

## Gilsonite Usage

Gilsonite is mineral Bitumen and its quality is like Petroleum Gilsonite and there is no difference between them. Only Gilsonite is in Lump mode but Petroleum Gilsonite is refinery product from Oil that is in Drum and therefore Gilsonite price is very lower than Petroleum MD approximately lower than half of Gilsonite price.

Gilsonite can mix with petroleum MD like MD 60/ 70 with additives of Mazut ( low quality fuel oil) , or SBS ( styrene butadiene styrene copolymer) for using in Asphalt Industries, Gilsonite factories and Waterproof roofing factories.

Water proof roofing factories normally mixing Gilsonite with SBS ( styrene butadiene styrene copolymer) and then using it in place of Bitumen or oxidized bitumen. When Asphalt companies using Gilsonite their Asphalt will not broke in cold weathers and hot weather it will not melt Very soon.

Gilsonite has different usage in industry as:

1. Gilsonite for road construction and asphalt
2. Gilsonite for roof insulation and isolation
3. Gilsonite for oil drilling as drilling mud
4. Gilsonite for Ink, Paint and Coat
5. Gilsonite is combined with coal to produce coke that has usage in different industries such as foundry sands, glass industry, ...

## INKS & Paint Industry

When you read a newspaper or magazine, you touch the benefits of Gilsonite. The jet black in many heatset printed magazines and high-quality publications simply would not be possible without the excellent carbon black dispersion properties of Gilsonite. Gilsonite delivers economic performance too. It is more cost effective than hydrocarbon and phenolic resins. For premium performance, you can rely on Gilsonite Naturally Better.

## Application Of Gilsonite In Paint Industry

Natural Bitumen or Gilsonite has been used for a long time in the paint industry. This material is used in paints with a bitumen base. The high nitrogen content of Gilsonite increases the adhesiveness and the stability of the Gilsonite against ultraviolet light. This product is mainly used in coating the exterior surface as also creating resistance against acids, it is used as the coating for car chassis and coating of metal structures. Gilsonite has been used as the first wet carbon agent in black inks for newspapers and magazines. High concentrations of Gilsonite have been used in newspaper printing inks. The main usage of this material is for dispersing black carbon particles which comprise the black color of the printing inks. This material is used in black ink as a cost-effective replacement for other resins. Moreover, in wood paintings it is used as dark brown paint. Due to the unique chemical and physical qualities of Gilsonite, it can lend useful characteristics to paints and polishing finishes. The high nitrogen content of Gilsonite increases the adhesiveness and stability against ultraviolet light.

## FOUNDRY

FOR HIGH VALUE IRON CASTINGS, GILSONITE PERFORMS LIKE NO OTHER.

Foundries around the world have known for decades that - when put to the fire of molten iron - Gilsonite brings high performance to your foundry sand. For your complex, high value iron castings, Natural Bitumen performs like no other carbon additive. Gilsonite ' s naturally superior properties mean high-quality castings with better finish and fewer imperfections. Three times as much gas generated as sea coal for better mold release High lustrous carbon for better finish Reductive atmosphere for less reaction between mold and casting for fewer imperfections

## ASPHALT

HIGH-STRENGTH, HIGH-PERFORMANCE ROADS THAT STAND THE TEST OF TIME. High-performance road surfaces have long been made possible with the use of Gilsonite. Gilsonite ' s superior properties make it the go-to modifier for hot mix pavements and pavement sealers.

Gilsonite is used in asphalt mix as an agent for increasing the efficiency and productivity. The asphalt mixed with high content of Gilsonite without adding any other balancing materials so that it becomes a highly solid material. Gilsonite as an additive in total of or portion regarding value and cost can replace SBS polymers in asphalt modifiers. Asphalts modified by Gilsonite have a higher stability, lower shape changes, stability against low temperatures and higher resistance against water compared to asphalts void of Gilsonite. In fact, the main task of Gilsonite in this application is to improve the stability of pavements and their resistance against shape changes which increases the ability to withstand high applied load and it is used in areas under high pressure. There are almost 35 different replacements for Gilsonite, but since their ratios of cost to benefit are higher than Gilsonite ' s,

### **Gilsonite is more often used.**

- High strength and durability
- Superior deformation performance
- Reduced pavement thickness
- Reduced temperature susceptibility
- Increased resistance to water stripping

### Using Gilsonite In Chemical Productions

This material is a non-toxic, non- carcinogenic and cost-effective replacement for natural rubber. Gilsonite is used as a solidifying agent in metal alloys. This material has a high carbon percentage which creates a reductive environment when added to melted steel. In shaping metals, Gilsonite is again used as a solidifying agent. Moreover, compared to other polymers, Gilsonite produces less smoke in high temperatures. Gilsonite as a solidifying and mixing material is used in steel desulfurization process. This material has volatile ingredients which facilitate the mixing of desulfurization chemical materials such as magnesium and hydrated lime. Moreover, it increases the percentage of the carbon added to steel and as soon as oxidation happens in high temperature, it creates a reductive environment. In manufacturing of products such as clutch plates and brake parts is used using Gilsonite which is basically as a solidifying agent. This material is also used as an additive for increasing paint,s shade and in some cases for reducing friction. Furthermore, Gilsonite is used as insulated coatings for pipes. This material is a non-toxic gum with excellent adhesiveness. Anti-corrosion coatings which are chemically

can be produced from Gilsonite. In the wood and carpentry industry, Gilsonite is used as a solidifying agent (glue). This material is water proof and corrosion resistant. Since Gilsonite is a very hard resin, it produces very hard products. This material is also used in making paints and because of its chemical properties it penetrates the surface of the objects which should be glued together. Moreover, a sticky material is produced from Gilsonite which is resistant against the destructing effects of ultraviolet light.

### **ABOUT GILSONITE (MD)**

Gilsonite, or MD or Natural Asphalt , Natural Bitumen is a natural, resinous hydrocarbon This natural asphalt is similar to a hard petroleum asphalt and is often called a natural asphalt, asphaltite, uintaite, or asphaltum. Gilsonite is soluble in aromatic and aliphatic solvents, as well as petroleum asphalt. Due to its unique compatibility, gilsonite is frequently used to harden softer petroleum products. Gilsonite in mass is a shiny, black substance similar in appearance to the mineral obsidian. It is brittle and can be easily crushed into a dark brown powder. MD is found below the earth's surface in vertical veins or seams that are generally between two and six feet in width, but can be as wide as 28 feet. Due to the narrow mining face, Gilsonite is mined today, much like it was 50 or 100 years ago. The primary difference is that modern miners use pneumatic chipping hammers and mechanical hoists.

Gilsonite Consumption Usage Gilsonite is used in the manufacture of wire insulation, paints and varnishes, construction materials, asphalt, printing ink, oil well drilling , drilling Fluid and in foundry casting.

Gilsonite is a geologically interesting and economically significant resource, and its wide range of uses has changed over time with new technology and industrial needs. Drilling fluids For many years, Gilsonite has been used in the oilfield as an additive in drilling fluids.

Gilsonite ' s unique properties make it important for many oil field drilling fluid products and the recent boom in oil and gas development has increased demand. When gilsonite is added to oil- and water-based drilling fluids, it partially melts or deforms, plugging off micro-fractures in the rock and smearing the inside of the well bore to make a tight, tough filter cake that prevents fluid loss. The dissolved gilsonite also increases drilling fluid viscosity, providing lubrication, and together with the sealing off and stabilization of problem rock around the well bore, helps prevent the drill pipe from getting stuck in the well. Gilsonite is also used in cementing fluids as a lost-circulation material due to its plugging and binding properties, and as a slurry density reducer in some specialty cementing Fluid.

### **CHEMICAL & OTHER**

Gilsonite is used as a binder and additive in steel desulfurization products. It has consistent volatiles that promote mixing of the other desulfurization chemicals like magnesium and hydrated lime. It will also add carbon content to the steel and will provide a reductive atmosphere as it oxidizes at high temperatures. Gilsonite is used to make waterproof coatings for water pipes. It is a natural non-toxic resin with excellent adhesion properties. A corrosion-resistant, chemically inert pipe coating can also be made from Gilsonite.

Natural Bitumen combines with many other chemicals and materials that take advantage of its unique physical and chemical properties. Binder and coating applications in metallurgical, wood product, refractory and other industries further demonstrate the versatility and usefulness of this remarkable material.

## CONSTRUCTION & ROAD PAVING

Asphalt producers use Gilsonite resin, road paving engineers and paving contractors who are concerned with PG specifications, high performance and cost effectiveness. Gilsonite, long known as a bitumen reinforce and hardening agent, also offers a unique combination of high performance and economical for high stress paving, as well as preservation applications. A significant benefit of Gilsonite is in producing

road pavement mixes of higher stability than conventional ones.

Various properties of asphalt are manipulated to produce a product that has the appropriate wear properties, rut resistance, fatigue and low temperature cracking resistance, adhesion strength, viscosity and pour point. Rut resistance is resistance to longitudinal surface depressions in the wheel paths. Adhesion strength is the maximum adhesion strength of the joint sealant and the joint reservoir, including but not limited to, between the aggregate and the binder. Shove resistance is resistance to permanent, longitudinal displacement of a localized area of the pavement surface caused by traffic pushing against the pavement. Heavy hydrocarbon that can be derived from, without limitation, natural asphalt (Gilsonite), shale asphalt, bottoms from a solvent DE Asphalting process, hard asphalt, blown asphalt, stiff refined asphalt and flux.

It is generally regarded that Gilsonite reduces pavements' low temperature properties making them susceptible to thermal cracking. Gilsonite melted into hot asphalt will reduce penetration and increase viscosity of the asphalt binder. Gilsonite may also be mixed with aggregate prior to combining with the asphalt binder. Gilsonite-modified asphalt pavements have been particularly successfully in highly stressed traffic areas.

## Advantages:

- Improved resistance to deformation
- Improved the economic performance of the road
- Improved resistance to stripping
- Improved resistance to fatigue
- Improved durability
- Compensation for poor mixes design
- Compensation for poor aggregates

## MD IN FOUNDRY

Gilsonite is combined with coal and other ingredients as an additive in foundry sands to insure the quality of the molded part. The lower gas evolution should reduce ventilation load on the pouring floor. The physical property relationships developed in new sand mixes were confirmed by sand using Gilsonite as an additive. Casting finish of a Gilsonite mix has been equal to sea coal.

Gilsonite is also used as a carbonated additive in casting sands that creates smoother plates on gray iron castings. In a lower temperature than coal, it makes the material volatile so that it improves the process of separating the metal from the mold.

Moreover, the surface of the mold is smoother and cleaner. Gilsonite can be used as an additive to or a replacement to sea coal or other common carbonated additives in foundry. One of the great advantages of using Gilsonite on sand mold is increasing the hot resistance, increasing the pure (dry) resistance, decreasing the penetration and increasing the hardness of the mold. Physical Sand properties with Gilsonite resin are equal or superior to sea coal at significantly lower additive levels. Gilsonite improves sand density, water requirements and strength (green, dry, baked, and hot). Gas evolution curves show that Gilsonite volatilizes more rapidly than sea coal. Gilsonite has the same total volatiles as sea coal at one-third the additive level. During pouring, the gases given off from the carbonaceous additives form a gaseous film which prevents the molten metal from making direct contact with the clay-coated sand grains, reducing sand-metal contact and consequently burn-on. When heated, the carbonaceous materials provide volatile, hydrocarbon gases which then pyrolyse to deposit a lustrous carbon graphitic layer in the metal-mold interface region. This deposition acts as a physical barrier to iron silicate formation as well as

not being readily wetted by molten iron. The combination effect is to inhibit burn-on and penetration.

### **Gilsonite will**

- Reduce imperfections due to the rapid reactions
- Improve sand peel from casting at shakeout
- Produce smoother, cleaner casting surface
- Minimize imperfections, casting losses, scrap

### **Gilsonite has**

- Three times as much gas generated as sea coal for better mold release
- High lustrous carbon for better finish
- Reductive atmosphere for less reaction between mold & casting for fewer imperfections

## **INKS AND PAINTS**

Gilsonite has been used for in the paint industry for a decent amount of time. This material is used in paints with a bitumen base. The high nitrogen content of Gilsonite increases the adhesiveness and the stability of the Gilsonite against ultraviolet (UV) light. This product is mainly used in coating the exterior surface as also creating resistance against acids, it is used as the coating for car chassis and coating of metal structures. Gilsonite has been used as the first wet carbon agent in black inks for newspapers and magazines. High concentrations of Gilsonite have been used in newspaper printing inks. The main usage of this material is for dispersing black carbon particles that comprise the black color of the printing inks. This material is used in black ink as a cost-effective replacement for other resins. Moreover, in wood paintings it is used as dark brown paint. Due to the unique chemical and physical qualities of Gilsonite, it can lend useful characteristics to paints and polishing finishes. Gilsonite powder is readily soluble without heating in aromatic solvents (Benzene, Toluene, Xylene) and in most chlorinated solvents. It is also soluble without heating in aliphatic and low aromatic solvents (VM&P and other Naphtha, Ink Oils and Mineral Spirits), but mixing time is longer. Without heating, the pulverized grade is recommended. In paint applications, Gilsonite is usually used in

combination with bitumen (asphalt). In most cases, if Gilsonite is used alone, the final paint will be very hard and brittle after drying.

If normal straight-run bitumen is used alone, the finished paint is too soft and tacky. Therefore, a combination of Gilsonite and bitumen is used to achieve the desired hardness (penetration) and drying time of the finished paint. In addition to imparting hardness to the paint, Gilsonite is also increasing the paint's: (1) adhesion; (2) gloss; (3) chemical resistance; (4) water resistance; and (5) body. For hardness, Gilsonite has a zero (0) penetration (at 25°C; 100 gm. 5 sec.) compared to the 60-70 pen, 80-100 pen or softer bitumen commonly available from petroleum companies or asphalt manufacturers.

### **Gilsonite is recommended to be used in**

- Underground Pipelines & Undercarriage
- Storage Tanks
- Barrels
- Automotive

### **Chemical Properties of Natural Asphalt**

Gilsonite is included in a class of solid bitumen known as asphaltites. Gilsonite deposits are located in eastern Utah in the United States. They are different from other asphaltites because of their:

- high asphaltene content
- high solubility in organic solvents
- high purity and consistent properties
- high molecular weight

Gilsonite is available in different grades categorized by softening point. Softening point is used as an approximate guide to melt viscosity and behavior in solution.

### **Solubility:**

Gilsonite is soluble in aliphatic, aromatic and chlorinated hydrocarbon solvents. It has limited solubility in most ketones, but is soluble in mixed aromatic solvents that contain a ketone component. Gilsonite is not soluble in water, alcohols, or acetone.

### **Molecular Structure:**

A variety of sophisticated analytical tests have been run on Gilsonite from the Uintah Basin to characterize its unique properties. For reference, the test methods include vacuum thermal gravimetric analysis (TGA), nuclear magnetic resonance (NMR), Fourier transform infrared spectrometry (FTIR), vapor pressure osometry (VPO), high performance liquid chromatography (HPLC), rapid capillary gas chromatography (RCAP), and several fractionation techniques. H/C ratios and NMR analysis indicate the presence of a significant aromatic fraction. Most of the aromatics exist in stable, conjugated systems, probably porphyrin-like structures that relate to the geologic source of the product. The remainder of the product consists of long, paraffinic chains. A very unique feature of Gilsonite is its high nitrogen content, which is present mainly as pyrrole, pyridine, and amide functional groups. Phenolic and carbonyl groups are also present. The low oxygen content relative to nitrogen suggests that much of the nitrogen has basic functionality. This probably accounts for Gilsonite's special surface wetting properties and resistance to

free radical oxidation. The average molecular weight of Gilsonite is about 3000. This is very high relative to other asphalt products and to most synthetic resins. This may relate to Gilsonite's "semi-polymeric" behavior when used as a modifying resin in polymeric and elastomeric systems. There is some reactive potential in Gilsonite. Crosslinking and addition type reactions have been observed. Gilsonite is known to react with formaldehyde compounds under certain conditions. Gilsonite Compatibility Gilsonite ( Natural Bitumen) is compatible with Microcrystalline and Paraffin Waxes, Petroleum Resins and Oils, Rosins, Tall Oil Pitch, Vegetable Oils (Linseed, Soya, etc.), Petroleum Process Oils, and Petroleum Asphalts.