

## Dry/Solid Lubricant Molybdenum Disulfide Powder

Molybdenum Disulfide is dry/solid lubricant powder, also known as the MoS<sub>2</sub>, 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 MoS<sub>2</sub>

Since the rise of 2D materials following graphene's discovery, MoS<sub>2</sub> has become the most extensively studied transition metal dichalcogenide (TMD). When reduced from bulk to a single layer, MoS<sub>2</sub> 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 MoS<sub>2</sub> 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: Tuneable 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
	(MoS2) CAS No
	1317-33-5
Colour	Blue- Silver Gray
Appearance	Crystalline Solid
Melting Point	o 1185 C decomposes
Density	-3 5060 Kg.m
Molecular Weight	160.08
Coefficient of Friction (COF)	
Thermal Stability in air	0 0 0 COF<0.1 @600 F (316 C) increases to 0.5 @ 1100 0
	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	0 0 Ambient: from -185 C to 350 C 0 0 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	HOMO / LUMO:
properties	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

MoS2 is available in particle sizes: 90 nm, 1.5 micron, 4.5 micron and 12.5 micron. Larger sizes are possible as custom orders.

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