



**JADE CHEMICALS**

## **Dry/Solid Lubricant Molybdenum Disulfide Powder**

Molybdenum Disulfide is dry/solid lubricant powder, also known as the  $\text{MoS}_2$ , also known as molybdenite, is a solid lubricant with a hexagonal layered structure, similar to graphite. It is chemically stable, insoluble in water and dilute acids, and effective in dry, inert, or vacuum environments up to 400°C.

- Withstands extreme pressure (up to 250,000 psi)
- Ideal for cold metal forming and high-load applications
- Used as an additive in greases, oils, polymers, paints, and coatings

### **Emerging and Future Applications of $\text{MoS}_2$ :**

Since the rise of 2D materials following graphene's discovery,  $\text{MoS}_2$  has become the most extensively studied transition metal dichalcogenide (TMD). When reduced from bulk to a single layer,  $\text{MoS}_2$  exhibits dramatic changes in properties, especially in its optoelectronic behaviour—shifting from an indirect bandgap (~1.3 eV) to a direct bandgap (~1.9 eV). This key difference makes  $\text{MoS}_2$  more versatile than graphene in certain electronic and photonic applications.

### **Key Applications:**

- Transistors: High on/off ratio field-effect transistors (FETs) with low leakage.
- Memristors: Memory devices using layered TMD films.
- Spintronics: Devices leveraging controllable spin and valley polarization.
- Optoelectronics: Tunable photoluminescence and confined exciton behaviour.
- Energy: Water electrolysis and hydrogen production.
- Photovoltaics: Solar cells and photodetectors using direct bandgap absorption

## Physical and Technical Properties

Properties	Molybdenum Disulfide (MoS <sub>2</sub> ) CAS No 1317-33-5
Colour	Blue- Silver Gray
Appearance	Crystalline Solid
Melting Point	1185 °C decomposes
Density	-3 5060 Kg.m
Molecular Weight	160.08
Coefficient of Friction (COF)	
Thermal Stability in air	COF <0.1 @600 °F (316 °C) increases to 0.5@ 1100 °F (594 °C)
Thermal Stability in argon	COF increases rapidly starting @800 °F (426 °C) COF >0.1 @ 900 °F (482 °C)
Load bearing ability	250,000 psi
Lubrication Temperature Range	Ambient: from -185 °C to 350 °C Vacuum: from -185 °C to 1100 °C
Chemical Durability	Inert Substance, Non-Toxic
Magnetism	Non-Magnetic
Corrosion Stability	
Coatable Substrates	Iron, Steel, Aluminum, Copper, other Metals, Plastics and Manmade Solids
Compatibility	Oil, Solvent, Paint, Fuel
Electronic / optoelectronic properties	HOMO / LUMO: HOMO = -6.39 eV; LUMO = -4.50 eV Bandgap: Eg = 1.89 eV Classification / Family: 2D semiconducting materials, monolayer materials, thin-layered transition-metal dichalcogenides (TMDs), n-type semiconductors