

Plasticizers are some of the most widely used chemicals in existence, giving shape, function, and durability to countless objects that surround us every day of our lives. From garden hoses to power cords, soft plastic toys to IV bags, these remarkable compounds enhance our lives in immeasurable ways. However, growing concern regarding the health impact of phthalates, the most prevalent plasticizers in use today, is creating a sea change in the chemical industry as manufacturers seek to design safer plasticizer alternatives to satisfy emerging government regulations and consumer demand. Spectrophotometric instrumentation is playing a central role in the development of this new generation of plasticizers, giving researchers and manufacturers the precise data needed to tailor formulations for optimal performance.

Moving Away From Phthalates

Currently, phthalates represent the vast majority of plasticizers sold worldwide, making up 70% of plasticizer sales in 2014. However, in recent years phthalates, particularly DEHP, have come under severe scrutiny, as researchers have discovered possible toxic and carcinogenic effects on humans. As a result, Western manufacturers have increasingly turned away from phthalates in many applications both as the result of government regulation and consumer outcry. In 2013, for example, Home Depot and Lowe's announced that they would no longer carry vinyl flooring containing phthalates and Apple eliminated phthalates from power cords and earbuds. While phthalates remain in heavy use in China, many experts believe that they too will need to move away from the chemicals to comply with consumer demand and new manufacturing standards.

In response to this rapidly changing market, many chemical companies are focusing on the development of non-phthalate plasticizers. While there is currently a variety of non-phthalate plasticizers on the market, replicating the look, feel, and functionality of phthalates is not an easy task. As Steve Cullen, plasticizers business director at Eastman Chemicals, says:

People want to sell exactly the same product, that looks the same, performs the same, and feels the same. They just don't want to have phthalate plasticizers in it. They want alternative ones. Sometimes you have a little bit of tweaking in the formulation to get it to do that.¹

One of the primary components of this tweaking is the evaluation of plasticizer color to ensure aesthetic harmony and consistency for new formulations. At a time when demand for non-phthalate plasticizers is forecasted to grow at a rate of 7% per year versus 2% for phthalate plasticizers, spectrophotometric instrumentation is being deployed to assess the quality and viability of emerging compounds now more than ever before.

Spectrophotometric Analysis of Non-Phthalate Plasticizers

The vast majority of plasticizers are formulated for water whiteness to prevent them from altering the color of the material to which they are being added. Spectrophotometric monitoring is critical to ensuring the clarity and colorlessness of the plasticizer by allowing the detection of even minute chromatic variations that compromise the integrity of the formula. The advanced analytical capabilities of HunterLab spectrophotometers and [EasyMatch QC software](#) allow for precise [APHA/Pt-Co/Hazen color scale evaluation](#) for the highest level of color quality control and rapid detection of a faulty product. However, plasticizers must not only display colorlessness at the moment of production, but over time; one major challenge for the formulation of some non-phthalate plasticizers is their vulnerability to discoloration in response to environmental stressors. To address this issue, chemical companies are employing spectrophotometric analysis to investigate chemical compositions that resist color change by measuring [color shift in response to artificial aging](#). For example, a group of researchers from Dow has developed an epoxidized soybean oil and trans-esterified epoxidized fatty acid methyl ester plasticizer that retains color during heat aging by precisely

quantifying chromatic data with [HunterLab MiniScan XE](#) instrumentation before and after heat exposure.² As new formulations of non-phthalate plasticizers become market-ready, spectrophotometers offer manufacturers the ability to continuously monitor product quality throughout production for complete color control.

Full article with photos available here:

<https://www.hunterlab.com/blog/color-chemical-industry/using-spectrophotometric-analysis-to-aid-development-safer-nonphthalate-plasticizers/>