



TECH BRIEF

Saybolt Color Scale

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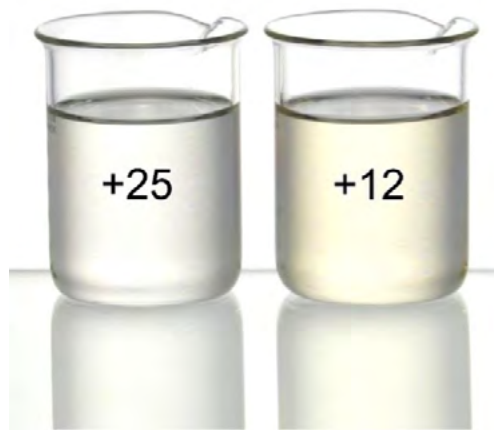
What is the Saybolt color scale?

The Saybolt color scale was developed in the early 20th century by George M. Saybolt, an American chemist as a standardized method to measure and quantify the color of light-colored fluids. The scale was specifically designed for products such as gasoline, kerosene, naphtha, diesel fuel, and lubricating oils in order to provide a consistent and objective means to assess and compare color regardless of where the measurement was taken.

Introduction

The scale is typically used to describe colors ranging from light yellow to nearly colorless, but it can also measure fairly dark colors too. From a visual perspective, here is a breakdown of color across the range:

- **Higher Positive Numbers (+30 to +25):** Indicate very light, almost colorless samples
- **Mid-Range Values (+25 to +10):** Represent light yellow hues
- **Lower Positive Numbers (+10 to 0):** Correspond to more pronounced yellow colors
- **Negative Numbers (0 to -16):** Indicate increasingly darker yellow to brownish hues



Typical Light Colors of the Saybolt Color Scale

For colors darker than Saybolt -16, the ASTM color standard is typically used. Saybolt -16 color is approx. equal to 0.5 ASTM color.

The Saybolt Color Scale is described in international standards, such as ASTM D156 and ISO 2049, that when followed, ensure consistency and accuracy of measurement across different laboratories and industries.

HOW IT WORKS

Traditionally, measurements were made using a Saybolt chromometer, an instrument designed specifically for the purpose. In a chromometer, a glass tube filled with a sample to a defined depth is visually compared against standardized color discs under controlled lighting conditions. Standardized color disks are inserted or rotated into the viewing aperture so that they are viewed side by side with the sample. The color value assigned to the sample is taken from the standard color disc that most closely matches the color of the sample. This method is still quite common.

Modern methods use colorimetric analyzers. Electronic colorimeters provide a more precise and reproducible measurement than the [often-subjective] visual comparison method of a chromometer, plus have much better specificity and resolution as they are not constrained by the discrete values of a standard color disc set (typically every even number plus zero between +30 and -16).

With electronic colorimeters, it is also possible to measure Saybolt color online in processing plants. Online Saybolt measurement is preferable to offline sample testing as it provides real-time data that allows for immediate adjustment in a production process to improve manufacturing efficiency. Continuous monitoring ensures that the products consistently meet quality standards by minimizing the risk of deviations that could occur between offline tests. Online measurement also eliminates the need for manual sampling and handling, reducing the potential for human error and can enhance safety by minimizing exposure to hazardous substances. Overall, online Saybolt measurement offers a more efficient, accurate, and safer approach to maintaining the quality of intermediates and products.

APPLICATION

Saybolt color scale measurement is widely used across various industries to assess the color of transparent and light-colored liquids. Here are some key applications.

- **Oil and Gas:** In petroleum refining, Saybolt color scale measurement is crucial for quality control of refined products such as gasoline, kerosene, diesel, jet fuel, and lubricating oils. Ensuring the color consistency of these products is vital as it often correlates with purity and the absence of contaminants. In Midstream applications, Saybolt color measurement helps monitor the integrity of products in pipelines. Sudden changes in color can indicate contamination or blending issues, allowing operators to quickly address and resolve problems to maintain product quality and prevent downstream processing concerns.
- **Chemicals:** Chemical manufacturers utilize Saybolt color scale measurements to monitor the purity of solvents, reactants, and other liquid chemicals used as feedstocks. It is also used further along in the process to monitor intermediates and final products. Consistent color indicates proper chemical composition and process control, which is critical for product performance and reliability.
- **Paints and Coatings:** Solvents used in paints and coatings must be of high quality to avoid any adverse effects on the color and performance of the final product. Saybolt color measurement is used to verify the color and quality of these solvents, ensuring they are free from impurities that could alter the paint's appearance.



Kemtrak DCP007 online colorimeter system complete with measurement cell.

The Saybolt color scale is essential for ensuring the quality and consistency of products, particularly petroleum products, as color can indicate the presence of contaminants or degradation. Over the years, the Saybolt color scale has become a widely recognized and standardized method for color assessment, playing a crucial role in quality control and product specification.

Learn More

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