Ingenia Flexible Packaging Brief

Antiblock MBs – what are they and why are they used?

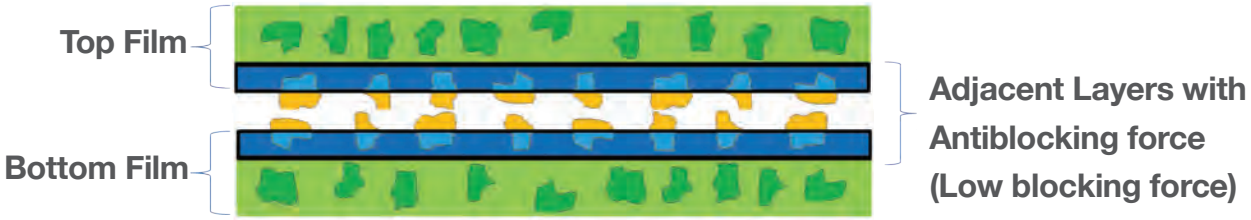
Blocking is the term used to describe the adhesion between adjacent layers of films due to presence of Van der Waal's interactions, specifically between the amorphous regions of polymer. This occurs in tightly wound rolls of film and increases in the presence of heat and pressure. An example of blocking is the sticking together of the thin plastic bags in the produce section in the grocery stores. To prevent this phenomenon of blocking, antiblocking agents are used. The common antiblocking agents used in Polyolefin films are Diatomaceous Earth (Natural silica), synthetic silica, talc and nepheline syenite. Calcium carbonate is also used as an antiblocking agent when clarity is not an issue.

Antiblocking agents are incorporated into the films through masterbatches. The minerals (antiblocking agents) form microscopic bumps on the surface of the film, thereby creating space between the adjacent layers, facilitating the easy separation of the films. Use of antiblocking agents also reduces the Coefficient of Friction. Antiblocking agents are synergistic with slip agents used to reduce the CoF.

Figure 1. The Blocking Phenomenom

The adjacent layers of film on a roll create highly attractive Van Der Waals forces which causes one layer of film to stick to the next.

Figure 2. Antiblocking Agents Preventing Blocking of Films



The presence of antiblocking agent makes the surface of the film bumpy which ensures a reduction in the area of contact and allows for easy separation of the films.

Factors to consider in selection of antiblocks are:

- Refractive index of the mineral – the refractive index of the mineral should be as close to the refractive index of the polyethylene/plastic matrix as possible to prevent haze and give good clarity.
- Particle size – an optimum particle size has to be selected to provide good antiblocking properties.
- Particle size distribution – the finer fractions impart haziness to the film.
- Morphology of the mineral- platy minerals will be less effective antiblocking agents.

The amount of antiblock to be introduced depends on the host resin; for example, metallocene catalyzed polyethylene requires up to 50% more antiblock than a traditional linear low density polyethylene film, to achieve the same level of blocking reduction.

The standard method for testing blocking between layers of plastic film is ASTM 3354-89. The force necessary to separate two layers of film after conditioning at a controlled temperature is measured. The lower the force, the more efficient the anti-blocking agent.

Antiblocking agents have to be carefully selected as they impart haze to the film. Haziness of the film obscures the view of the product inside the flexible packaging, preventing consumers from being able to see their favorite brands' product. The haze is measured using a spectrophotometer. It is the measurement used to quantify the degree of cloudiness of a transparent film. The other critical optical property that is measured is the gloss of the film. A gloss meter is used to measure the decrease in the gloss of the film, upon incorporation of the mineral. Minimizing loss of gloss allows for a better view of the product inside the package by the consumer.

In Summary

Blocking of films is a well known phenomenon in the film industry. The use of antiblock agents can effectively remedy this concern. Finding the right product with the best blend of properties for a particular application can be difficult. With a wide range of products and the tools and experience to determine the best product and loading to provide the target film properties, the technical support team at Ingenia is ready to assist.