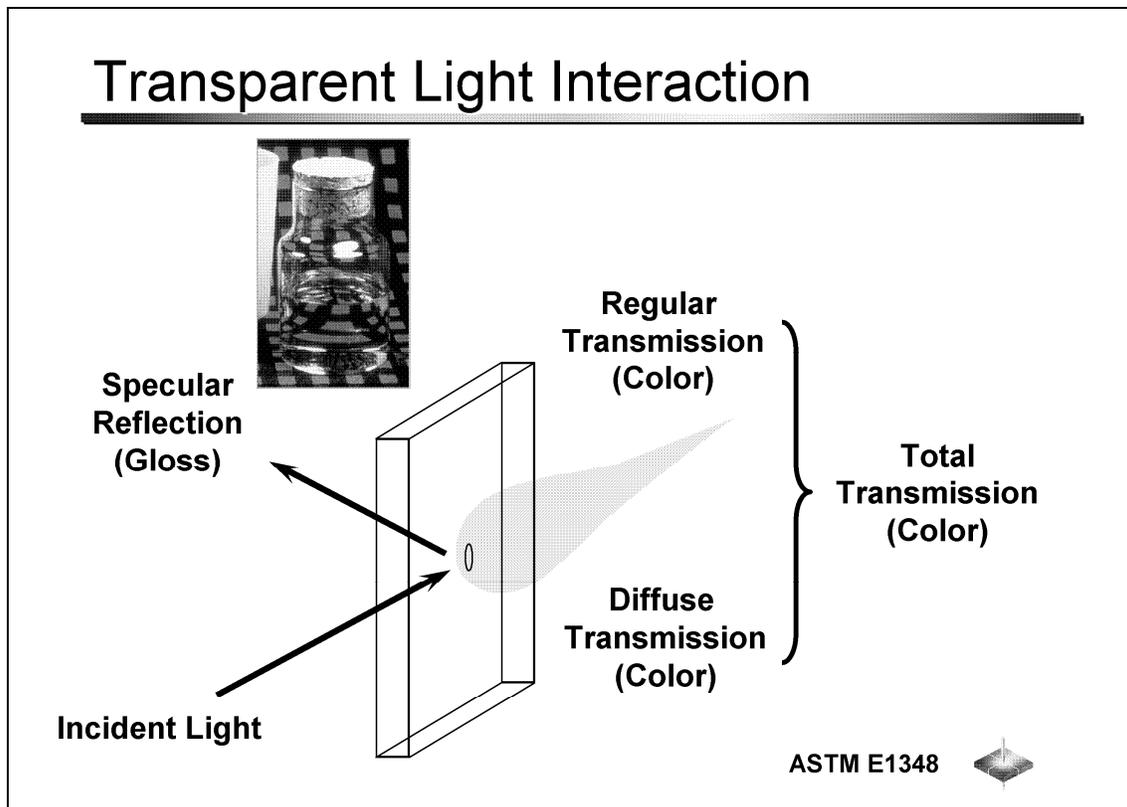


RTRAN Versus TTRAN

For transparent materials, gloss is seen in the specular reflection. Color is seen primarily in the **regular transmission** that passes without deviation through the transparent material, modified by the absorption of the colorants.

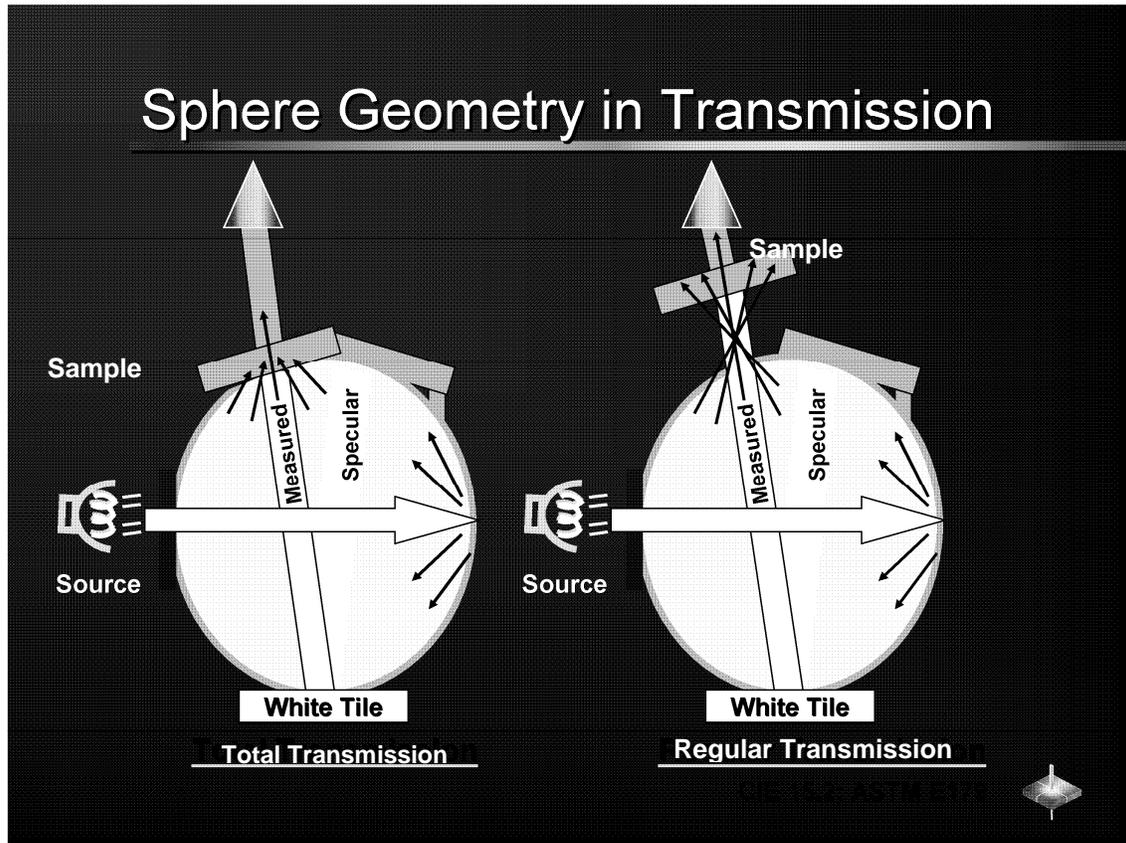
The presence of internal scattering centers such as scratches, cloudiness, bubbles, or suspended particles within the material or the surface texture can cause the regular transmission signal to scatter or diffuse. This **diffuse transmission** also contains a secondary color component of the material and is responsible for any hazy or cloudy appearance. Clear, transparent materials generally have little or no diffuse transmission.

Total transmission is a combination of **regular and diffuse transmission**.



Most sphere instruments are constructed in the inverse $d/8^\circ$ geometry (diffuse illumination/ 8° viewing). In this configuration, total transmission (TTRAN), which includes both the regular and the diffuse (scattered) components of the transmitted light, is measured with the sample situated at the sphere side of the transmission compartment. Regular transmission (RTRAN) is measured with the sample situated at the lens, including only the transmitted light that comes straight through the sample. Diffuse transmission is calculated as total transmission minus regular transmission.

Diffuse Transmission = Total Transmission - Regular Transmission.



TTRAN measurements are recommended for samples that are slightly hazy and have some internal light scattering. Brewed tea, fruit juices, and biopharma/chemical solutions are examples of samples that require TTRAN measurements due to scattering. RTRAN measurements are used for clear (non-hazy, non-scattering) samples.

The HunterLab instruments that are capable of measuring diffuse, regular, and total transmission are the ColorQuest XE, ColorQuest XT, UltraScan XE, UltraScan PRO, and UltraScan VIS.

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