

## Measurement of Fluorescence Quantum Yields on ISS Instrumentation Using Vinci

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### Introduction

The quantum yield  $Q$  can also be described by the relative rates of the radiative and non-radiative pathways, which deactivate the excited state:

$$Q = \frac{k_r}{k_r + \sum k_{nr}} \quad [1]$$

where  $k_r$  and  $k_{nr}$  correspond to radiative and non-radiative processes, respectively. In this equation,  $\sum k_{nr}$  describes the sum of the rate constants for the various processes that compete with the emission process. These processes include photochemical, and dissociative processes including other, less well characterized changes that result in a return to the ground state with simultaneous dissipation of the energy of the excited state into heat. These latter processes are collectively called non-radiative transitions and two types have been clearly recognized: intersystem crossing and internal conversion. Intersystem crossing related to the radiationless spin inversion of a singlet state ( $S_1$ ) in the excited state into a triplet state ( $T_1$ ).

The luminescence quantum yield is also given as the ratio of the number of photons emitted to the number of photons absorbed by the sample:

$$Q = \frac{\text{photons}_{em}}{\text{photons}_{ab}} \quad [2]$$

While measurements of the "absolute" quantum yield do require more sophisticated instrumentation [1], it is easier to determine the "relative" quantum yield of a fluorophore by comparing it to a standard with a known quantum yield. Some of the most common standards are listed in table below:

Quantum Yield [Q.Y.] Standards	Q.Y. [%]	Conditions for Q.Y. Measurements	Excitation [nm]	Ref.
Cy3	4	PBS	540	2
Cy5	27	PBS	620	2
Cresyl Violet	53	Methanol	580	3

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