical Hazards. "#0371". [National Institute for Occupational Safety and Health](#) (NIOSH).*
- <sup>^</sup> [Chambers, Michael. "\[ChemIDplus - 7580-67-8 - SIAPCJWMELPYOE-UHFFFAOYSA-N - Lithium hydride - Similar structures search, synonyms, formulas, resource links, and other chemical information\]\(#\)". chem.sis.nlm.nih.gov. Retrieved 10 April 2018.](#)
- <sup>^</sup> ["\[Lithium hydride\]\(#\)". \*Immediately Dangerous to Life or Health Concentrations \(IDLH\)\*. \[National Institute for Occupational Safety and Health\]\(#\) \(NIOSH\).](#)
- <sup>^</sup> [Solvent- and catalyst-free mechanochemical synthesis of alkali metal monohydrides IZ Hlova, A Castle, JF Goldston, S Gupta, T Prost... - Journal of Materials Chemistry A, 2016](#)
- <sup>^</sup> ["\[NCERT Chemistry Textbook\]\(#\)" \(PDF\).](#)
- <sup>^</sup> [\[Lex Archived\]\(#\) 2008-07-23 at the \[Wayback Machine\]\(#\). Astronautix.com \(1964-04-25\). Retrieved on 2011-11-01.](#)



10. [Empirical laws for hybrid combustion of lithium hydride with fluorine in small rocket engines](#). Ntrs.nasa.gov. Retrieved on 2011-11-01.   (password-protected)
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13. [Welch, Frank H. \(February 1974\). "Lithium hydride: A space age shielding material". \*Nuclear Engineering and Design\*. \*\*26\*\* \(3\): 440–460. doi:10.1016/0029-5493\(74\)90082-X.](#)
14. [Massie, Mark; Dewan, Leslie C. "US 20130083878 A1, April 4, 2013, NUCLEAR REACTORS AND RELATED METHODS AND APPARATUS". U.S. Patent Office. U.S. Government. Retrieved 2 June 2016.](#)

## External links[[edit](#)]

Look up [lithium hydride](#) in Wiktionary, the free dictionary.

- [University of Southampton, Mountbatten Centre for International Studies, Nuclear History Working Paper No5.](#)
- [CDC - NIOSH Pocket Guide to Chemical Hazards](#)

**show**

- [v](#)
- [t](#)
- [e](#)

### Lithium compounds (list)

- [Li<sub>2</sub>](#)
- [LiAlCl<sub>4</sub>](#)
- [Li<sub>1+x</sub>Al<sub>x</sub>Ge<sub>2-x</sub>\(PO<sub>4</sub>\)<sub>3</sub>](#)
- [LiAlH<sub>4</sub>](#)
- [LiAlO<sub>2</sub>](#)
- [LiAl<sub>1+x</sub>Ti<sub>2-x</sub>\(PO<sub>4</sub>\)<sub>3</sub>](#)
- [LiAs](#)
- [LiAsF<sub>6</sub>](#)
- [Li<sub>3</sub>AsO<sub>4</sub>](#)
- [Li\[AuCl<sub>4</sub>\]](#)
- [LiB\(C<sub>2</sub>O<sub>4</sub>\)<sub>2</sub>](#)
- [LiB\(C<sub>6</sub>F<sub>5</sub>\)<sub>4</sub>](#)
- [LiBF<sub>4</sub>](#)
- [LiBH<sub>4</sub>](#)
- [LiBO<sub>2</sub>](#)
- [LiB<sub>3</sub>O<sub>5</sub>](#)
- [Li<sub>2</sub>B<sub>4</sub>O<sub>7</sub>](#)

### Inorganic (list)

- $\text{Li}_2\text{B}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$
- $\text{LiBSi}_2$
- $\text{LiBr}$
- $\text{LiBr} \cdot 2\text{H}_2\text{O}$
- $\text{LiBrO}$
- $\text{LiBrO}_2$
- $\text{LiBrO}_3$
- $\text{LiBrO}_4$
- $\text{Li}_2\text{C}_2$
- $\text{LiCF}_3\text{SO}_3$
- $\text{CH}_3\text{CH}(\text{OH})\text{COOLi}$
- $\text{LiC}_2\text{H}_2\text{ClO}_2$
- $\text{LiC}_2\text{H}_3\text{IO}_2$
- $\text{Li}(\text{CH}_3)_2\text{N}$
- $\text{LiCHO}_2$
- $\text{LiCH}_3\text{O}$
- $\text{LiC}_2\text{H}_5\text{O}$
- $\text{LiCN}$
- $\text{Li}_2\text{CN}_2$
- $\text{LiCNO}$
- $\text{Li}_2\text{CO}_3$
- $\text{Li}_2\text{C}_2\text{O}_4$
- $\text{LiCl}$
- $\text{LiClO}$
- $\text{LiClO}_2$
- $\text{LiClO}_3$
- $\text{LiClO}_4$
- $\text{LiCoO}_2$
- $\text{Li}_2\text{CrO}_4$
- $\text{Li}_2\text{CrO}_4 \cdot 2\text{H}_2\text{O}$
- $\text{Li}_2\text{Cr}_2\text{O}_7$
- $\text{CsLiB}_6\text{O}_{10}$
- $\text{LiD}$
- $\text{LiF}$
- $\text{Li}_2\text{F}$
- $\text{LiF}_4\text{Al}$
- $\text{Li}_3\text{F}_6\text{Al}$
- $\text{FLiBe}$
- $\text{LiFO}$
- $\text{LiFePO}_4$
- $\text{FLiNaK}$
- $\text{LiGaH}_4$
- $\text{Li}_2\text{GeF}_6$

- $\text{Li}_2\text{GeO}_3$
- $\text{LiGe}_2(\text{PO}_4)_3$
- $\text{LiH}$
- $\text{LiH}_2\text{AsO}_4$
- $\text{Li}_2\text{HAsO}_4$
- $\text{LiHCO}_3$
- $\text{Li}_3\text{H}(\text{CO}_3)_2$
- $\text{LiH}_2\text{PO}_3$
- $\text{LiH}_2\text{PO}_4$
- $\text{LiHSO}_3$
- $\text{LiHSO}_4$
- $\text{LiHe}$
- $\text{LiI}$
- $\text{LiIO}$
- $\text{LiIO}_2$
- $\text{LiIO}_3$
- $\text{LiIO}_4$
- $\text{Li}_2\text{IrO}_3$
- $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$
- $\text{LiMn}_2\text{O}_4$
- $\text{Li}_2\text{MoO}_4$
- $\text{Li}_{0.9}\text{Mo}_6\text{O}_{17}$
- $\text{LiN}_3$
- $\text{Li}_3\text{N}$
- $\text{LiNH}_2$
- $\text{Li}_2\text{NH}$
- $\text{LiNO}_2$
- $\text{LiNO}_3$
- $\text{LiNO}_3 \cdot \text{H}_2\text{O}$
- $\text{Li}_2\text{N}_2\text{O}_2$
- $\text{LiNa}$
- $\text{Li}_2\text{NaPO}_3$
- $\text{LiNaNO}_2$
- $\text{LiNbO}_3$
- $\text{Li}_2\text{NbO}_3$
- $\text{LiO}^-$
- $\text{LiO}_2$
- $\text{Li}_2\text{O}$
- $\text{Li}_2\text{O}_2$
- $\text{LiOH}$
- $\text{Li}_3\text{P}$
- $\text{LiPF}_6$

- $\text{Li}_2\text{HPO}_3$
- $\text{Li}_2\text{HPO}_4$
- $\text{Li}_3\text{PO}_3$
- $\text{Li}_3\text{PO}_4$
- $\text{Li}_2\text{Po}$
- $\text{Li}_2\text{PtO}_3$
- $\text{Li}_2\text{RuO}_3$
- $\text{Li}_2\text{S}$
- $\text{LiSH}$
- $\text{LiSO}_3\text{F}$
- $\text{Li}_2\text{SO}_3$
- $\text{Li}_2\text{SO}_4$
- $\text{Li}[\text{SbF}_6]$
- $\text{Li}_2\text{Se}$
- $\text{Li}_2\text{SeO}_3$
- $\text{Li}_2\text{SeO}_4$
- $\text{LiSi}$
- $\text{Li}_2\text{SiF}_6$
- $\text{Li}_4\text{SiO}_4$
- $\text{Li}_2\text{SiO}_3$
- $\text{Li}_2\text{Si}_2\text{O}_5$
- $\text{LiTaO}_3$
- $\text{Li}_2\text{Te}$
- $\text{Li}_2\text{TeO}_3$
- $\text{Li}_2\text{TeO}_4$
- $\text{Li}_2\text{TiO}_3$
- $\text{Li}_4\text{Ti}_5\text{O}_{12}$
- $\text{LiTi}_2(\text{PO}_4)_3$
- $\text{LiVO}_3 \cdot 2\text{H}_2\text{O}$
- $\text{Li}_3\text{V}_2(\text{PO}_4)_3$
- $\text{Li}_2\text{WO}_4$
- $\text{LiYF}_4$ 
  - Neodymium-doped
- $\text{LiZr}_2(\text{PO}_4)_3$
- $\text{Li}_2\text{ZrO}_3$

- Hemolithin (extraterrestrial protein)
- Organolithium reagents
  - Gilman reagent
- CH<sub>3</sub>COOLi
- C<sub>4</sub>H<sub>6</sub>LiNO<sub>4</sub>
- LiC<sub>2</sub>F<sub>6</sub>NO<sub>4</sub>S<sub>2</sub>
- LiN(SiMe<sub>3</sub>)<sub>2</sub>
- Li<sub>3</sub>C<sub>6</sub>H<sub>5</sub>O<sub>7</sub>
- C<sub>5</sub>H<sub>5</sub>Li
- LiN(C<sub>3</sub>H<sub>7</sub>)<sub>2</sub>
- (C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>PLi
- C<sub>18</sub>H<sub>35</sub>LiO<sub>3</sub>
- C<sub>6</sub>H<sub>13</sub>Li
- C<sub>4</sub>H<sub>9</sub>Li
- CH<sub>3</sub>CHLiCH<sub>2</sub>CH<sub>3</sub>
- (CH<sub>3</sub>)<sub>3</sub>CLi
- C<sub>12</sub>H<sub>28</sub>BLi
- CH<sub>3</sub>Li
- Li<sup>+</sup>C<sub>10</sub>H<sub>8</sub><sup>-</sup>
- C<sub>5</sub>H<sub>11</sub>Li
- C<sub>5</sub>H<sub>3</sub>LiN<sub>2</sub>O<sub>4</sub>
- C<sub>6</sub>H<sub>5</sub>Li
- LiC<sub>2</sub>CH<sub>3</sub>
- LiO<sub>2</sub>C(CH<sub>2</sub>)<sub>16</sub>CH<sub>3</sub>
- C<sub>4</sub>H<sub>5</sub>LiO<sub>4</sub>
- LiEt<sub>3</sub>BH
- LiOC(CH<sub>3</sub>)<sub>3</sub>
- C<sub>9</sub>H<sub>18</sub>LiN
- LiC<sub>2</sub>H<sub>3</sub> Vinylithium

**Organic (soaps)**

## Minerals

- [Amblygonite](#)
- [Elbaite](#)
- [Eucryptite](#)  $\text{LiAlSiO}_4$
- [Faizievite](#)
- [Fluor-liddicoatite](#)
- [Hectorite](#)
- [Jadarite](#)  $\text{LiNaSiB}_3\text{O}_7\text{OH}$
- [Keatite](#)  $\text{Li}(\text{AlSi}_2\text{O}_6)$
- [Lepidolite](#)
- [Lithiophilite](#)  $\text{LiMnPO}_4$
- [Lithiophosphate](#)  $\text{Li}_3\text{PO}_4$
- [Nambulite](#)
- [Neptunite](#)
- [Petalite](#)  $\text{LiAlSi}_4\text{O}_{10}$
- [Pezzottaite](#)  $\text{Cs}(\text{Be}_2\text{Li})\text{Al}_2\text{Si}_6\text{O}_{18}$
- [Salitotite](#)
- [Spodumene](#)  $\text{LiAl}(\text{SiO}_3)_2$
- [Sugilite](#)
- [Tourmaline](#)
- [Triphylite](#)  $\text{LiFePO}_4$
- [Zabuyelite](#)  $\text{Li}_2\text{CO}_3$
- [Zektzerite](#)
- [Zinnwaldite](#)

## Hypothetical

- [\$\text{Li}\_x\text{Be}\_y\$](#)
- [\$\text{HLiHe}^+\$](#)
- [\$\text{LiFHeO}\$](#)
- [\$\text{LiHe}\_2\$](#)
- [\$\(\text{HeO}\)\(\text{LiF}\)\_2\$](#)
- [\$\text{La}\_{2/3-x}\text{Li}\_{3x}\text{TiO}\_3\text{He}\$](#)

## **Other Li-related**

- [Aluminium–lithium alloys](#)
- [Heteroatom-promoted lateral lithiation](#)
- [LB buffer](#)
- [\$\text{LiNi}\_x\text{Co}\_y\text{Al}\_z\text{O}\_2\$](#)
- [\$\text{LiNi}\_x\text{Mn}\_y\text{Co}\_z\text{O}\_2\$](#)
- [Lithium soap](#)
- [Lucifer yellow](#)
- [Magnesium–lithium alloys](#)
- [NASICON](#)

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Binary compounds of hydrogen

Alkali metal  
(Group 1) hydrides

- LiH
- NaH
- KH
- RbH
- CsH

Alkaline  
(Group 2)  
earth hydrides

Monohydrides

- BeH
- MgH
- CaH
- SrH
- BaH

Dihydrides

- BeH<sub>2</sub>
- MgH<sub>2</sub>
- CaH<sub>2</sub>
- SrH<sub>2</sub>
- BaH<sub>2</sub>

Group 13  
hydrides

Boranes

- BH<sub>3</sub>
- BH
- B<sub>2</sub>H<sub>6</sub>
- B<sub>2</sub>H<sub>2</sub>
- B<sub>2</sub>H<sub>4</sub>
- B<sub>4</sub>H<sub>10</sub>
- B<sub>5</sub>H<sub>9</sub>
- B<sub>5</sub>H<sub>11</sub>
- B<sub>6</sub>H<sub>10</sub>
- B<sub>6</sub>H<sub>12</sub>
- B<sub>10</sub>H<sub>14</sub>
- B<sub>18</sub>H<sub>22</sub>

Alanes

- AlH<sub>3</sub>
- Al<sub>2</sub>H<sub>6</sub>

Gallanes

- GaH<sub>3</sub>
- Ga<sub>2</sub>H<sub>6</sub>

- Indiganes**
- InH<sub>3</sub>
  - In<sub>2</sub>H<sub>6</sub>

- Thallanes**
- TlH<sub>3</sub>
  - Tl<sub>2</sub>H<sub>6</sub>

- Hydrocarbons**
- alkanes
  - alkenes
  - alkynes
  - Cycloalkanes
  - Cycloalkenes
  - Annulenes

- CH
- CH<sub>2</sub>
- CH<sub>3</sub>
- C<sub>2</sub>H

**Group 14 hydrides**

- Silanes**
- SiH<sub>4</sub>
  - Si<sub>2</sub>H<sub>6</sub>
  - Si<sub>3</sub>H<sub>8</sub>
  - Si<sub>4</sub>H<sub>10</sub>
  - Si<sub>5</sub>H<sub>12</sub>
  - Si<sub>6</sub>H<sub>14</sub>
  - Si<sub>7</sub>H<sub>16</sub>
  - Si<sub>8</sub>H<sub>18</sub>
  - Si<sub>9</sub>H<sub>20</sub>
  - Si<sub>10</sub>H<sub>22</sub>
  - more...

- Silenes**
- Si<sub>2</sub>H<sub>4</sub>

- Silynes**
- Si<sub>2</sub>H<sub>2</sub>
  - SiH

- Germanes**
- GeH<sub>4</sub>
  - Ge<sub>2</sub>H<sub>6</sub>
  - Ge<sub>3</sub>H<sub>8</sub>
  - Ge<sub>4</sub>H<sub>10</sub>
  - Ge<sub>5</sub>H<sub>12</sub>

- Stannanes**
- SnH<sub>4</sub>



- $\text{Sn}_2\text{H}_6$

**Plumbanes**

- $\text{PbH}_4$

- $\text{NH}_3$
- $\text{N}_2\text{H}_4$
- $\text{N}_3\text{H}_5$
- $\text{N}_4\text{H}_6$
- $\text{N}_5\text{H}_7$
- $\text{N}_6\text{H}_8$
- $\text{N}_7\text{H}_9$
- $\text{N}_8\text{H}_{10}$
- $\text{N}_9\text{H}_{11}$
- $\text{N}_{10}\text{H}_{12}$
- more...

**Azanes**

- $\text{N}_2\text{H}_2$
- $\text{N}_3\text{H}_3$
- $\text{N}_4\text{H}_4$

**Azenes**

**Pnictogen  
(Group 15) hydrides**

- $\text{PH}_3$
- $\text{P}_2\text{H}_4$
- $\text{P}_3\text{H}_5$
- $\text{P}_4\text{H}_6$
- $\text{P}_5\text{H}_7$
- $\text{P}_6\text{H}_8$
- $\text{P}_7\text{H}_9$
- $\text{P}_8\text{H}_{10}$
- $\text{P}_9\text{H}_{11}$
- $\text{P}_{10}\text{H}_{12}$
- more...

**Phosphanes**

- $\text{P}_2\text{H}_2$
- $\text{P}_3\text{H}_3$
- $\text{P}_4\text{H}_4$

**Phosphenes**

- $\text{AsH}_3$
- $\text{As}_2\text{H}_4$

**Arsanes**

**Stibanes**

- $\text{SbH}_3$

**Bismuthanes**



- HN<sub>3</sub>
- NH
- HN<sub>5</sub>
- NH<sub>5</sub>

**Polyoxidanes**

- H<sub>2</sub>O
- H<sub>2</sub>O<sub>2</sub>
- H<sub>2</sub>O<sub>3</sub>
- H<sub>2</sub>O<sub>4</sub>
- H<sub>2</sub>O<sub>5</sub>
- H<sub>2</sub>O<sub>6</sub>
- H<sub>2</sub>O<sub>7</sub>
- H<sub>2</sub>O<sub>8</sub>
- H<sub>2</sub>O<sub>9</sub>
- H<sub>2</sub>O<sub>10</sub>
- more...

**Polysulfanes**

- H<sub>2</sub>S
- H<sub>2</sub>S<sub>2</sub>
- H<sub>2</sub>S<sub>3</sub>
- H<sub>2</sub>S<sub>4</sub>
- H<sub>2</sub>S<sub>5</sub>
- H<sub>2</sub>S<sub>6</sub>
- H<sub>2</sub>S<sub>7</sub>
- H<sub>2</sub>S<sub>8</sub>
- H<sub>2</sub>S<sub>9</sub>
- H<sub>2</sub>S<sub>10</sub>
- more...

**Hydrogen  
chalcogenides  
(Group 16 hydrides)**

**Selanes**

- H<sub>2</sub>Se
- H<sub>2</sub>Se<sub>2</sub>

**Tellanes**

- H<sub>2</sub>Te
- H<sub>2</sub>Te<sub>2</sub>

**Polanes**

- PoH<sub>2</sub>

- HO
- HO<sub>2</sub>
- HO<sub>3</sub>

Hydrogen halides  
(Group 17 hydrides)

- $\text{H}_2\text{O}^+\text{-O}^-$
- $\text{HS}$
- $\text{HDO}$
- $\text{D}_2\text{O}$
- $\text{T}_2\text{O}$

- $\text{HF}$
- $\text{HCl}$
- $\text{HBr}$
- $\text{HI}$
- $\text{HAt}$
- $\text{ScH}_2$
- $\text{YH}_2$
- $\text{YH}_3$
- $\text{YH}_6$
- $\text{YH}_9$
- $\text{TiH}_2$
- $\text{TiH}_4$
- $\text{ZrH}_2$
- $\text{HfH}_2$
- $\text{VH}$
- $\text{VH}_2$
- $\text{NbH}$
- $\text{NbH}_2$

Transition metal hydrides

- $\text{TaH}$
- $\text{CrH}$
- $\text{CrH}_2$
- $\text{CrH}_x$
- $\text{NiH}$
- $\text{PdH}_x (x < 1)$
- $\text{IrH}_3$
- $\text{FeH}$
- $\text{FeH}_2$
- $\text{FeH}_5$
- $\text{CoH}_2$
- $\text{RhH}_2$
- $\text{CuH}$
- $\text{ZnH}_2$
- $\text{CdH}_2$
- $\text{HgH}_2$

### Lanthanide hydrides

- LaH<sub>2</sub>
- LaH<sub>3</sub>
- LaH<sub>10</sub>
- CeH<sub>2</sub>
- CeH<sub>3</sub>
- PrH<sub>2</sub>
- PrH<sub>3</sub>
- NdH<sub>2</sub>
- NdH<sub>3</sub>
- SmH<sub>2</sub>
- SmH<sub>3</sub>
- EuH<sub>2</sub>
- GdH<sub>2</sub>
- GdH<sub>3</sub>
- TbH<sub>2</sub>
- TbH<sub>3</sub>
- DyH<sub>2</sub>
- DyH<sub>3</sub>
- HoH<sub>2</sub>
- HoH<sub>3</sub>
- ErH<sub>2</sub>
- ErH<sub>3</sub>
- TmH<sub>2</sub>
- TmH<sub>3</sub>
- YbH<sub>2</sub>
- LuH<sub>2</sub>
- LuH<sub>3</sub>

### Actinide hydrides

- AcH<sub>2</sub>
- ThH<sub>2</sub>
- ThH<sub>4</sub>
- Th<sub>4</sub>H<sub>15</sub>
- PaH<sub>3</sub>
- UH<sub>3</sub>
- UH<sub>4</sub>
- NpH<sub>2</sub>
- NpH<sub>3</sub>
- PuH<sub>2</sub>
- PuH<sub>3</sub>
- AmH<sub>2</sub>
- AmH<sub>3</sub>

- [CmH<sub>2</sub>](#)

## **Exotic matter hydrides**

- [PsH](#)

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