

## Hexagonal Boron Nitride (hBN) Powder

Hexagonal Boron Nitride (hBN) is also known as 'White Graphite', has similar (hexagonal) crystal structure as of Graphite. This crystal structure provides excellent lubricating properties. hBN is much superior to Graphite and has following characteristics:

### Physical Properties of Hexagonal Boron Nitride

|  |   |
|--|---|
| CAS Number   | 10043-11-5  |
| Chemical Formula                                     | BN  |
| Crystal Structure                                    | Hexagonal   |
| Color  | White   |
| Density (gm/cm <sup>3</sup> )                        | 2.3   |
| Melting Point  | 3000°C Dissociates  |
| Coefficient of Friction (COF)                        | 0.15 to 0.70  |
| Dielectric Constant (MHz)                            | 4   |
| Dielectric Breakdown strength                        | 35 KV/mm  |
| Youngs Modulus (MPa)                                 | 20-102  |
| Thermal Expansion Coefficient @ 25°C-1000°C          | 1 x 10 <sup>-6</sup> /°C (Parallel to press dir.)<br>4 x 10 <sup>-6</sup> /°C (Perpendicular to press dir.) |
| Thermal Conductivity (at 293 K, directional average) | 0.08 cal/ cm.sec.K  |
| Temperature Stability                                | 1000° C in Air<br>1400° C in Vacuum<br>1800° C in Inert atmosphere  |

- Excellent Lubricating Properties due to low Coefficient of Friction at 0.15 to 0.70
- Good Chemical Inertness
- Electrical Insulator
- Thermal Conductor (result: better heat dissipation)
- High Temperature Stability, 1000° C in Air, 1400° C in Vacuum and 1800° C in Inert gas
- Low Thermal Expansion
- Low Dielectric Constant
- High Load bearing properties
- Non-Wetting: hBN is not wetted by Glasses, Salts and (most) metals, therefore it provides strong resistance to chemical attack
- Easy Machineability (in hot pressed state). Complex shapes can be machined from hot pressed structure.

## Uses of Hexagonal Boron Nitride (hBN)

- hBN powder is used as a lubricant additive and can be dispersed in Lubricating Oil, Grease, Water and Solvents. When mixed with water and binders, it can also be applied as paint (for lubricity coating).
- Due to strong thermal resistance hBN is used as an additive for high temperature lubrication.
- hBN powder can be sprayed (similar to sand blasting) or can be sprinkled on hot surfaces (hot forging dies) to provide dry lubricity. Used in extrusion of Aluminum.
- Electrical Insulators: Due to high dielectric breakdown strength and resistivity, hBN is used as an electrical insulator in electronics as substrate for semiconductors, microwave transparent windows, seals, electrodes and catalyst in fuel cell and batteries. It is used as filler for insulation and heat radiation material.
- Due to Chemical inertness, hBN is used in manufacture of crucibles, boats, molten metal carrier pipes, pumps, thermocouple protection sheaths and lining for reaction vessels.
- hBN being a good thermal conductor, it is used as an additive to various types of heat radiation material.
- Due to high lubricity hBN is used as mold release agent for Plastic Injection and Metal Injection Molds. hBN coating is used in refractory molds for glass forming and Titanium forming.
- Due to Non-Wetting property, hBN is widely used in glass manufacturing process.
- hBN powder can be mixed with ceramics, alloys, resins, plastics, rubbers and other material for self-lubricating properties.
- hBN is also used in manufacture of Cosmetics, Paints, Dental Cements, Pencil Leads etc.
- Due to high temperature stability, hBN is used in many Aeronautic and Space applications.

hBN powders are available in following particle sizes:

**70 nm, 150 nm, 0.5 micron, 1.5 micron, 5 microns to 30 microns**