Differences between Gilsonite and ER 125 Resin: the ER Resin Manufacturing Process

Gilsonite Resin is composed of a wide variety of different types of hydrocarbon molecules. They may be characterized into two major categories, aliphatics and aromatics. Gilsonite contains approximately 45% to 50% of each.

Aliphatics are those hydrocarbons which have the carbon atoms bonded to each other in single bonds. Usually, aliphatics are drawn with the carbon atoms in straight chains with the hydrogen atoms branching off from them sideways. In Gilsonite, the aliphatic hydrocarbons have lower softening points and lower molecular weights.

Aliphatic hydrocarbons dissolve in the weak, aliphatic solvents (mineral oil, ink oil, white spirits) commonly used to make offset printing inks. When they are dissolved in aliphatic solutions, they yield low initial viscosities and stable solution viscosities over time. In general, aliphatic hydrocarbons are the most useful piece of the Gilsonite when making offset inks with weak, aliphatic solvents.

Aromatic hydrocarbons are ring structures with the carbon atoms attached to each other in rings with an alternating single bond-double bond pattern. They have higher softening points and higher molecular weights. Aromatic hydrocarbons dissolve in aromatic solvents (toluene, xylene) used to make liquid, gravure printing inks. Aromatics do not dissolve in weak, aliphatic solvents used for offset inks. They only disperse. After time, these dispersed aromatics rejoin, or agglomerate, and increase the viscosity of the varnish. This is a disadvantage for Gilsonite in offset ink making.

Because Gilsonite is a naturally occurring substance, it contains a small amount of ash or grit that was included in the material years ago when it was originally formed. In inkmaking, it is required that this ash either gets filtered, centrifuged, or settled out of the varnish. Gilsonite also contains a small percentage of "light oils," lightweight molecules that evaporate easily and give Gilsonite its characteristic smell.

In general, the most valuable piece of the Gilsonite in offset ink manufacture is the aliphatic hydrocarbon portion. All of the other parts cause problems in some way and they must be dealt with. The aromatics don't truly dissolve and they yield high viscosities and viscosity increases over time. The ash must be filtered out of the varnish so it won't scratch the printing plates or blankets and the light oils smell.

Gilsonite is used in ink manufacture principally as a carbon black dispersing agent or wetting agent. It performs this function at concentrations of 2% to 5% of the finished ink recipe.

Gilsonite itself is a hard, high softening point resin, and it could be used in the finished ink formula for its resinous abilities to offset the hydrocarbon and other resins. However, this requires a concentration on 10% to 15% Gilsonite in the finished ink recipe before it performs this function. This is possible, but difficult, because of dealing with Gilsonite's ash and aromatic contents at such high concentrations. At such high concentrations, there is too much as to filter, the viscosities start too high and increase even higher, etc. Therefore, most inkmakers use Gilsonite at low concentrations for carbon black dispersing only and use other resins such as "C5/C9" hydrocarbons or modified rosin phenolics for the ink's resinous ingredients.

American Gilsonite Company (AGC) has recognized the benefits and disadvantages of Gilsonite in printing ink manufacture. Accordingly, a solvent-extraction facility to create a new resin from Gilsonite, called Environmental Resin ER-125, was built in the early 1990s. Essentially, ER-125 Resin selects the most useful, aliphatic portion of the Gilsonite for offset inkmaking and eliminates the rest.

In AGC's ER Manufacturing Plant, the Gilsonite is mixed into a weak, heptane solvent that is capable of dissolving only the aliphatic portion of the Gilsonite. The solution is then centrifuged to separate the aliphatic-containing portion (ER Resin) from the aromatics and the ash content (called IR Resin). Then heptane is then evaporated form the separate solutions; the light oils are removed via steam; and the newly separated resins are each flaked out on flaker belts.

ER-125 Resin is sold to the printing ink industry. IR Resin is sold to the oil well drilling and road construction industries.

ER-125 Resin's aliphatic content is about 97%. When compared to the original Gilsonite, ER's molecular weight has been reduced from 3500 to 1000 and its softening point has been reduced from 175°C to 125°C. ER-125's ash content is 0.05% maximum. Moisture content is essentially zero. In addition, dust has greatly been reduced because ER Resin is delivered in flakes rather than in dusty, granular form. The Quality Control procedures for ER Resin closely monitor its solution viscosity, 50% solids on Magie 52 Oil (aromatic free), to be within 5,000 cp and 15,000 cp.

With this process, American Gilsonite Company has created a resin that has all of the carbon black dispersing advantages of Gilsonite but none of the Gilsonite disadvantages of high viscosity, viscosity increases, ash content or smell. ER-125 may be used in high concentrations, 15% and above, to replace the hydrocarbon phenolic and alkyd resin portions of most offset ink recipes. Sample formulations show how ER-125 Resin may completely eliminate these other resins yielding a high performance ink at significant cost savings to the inkmaker.

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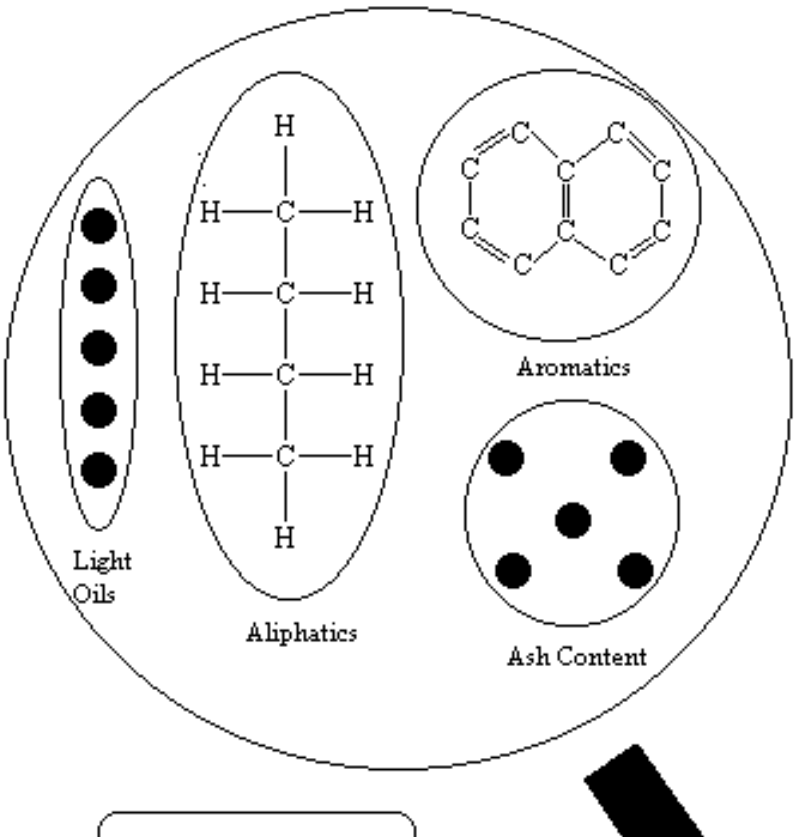

GILSONITE RESIN

Gilsonite Characteristics	
Molecular Weight	3500
Softening Point	350 F, 175 C
Ash Content	0.5%
Moisture Content	0.7%

ER 125 Resin Manufacturing Process

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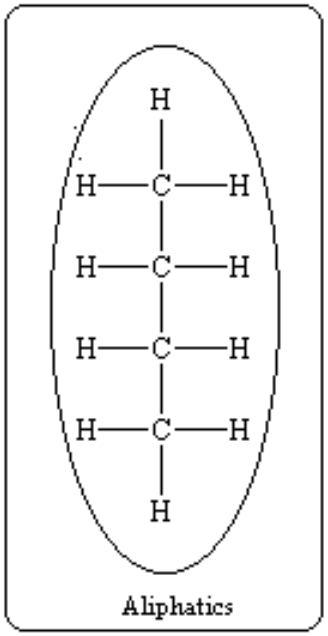
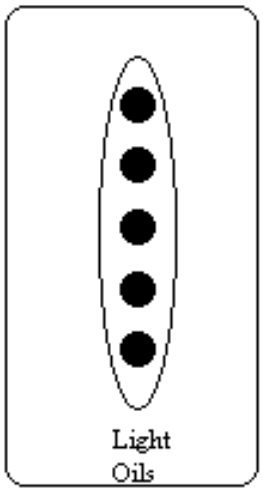
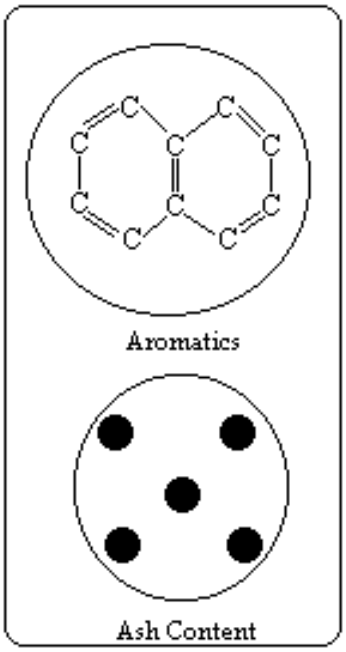


ER 125 Resin



Gilsonite Oil



IR 200 Resin

ER-125 Resin Characteristics

Molecular Weight	1000
Moisture Content	0%
Ash Content	<0.1%
Softening Point	247 - 258 F
	120 - 125 C
Viscosity	5000 - 15,000 cP
(50% solids solution in Magie 52 Oil)	