

The following are the manufacturing procedures for leaded zinc, zinc sulfide, and zinc sulfate, which you have requested.

Leaded Zinc

Ozlo leaded zinc pigments are manufactured from the highest grade lead and zinc ores available.

As these ores come from the mines, they first undergo a crushing operation. They are then concentrated either by oil flotation, in jigs, on shaking tables or by electrostatic separation.

The clean concentrates, upon arrival at the plant are sampled for chemical analysis and segregated in storage bins according to their zinc or lead content. The zinc sulfide ores from this district, called zinc blends, assay about 60% of zinc and 1% of lead, while the lead sulfide ores, known as galena, assay, on an average, 80% of lead and 1% of zinc. The remaining portion of these ores consists mainly of the sulfur with which the metals are combined.

The next step is one of roasting the zinc ores, a sort of refining process, having, as its purpose, the removal of the sulfur content. This sulfur is driven off at a red heat in huge, automatically operated roasters leaving the zinc in the form of the oxide.

The lead sulfide (galena) ores are not given this roasting. The sulfur content of these is ultimately oxidized to the basic sulfate in the furnace operations described below. It is in this furnace processing that the finished pigment is made.

In preparing the furnace charge or mix the proper blending of the lead ores with the roasted zinc ores and these in turn with the other ingredients of the charge, such as chatts, coal, and flux, is of very great importance. Upon it depends the ratio of zinc oxide to basic lead sulfate in the finished pigment. Likewise the color and other important qualities of the final product are largely determined at this point.

From the mixers the charge is fed to the furnaces and ignited. The intense heat from the burning of the coal causes various chemical reactions to take place and as a result lead and zinc vapors are formed which rise from the charge to enter what is known as the combustion chamber. Here the vapors, burned by the admittance of air, form rolling white clouds of the very finely divided basic lead sulfate and zinc oxide particles which together constitute Ozlo Leaded Zinc.

The lead and zinc components fumed together, as they are, become bonded in a form highly desirable, especially from a standpoint of durability.

As the pigment passes from the concentration chamber it is conducted, in a steady stream of floating particles, through long cooling lines to the collecting system. Here it is caused to enter cotton bags standing upright over hoppers. The pigment particles are retained on the inner walls of the bags while the furnace gases pass out thru the meshes of the cloth. At regular intervals the bags are shaken, causing the pigment to fall to the hoppers below from which it is drawn and filled into bags for shipping.

The following table lists the uses and characteristics of Zinc Oxide Pigments.

Grade	Ratio (Zinc Oxide to Specific Residue Basic Lead Sulfate)	Gravity	Average on 325 Mesh	Oil Absorption
				Gardner-Coleman Method (gms. Oil per 100 gms. Pigment)
412	65/35	5.92	0.025%	17.0 - 19.0
1526	60/40	5.94	0.025%	16.0 - 18.0
<u>Uses</u>				
412				Paints
1526				Paints

Zinc Sulfide

When the water solution of a zinc salt is mixed with the water solution of a sulfide a chemical reaction takes place which results in the precipitation of zinc sulfide as a very finely divided white solid. It is by this precipitation process, from highly purified solutions, that zinc sulfide is given its first form in this plant.

The "crude" zinc sulfide thus produced is then carefully washed free of the reaction liquor. This is followed by drying preparatory to calcination.

The purpose of the calcining operation is one of altering the physical characteristics in such a way as to best develop whiteness of color, high opacity, proper oil absorption and desirable texture. This is accomplished by careful heating under highly controlled atmospheric conditions followed by water quenching.

Lumps of pigment formed by these operations are completely broken up by wet milling leaving the zinc sulfide particles very finely divided in water suspension.

The next step is the removal of the bulk of the water by filtration. Following this, the pigment is carefully dried at low temperatures, thoroughly disintegrated and packed into bags ready for shipment.

Below are given characteristics and uses of our Zinc Sulfide Pigment.

<u>Grade</u>	<u>Gravity</u>	<u>on 325 Mesh</u>	Oil Absorption
			Gardner-Coleman Method (gm Oil per 100 gms. Pigment)
"A"	4.00	Max. - 0.3%	28.0 - 30.0

Uses

Pigment in - Paints, Oil Cloths, Linoleum, Leather, In the manufacture of white and opaque glass.

Zinc Sulfate

Zinc Sulfate, also known as white vitriol, is manufactured at Coffeyville from the same, prime quality, zinc sulfide ores as are used in making Ohio Leaded Zinc Pigments.

As the zinc, in this instance, is extracted by a leaching process it is highly desirable that the ore be reduced to as small a particle size, as is practical, in keeping with other conditions. This is accomplished by a grinding and screening operation. The ground ore is then roasted in much the same manner and to the same end as is the zinc ore which is taken for use in the manufacture of leaded zinc pigment.

This roasted ore is subsequently filled into suitably designed leaching tanks where it is treated with dilute sulfuric acid. The acid reacts chemically with the zinc oxide in the roasted ore resulting in the making of a dilute zinc sulfate solution. Since just enough sulfuric acid is used with a batch of ore to react with the zinc oxide present, the leaching process ends at a point where both acid and oxide are entirely used up.

The zinc sulfate solution is clarified by settling and filtering. It is then pumped through a purifying system where any traces of soluble impurities are carefully removed.

The purified liquor is then run into evaporating tanks where the excess water is driven off by heating. The resulting, concentrated solution is either run off into crystallizing pans where that grade of solid zinc sulfate, containing five moles of water and 25% of zinc, is obtained by crystallization, or it is subjected to high temperatures in a dehydration process to produce the one mole salt which contains 36% of zinc.

Finally, both grades are ground, screened and packed into bags or barrels, ready for the trade.

In the table, which follows, the uses and characteristics of these two grades of zinc sulfate are given.

<u>Grade</u>	<u>Zinc Metal Content</u>	<u>Fineness</u>
One Mole	36%	Thru 7 Mesh
Five Mole	25 $\frac{1}{2}$ %	Thru 7 Mesh

Uses of Zinc Sulfate

Manufacture of lithopone.
Mordant in printing and dyeing.
Agent in removal of sulfur compounds from gasoline.
Preservative and clarifying agent for glue solutions.
In the chemical industry as a precipitant of contaminating sulfides
in certain processes.
Preservative of wood and skins.
Agent in the treating of soils.
Disinfectant.
Differential flotation of minerals.
Rayon manufacture.

Yours very truly,

CEP:RK