

Raw Materials

Plastic raw materials such as polypropylen (PP), polyethylene (PE) and polycarbonate (PC) are usually supplied as colorless granular bulk goods. In order to guarantee consistent color, gloss and transparency of the final product, a routine quality control system needs to be established at the very first production step. Otherwise the phrase "garbage in – garbage out" may become reality. As granular plastic pellets are of irregular shape, the key for repeatable measurement results is a standardized sample preparation.



For quick and efficient quality control, it is necessary to mold the plastic pellets into plaques with a homogenous surface and defined thickness. The plaques can then be measured in reflection mode by the spectro2guide, a portable color spectrophotometer, which automatically calculates the yellowness index according to international standards. As the yellowness index is just a one-dimensional number, it sometimes does not completely describe the visual perception. Very often samples show additionally a significant difference in hue and lightness. Therefore, a three dimensional description of color using the commonly available CIELab color system is recommended. Within this system, the b^* value can be used as an indicator for yellowness.

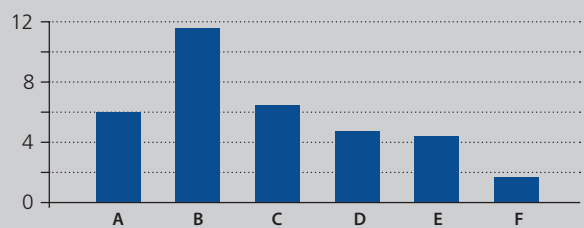
The basis for any plastic material is mineral oil which undergoes several fractionating steps to finally end up as straight-run gasoline (naphtha) which is then cracked and polymerized into different plastic resins. Dependent on the selection of the raw materials, the manufacturing process and the additives, different properties of the final plastic material can be achieved.

The molded plaques are usually not completely opaque. Thus, the background when taking the color readings has a crucial impact on measurement results. To achieve the best discrimination between different products a white backing material is recommended. The material should be long-term stable and agreed upon between the involved parties.

Consistent color

Plastic raw materials such as PP, which is often used for colored end-use applications, must be controlled for degree of yellowness. If the resin is not "white", the final color will be off specification. The degree of yellowness is influenced by contamination or impurities of the raw materials as well as process variations (e.g. temperature, amount of catalysts).

Yellowness of PE Pellets (YI E313)



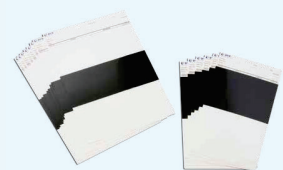
BYK-Gardner Solution



Solid Color & Gloss
spectro2guide



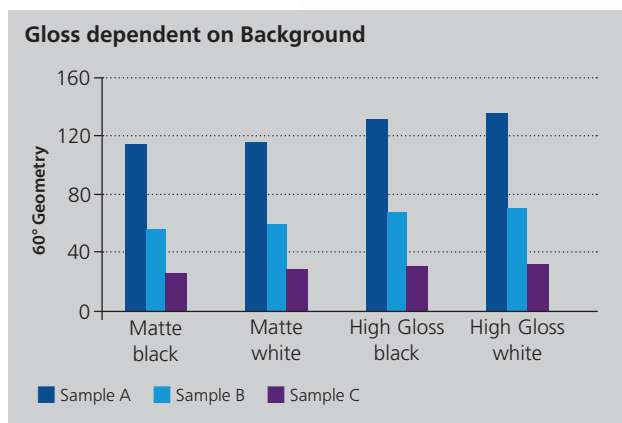
Gloss
micro-gloss



Drawdown Test Charts
byko-charts

Consistent gloss

As specular gloss is used primarily as a measure of the shiny appearance of the final product, plaques or films are extruded to ensure consistent quality for the end-user. These samples have in common that they are transparent or translucent. To avoid additional reflection from the background, which will result in erroneous gloss measurements, a matte black backing must be placed behind the film or sheet. Either a black paper board or matte test chart like the byko-charts can be used. The backing material should have a gloss value close to zero.



Consistent transparency

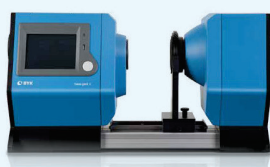
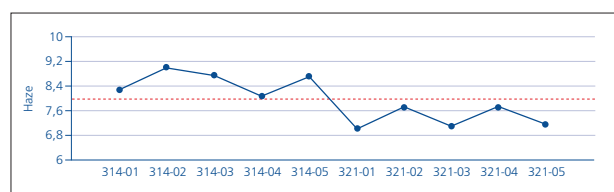
The appearance of a transparent product is defined by its application. Plastic containers used in the food industry should be very clear and transparent, while containers for cosmetic products (e.g. beauty cream) should be translucent and diffuse the light to ensure long-term stability of the content. Therefore, these parameters are tested on the final product by extruding plaques or films with defined thickness.

The haze-gard i is a versatile hazemeter which determines total transmittance and transmission haze according to the ASTM and ISO test method. The test sample must be large enough to cover the measurement port of the instrument and should be free of dust, or any other imperfections. The most critical

parameter for plastic raw materials is the haze value. The goal is to achieve a haze value as low as possible – ideally close to glass. Otherwise additives used in the final product, so called clarifiers, cannot guarantee optimum transparency and coloring properties.

The challenge when measuring transmission and haze of plastic plaques is to place them flush and repeatable against the measurement port. Versatile sample holders were developed that can be easily mounted into the open measurement compartment.

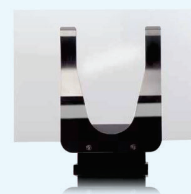
For efficient process control Pass/Fail limits for different product specifications can be directly input in the haze-gard i. The new batch is then measured and automatically compared to the specifications. Green or red indicators instantly illustrate the results on the instrument display. Using smart-lab Haze software even facilitates showing production process stability using trend reports including data tables with statistics and line graphs with Pass/Fail coloring.



Transparency
haze-gard i



Thin Film Accessory
thin film Holder



Film and Sheet Accessory
sample holder