

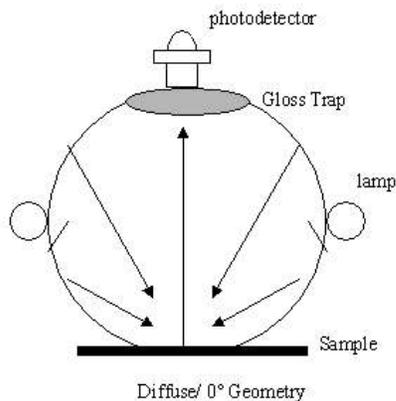
Brightness in paper industry

Brightness testing, is the reflectance of blue light (a specific spectral distribution with a principal wavelength of 457 nm). We make readings in this wavelength because it coincides with lignin absorption. Lignin is the "glue" that holds fibers together and can give paper a yellow tint. The brightness value shows the bleaching quality in the pulp of the paper.

There are different standard methods of measuring brightness. The following standard tests are frequently used test methods in the paper industry.

| | |
|----------|---|
| T525 | Diffuse brightness of pulp (d/0deg) |
| T452 | Brightness of pulp, paper, and paperboard (directional reflectance at 457 nm) |
| ISO 2470 | Paper and board measurement of diffuse blue reflectance factor ISO brightness |
| ISO 2469 | Measurement of diffuse factor |

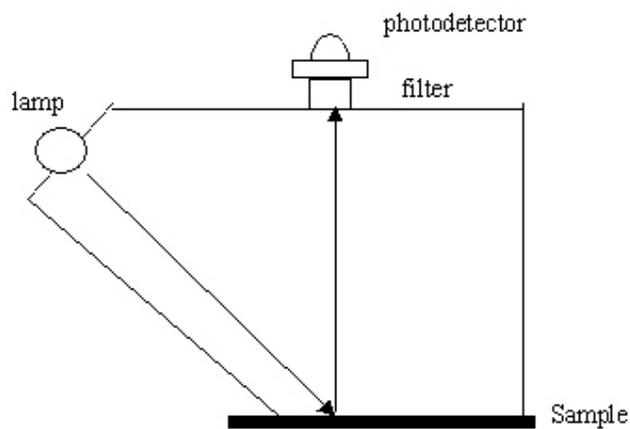
You can see the differences between brightness tests in the geometry of the tester: Below, you see two configurations used in brightness testing.



The Diffuse / 0° Geometry works this way:

- Two lamps shine in an integrating sphere.
- The sphere causes light to bounce around and lights the sample diffusely.
- A photodetector located perpendicular to the sample plane records the light coming from the paper surface.

The Directional Brightness Tester has one light that shines at 45[ordm] to the sample.



45°/0° Geometry

When looking at diffuse vs directional brightness, it is important to know:

- There is not a simple correlation from one instrument to the other.
- The directional brightness tester measures a smaller test diameter (9mm) than the diffuse brightness tester (30mm).
- The directional tester is also susceptible to paper direction while the diffuse tester averages the directionality effects.
- The directional tester completely eliminates specular gloss by its design, while the diffuse tester cannot completely remove it from the measurement.

Effects of optical brighteners

Since brightness testing is the measure of reflectance of blue light, brightness measurements are also affected by the presence of optical brighteners. These brighteners absorb ultra-violet radiation and emit light in the blue region of the visible spectrum. Therefore, the amount of ultraviolet radiation that strikes the sample affects the resulting brightness of the paper. Use of different sources/illuminants changes the ultraviolet amount as well as the visible spectrum.

Brightness measurements depend on:

- Whether you are using a diffuse or directional brightness tester.
- The amount of ultraviolet radiation that strikes the sample.
- The amount of brighteners present in the media.
- The composition of the media.