



<b>Lubrication for Extreme Environments</b>
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### **Abstract**

In general, since butane is extremely flammable, one would not immediately consider its potential use as a lubricant in a high friction environment. However, butane has potential in terms of lubricity and antiwear properties. It is oxidation, thermal and hydrolytically stable. Butane, as a petroleum product, has compatibility with other petroleum compounds, paints, plastics and elastomers. Lastly, the cost would be low to use butane as a lubricant as compared to other conventional lubricants.

### **Background**

As a liquid, butane may be sprayed onto critical parts or components, injected into sealed bearings or sealed equipment containing moving parts. Butane or a butane/water mix may be used as a cutting lubricant.

### **Potential Applications**

Butane may be used in liquid form as a superior lubricant in extreme environments. In addition, as a solid, butane may be superior to graphite for lubrication and corrosion protection. Under extreme cold conditions, conventional lubricants solidify and gel. This marked increase in viscosity lowers the potential for a compound to serve as a lubricant. When butane solidifies, its lubricity increases, rather than decreases.

At or approaching absolute zero, at the far extremes of cold temperature, butane may act as a conductor. Near absolute zero, some physical properties of chemicals reverse. Thus, butane's dielectric constant may alter such that butane becomes a superior conductor of electricity. Alternatively, at or approaching absolute zero, the lubricity of butane may markedly increase, thus it may act as a superior lubricant and superior conductor. The use of butane at or near absolute zero may have far ranging consequences on the electrical, manufacturing, computer and precision equipment industries.

Some potential uses for butane as a lubricant include the following: bearing lubricants; critical parts assembly – extremely tight tolerance parts or precision equipment; extreme service valve lubricant; fluid couplings; cutting fluid as performed in butane enriched environment – above upper explosive limit (UEL) or nitrogen or other inert gas environment; gear lubricant; and hydraulic fluid for extreme environments.

### **References**

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One or more U.S. Patents Pending.