

Comparison between (MoS2) & (WS2)

Comparison between Molybdenum Disulphide (MoS2) & Tungsten Disulphide (WS2)

Tungsten Disulphide (WS2) is one of the most lubricous materials known to science. With Coefficient of Friction at 0.03, it offers excellent dry lubricity unmatched to any other substance. It can also be used in high temperature and high pressure applications. It offers temperature resistance from -270°C to 650°C in normal atmosphere and from -188°C to 1316°C in Vacuum. Load bearing property of coated film is extremely high at 300,000 psi.

Tungsten Disulphide (WS2) can be used instead of Molybdenum Disulphide (MoS2) and Graphite in almost all applications, and even more. Molybdenum and Tungsten are from same chemical family. Tungsten is heavier and more stable. Molybdenum Disulphide (Also known as Moly Disulphide) till now has been extremely popular due to cheaper price, easier availability and strong and innovative marketing. Tungsten Disulphide is not new chemical and has been around as long as Moly, and is used extensively by NASA, military, aerospace and automotive industry.

Till few years ago, price of Tungsten Disulphide was almost 10 times that of Molybdenum Disulphide. But since then price of Molybdenum Disulphide has doubled every six months. Now the prices of both chemicals are within comparable range. Now, it makes more economic sense to use superior dry lubricant (Tungsten Disulphide) and improve the quality and competitiveness of final product.

Tungsten Disulphide offers excellent lubrication under extreme conditions of Load, Vacuum and Temperature. The properties below show that Tungsten Disulphide offers excellent thermal stability and oxidation resistance at higher temperatures. WS2 has thermal stability advantage of 93°C over MoS2. Coefficient of Friction of WS2 actually reduces at higher loads.

Physical and Technical Properties:

Properties	Tungsten Disulphide (WS2) CAS No 12138-09-9	Molybdenum Disulphide (MoS2) CAS No 1317-33-5
Colour	Silver grey	Blue- Silver grey
Appearance	Crystalline Solid	Crystalline Solid
Melting Point	1250°C, 1260°C (decomposes)	1185°C (decomposes)
Boiling Point	450°C	
Density	7500 Kg.m-3	5060 Kg.m-3
Molecular Weight	248	160.08
Coefficient of Friction (COF)	0.03 Dynamic; 0.07 Static	
Thermal Stability in air	COF <0.1 till 594°C	COF<0.1 @316°C increases to 0.5 @ 594°C
Thermal Stability in argon	COF <0.1 till 815o C	COF increases rapidly starting @ 426°C COF >0.1 @ 482°C
Load bearing ability	400,000 psi for coated film COF:0.044@ 20,000 psi COF reduces to 0.024 between 200,000 to 400,000 psi	250,000 psi
Lubrication Temperature Range	Ambient: from -273°C to 650°C Vacuum(10-14 Torr): from -188°C to 1316°C	Ambient: from -185°C to 350°C Vacuum: from -185°C to 1100°C
Chemical Durability	Inert Substance, Non-Toxic	Inert Substance, Non-Toxic
Magnetism	Non-Magnetic	Non-Magnetic

