MARCUS OIL & CHEMICAL

Marcus Wax Applications in Plastic Additive

Use of Marcus waxes for dispersing color and other additives in plastics

MARCUS WAX IN PLASTIC CONCENTRATESADDITIVES

Prduction of plastic additives and colorants usually results in formation of small agglomerates that must be broken down and dispersed in plastics to maximize their effectiveness. Dispersing additives directly into viscous base resins is not efficient and may result in overworking the resin or necessitate greater addition of the additive.

Handling issues also exist with many additives and colorants. Dusting, cross contamination and possible inhalation are some of the difficulties in dealing directly with powdered additives and colorants.

For these reasons additives and colorants are often supplied in a wax and resin system called an additive or color concentrate

Plastic additive concentrates using Marcus Polyethylene waxes provide numerous benefits including:

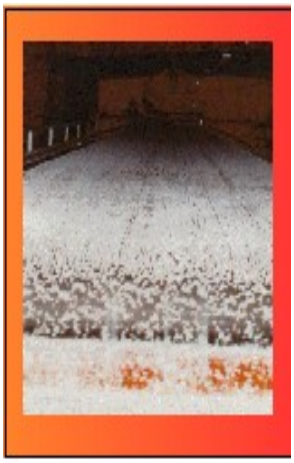
- Reduced additive use due to better dispersion
- Ease of handling additives vs a powder or liquid form
- More uniform and consistent color generation due to repeatable dispersion efficiency
- Improved polymer flow properties and greater thermal stability due to the lubricating properties of the Marcus Wax

Marcus Polyethylene Waxes are low molecular weight polymers with very low viscosities that help wet out and disperse many plastic additives and colorants. Additionally Marcus Polyethylene Wax can aid in processing resins due to its excellent lubricating and release properties.

Once properly dispersed in the wax/binder matrix the particles remain suspended and are prevented from re-agglomerating.

Marcus Polyethylene Waxes can be used with many organic and inorganic additives and colorants to produce high quality concentrates.

Marcus Polyethylene waxes are compatible with many base resins including olefin polymers such as polyethylene and poly propylene. Best results are usually achieved with the use of a Marcus Homopolymer wax such as M300 or M500. Both M300 and M500 have very low viscosity and relatively sharp melting points around 116° C.



Concentrates typically include three components:

- **Additive or colorant**
- **Resin / binder**
- **Wax**

Typical Marcus Wax addition levels in the concentrate can range from 5-25% and more commonly <10% depending on which mixing process is employed. Let down levels into the base resin system range from 1-5% resulting in a final wax content of 0.1--0.5%. This level is usually not significant in terms of effecting the physical properties of the base resin.

Pigment loadings can be as high as 60% for inorganic and 25-50% for organics and carbon black

The resin / binder used in the concentrate should be compatible with the base resin and helps build shear in mixing equipment and add strength for processing of the concentrate

Compounding of colorants and other additives can use one of the following production techniques:

- **Milling-** utilizing a two roll mill. Requires controlled rheology allowing for high shear . Processing times tend to be longer than other methods.
- **High Intensity Mixing**- heat generated in this process melts the wax which wets out the colorant/additive. This process usually utilizes single or twin screw extruders, the latter generally requiring less wax be used.

  A variation of this method is referred to as flushing where wax is melted and combined with press cake. The wax displaces the water and wets out the colorant/additive particles
- **Internal (Banbury) mixing**- where all ingredients are processed under high shear followed by sheeting, dicing and extruding for strand granulation
- **Continuous internal mixing**- a continuous variation of internal mixing utilizing a Buss or Farrel mixer for large scale production.

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