Organolithiums Encyclopedia Article

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Organolithiums

Organolithiums are a type of organometallic compound in which the **carbon** of an organic group is directly bonded to a **lithium atom**. The term is also sometimes used for compounds in which a **nitrogen** or other non-metallic atom of an organic group is directly bonded to a lithium atom. Organolithiums are critical to the preparation of many important pharmaceuticals, agricultural compounds, and specialty organic chemicals.

Organolithiums were first identified in 1917 as products from the reaction of lithium metal and organomercury compounds. A simpler preparation discovered in 1930, reaction of an organic **halide** with lithium metal, made possible their current widespread use.

Organolithium-initiated polymerization of isoprene was discovered in 1957. When carried out in **hydrocarbon** solvent, this reaction produces a synthetic rubber similar to natural rubber. This discovery led to the first large scale application of organolithiums. They are now used in the preparation of polymers such as styrene-butadiene-styrene (SBS) rubber. SBS rubber is a common component of tire treads and rubber-soled shoes.

Organolithiums undergo similar chemical reactions to those of Grignard reagents, another important class of organometallic compounds. However, organolithiums are generally more reactive and hence more useful. Most organolithiums react vigorously with air and **water**. The more reactive burn spontaneously in air. To avoid such reactions, the compounds and their solutions must be handled under a protective atmosphere of nitrogen or **argon**.

Organolithiums have physical properties similar to organic compounds. Organolithiums made from nonconjugated hydrocarbons are colorless **liquids** or low-melting, white, crystalline **solids**. Compounds with conjugated hydrocarbon groups are often colored. Most organolithiums are soluble in hydrocarbon **solvents**, which are cheaper than the **ether** solvents required by Grignard reagents. Although commonly represented as monomers, organolithiums tend to form oligomers of two to six (or more) **monomer** units. The degree of association depends on the organic group, solvent, **concentration**, and **temperature**.