



SNS COLLEGE OF TECHNOLOGY

Vazhiampalayam, Coimbatore-35

(An Autonomous Institution)

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Lubricants



DR. C SONIA AP/CHEMISTRY





Lubricants



A lubricant (often shortened to lube) is a substance that reduces friction between surfaces in contact

Friction Reduction: Lubricants minimize heat generation when surfaces move against each other

Liquid Lubricants: Examples include mineral oils, synthetic liquids, and vegetable oils.

Semi-solid (Grease): Greases maintain a semi-fluid state and are commonly used.

Solid Lubricants: Graphite, molybdenum disulfide, and tungsten disulfide operate at high temperatures.

Gas Lubricants: Gases serve specific conditions.



Lubricants



Emulsion lubricants are a type of lubricant that consists of oil and water, along with an emulsifying agent.

Composition:

An emulsion lubricant contains fine water droplets dispersed in oil

Properties

High boiling point, low freezing point.

Viscosity index, thermal stability, and corrosion prevention.

Resistance to oxidation and demulsibility¹



Lubricants



Solid lubricants operate exclusively in the boundary regime, where their primary function is to form a thin film on the surfaces of moving components. Here's how they work:

Thin Film Formation:

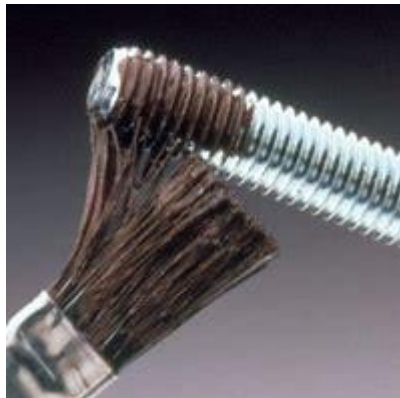
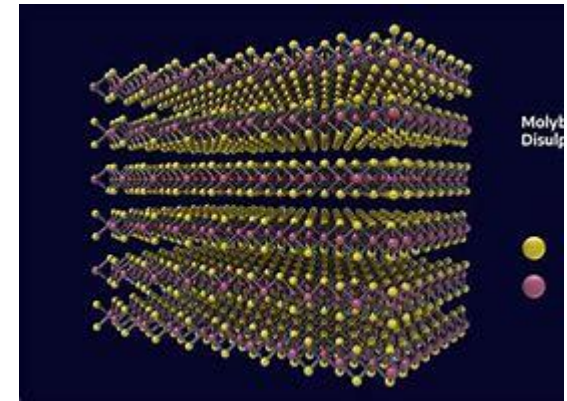
Solid lubricants create a barrier film (often called a “tribofilm”) between the surfaces.

This film helps reduce adhesive wear by preventing direct contact between the moving parts

Structure:



Lubricants





Lubricants



Most solid lubricants consist of lamellar solid materials with atomically thin layers.

These layers are held together by weak Van der Waals forces and can be easily sheared by relative motion.

Imagine someone running on a floor covered in playing cards—the layers shear similarly.

Thickness Matters:

The thickness of the tribofilm is crucial.

A thin film provides low friction and reduces wear.

A film that's too thick can increase friction and wear.

Factors affecting thickness include the lubricant type, load, and environment.



Lubricants



Common Solid Lubricants:

Graphite: Naturally occurring carbon; good for high-temperature applications with low friction.

Molybdenum disulfide (MoS_2): Forms a protective film under extreme conditions.

Mechanism

Solid lubricants operate exclusively in the boundary regime. Their lubrication mechanism is based on their ability to form a thin film on the surfaces of moving components. This film (sometimes known as a “tribofilm”) acts as a barrier between the surfaces, helping to reduce adhesive wear¹. In other words, solid lubricants create a protective layer that minimizes direct contact and friction, enhancing the overall performance of the system.



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