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Re: Zinc Oxide Expiration, Stability and Shelf Life Statement

Zinc oxide (ZnO) expiration is 12 months from date of manufacturing (DOM) for ≥ 8.0 m²/g surface area, rubber applications, and product stored under roof only. Expiration is 18 months from DOM for < 8 m²/g and other applications. Stability studies with simulated factory wrapped package units support the 12 or 18 mo. expiration. Zochem warrants the zinc oxide product to pass testing for characteristics listed on the Certificate of Analysis within its expiration date, subject to the material handling and transportation limitations listed below. Zochem does not warrant material handling or application processing.

ZnO processing ability depends on storage and handling after product leaves the manufacture. If stored in $> 65\%$ RH (relative humidity), or after a factory stretch-wrapped pallet unit is opened up, bags should be used within six months. Open bags should be used within a month after opening. Product may settle when stored over 6 months causing clumping agglomerates. Processes sensitive to clumping should pre-screen product before use.

ZnO slowly degrades to zinc carbonate (ZnCO₃) by reacting with carbon dioxide (CO₂) in ambient air. Degradation is accelerated by moisture, which exists with higher m²/g surface area, higher humidity storage, product exposure to air, or product or packaging becoming damp. Significantly degraded product may have increased hard particulates, decreased ZnO assay, increased LOI, and reduced m²/g. Carbonation is not homogenous and Zochem does not offer or support retesting to extend expiration. A Loss on Ignition (LOI) test $> 500^{\circ}\text{C}$ is a leading indicator of carbonation. LOI passing per USP monograph and other standard is 1.0% max wt. loss. However, rubber is particularly sensitive to hard white particulates and rubber applications may have dispersion problems with a lower LOI testing result.

Kraft paper bags provide less air and humidity protection than FIBC's or fiber drum with plastic bag liner packaging. Customers who require greater product storage protection should use 2000 lb net wt. polypropylene FIBC sacks or fiber drum (with inner plastic bag liner), in lieu of Kraft paper bags.

Regards,

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