

## Front-Face Detection for Highly-Concentrated, Opaque, or Solid Samples

When working with highly-concentrated, opaque, or solid samples such as blood, paint, optical brighteners, living cells, polymer films, or phosphors, front-face fluorescence detection offers significant advantages for quantitative and qualitative fluorescence measurements. Highly concentrated and opaque liquids typically have problems with self-absorption and complete attenuation of the beam. When measuring fluorescence at 90°, intensity measurements may not be reproducible or detectable, and the excitation or emission spectra may appear distorted. Front-face detection offers the solution for these problems.

Using the technique of front-face detection for opaque liquids and solids can be an important analytical tool for characterizing fluorescence of various sample types. In the front-face technique, the excitation light is focused to the front surface of the samples and then fluorescence emission is collected from the same region at an angle that minimizes reflected and scattered light.

### Types of Samples

- Highly concentrated: blood, oil, optical brighteners
- Highly opaque: paints, phosphors
- Solids: polymers, films, paper, contact lenses, crystals

### Front-Face Detection

- **FLUOROLOG®**  
Use the 22.5° collection path for liquid and solid samples.
- **FLUOROMAX®**  
Use the Model 1933 Solid-Sample Holder at a 30/60° angle for solids. For liquids, use the Model 1967 Front-Face Thermostatted Cell Holder with magnetic stirrer accessory.

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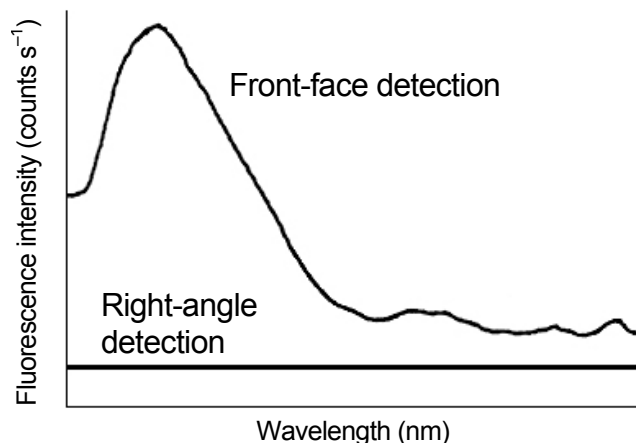
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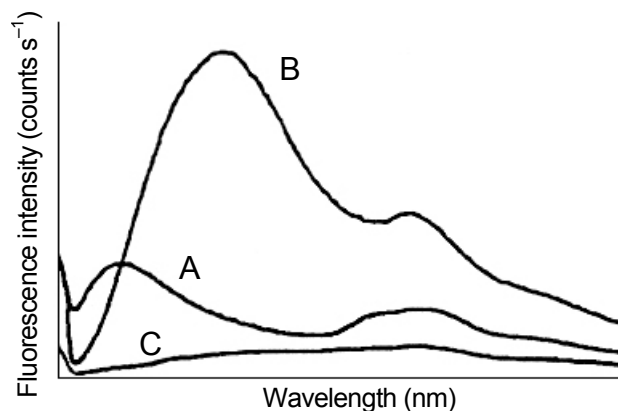
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**Figure 1.** Comparison of fluorescence emission signal from sickle-cell hemoglobin using right-angle detection versus front-face detection. The  $\beta$ -37 tryptophan is primarily responsible for this fluorescence.



**Figure 2.** Comparison of fluorescence emission signal from three contact-lens samples. These spectra can be used to determine if protein from tears adhered to the lens surface. Contact-lens manufacturers must verify that enzymatic cleaners actually remove these proteins. (A) Tyrosine; (B) tryptophan; (C) enzymatically cleaned lens. This verifies that the solution actually cleaned the lens.

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