

Slip Agent Masterbatch

Introduction

Polyolefin films tend to adhere to themselves (film-to-film) and metal surfaces (film-to-metal) due to their high coefficient of friction (COF). For easy processing, polyolefin films need around 0.2 COF.

Slip agent masterbatches are able to modify the surface properties of a film and thus lower the friction between film layers and other surfaces. To be effective the slip needs to migrate out of the polymer to the surface and therefore it must have a degree of incompatibility with the polymer.

Product Benefits

- Improve the flow characteristics of plastics during processing
- Reduce the frictional resistance of end product surfaces
- Enhance both appearance and function
- Can be used together with other additive masterbatches such as anti-blocking, antistatic and heat stabilizer masterbatches

Slip Agents

As slip agents, fatty acid amides (Oleamide, Erucamide and Stearamide) are normally used. During processing they are solubilized in the amorphous melt, but as the polymer cools and crystallizes the fatty acid amides are squeezed out forming a lubricating layer at the polymer surface. The addition of slip agents can prevent film sticking and pulling helping to increase throughput.

- Types and Chemical Formula

Type	Chemical Formula	Melting Point °C
Oleamide	$\text{CH}_3(\text{CH}_2)_7 - \text{CH} = \text{CH} - (\text{CH}_2)_7 - \text{CONH}_2$	66 ~ 72
Erucamide	$\text{CH}_3(\text{CH}_2)_7 - \text{CH} = \text{CH} - (\text{CH}_2)_{11} - \text{CONH}_2$	79 ~ 85
Stearamide	$\text{CH}_3(\text{CH}_2)_{14\sim 16} - \text{CONH}_2$	98 ~ 104

- Oleamide migrates quicker than Erucamide (fast blooming). So, it is generally used where a low COF is needed in a short period of time
- After some period of time, the slower Erucamide will provide films with a lower COF than Oleamide. Due to its lower vapor pressure and volatility, Erucamide is used in higher temperature processing applications, it also stays at the surface longer, not venting off as smoke.
- Stearamide is often used together with Erucamide or Oleamide to provide an anti-blocking effect when film transparency is very important.

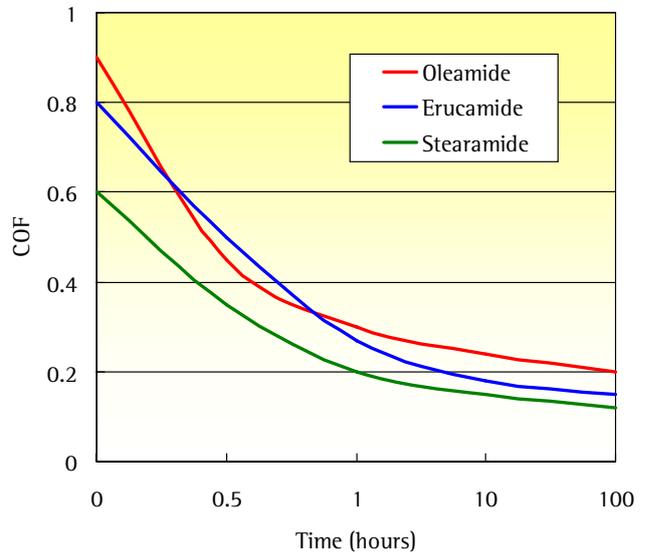


Figure: The effectiveness of slip agents in LDPE film

Composition

- Additive: High purity ERUCAMIDE (Long-term), OLEAMIDE (Short-term)
- Carrier Resins: Polypropylene / Polyethylene

Applications

- Polyolefin Casting and Blown films

Recommended Dosage Rate

- Up to 4 wt%

Because processability and quality of applications are depended on processing conditions (temperature, pressure, speed, etc.) and applied resins, the optimum dosage rate must be determined by pre-test.