Things to be included to the report:

-The main principles of the single photon counting method

-Schematic figure of the equipment (including necessary optical components)
-Why does the count rate has to be less than 1/100 of the rate of the excitation pulses?
-What does the time resolution mean and what are the factors affecting on it?

-The concept of anisotropy

-What is ”magic angle”?
-Find information and explain stick and slip models of rotational correlation
-What assumptions about the molecule are made in the Stoke-Einstein-Debye-equation? Is the equation valid in this particular experiment?

Results:

-Absorption and fluorescence spectra (The concentration of the sample can be calculated by using molar absorption coefficient)
-An estimation of the time resolution of the present experiment
-The fluorescence lifetime of eosin (Does temperature affect on it?)

-Calculate the magic angle -signal and fit ”exponential decay” by using Origin program

-The anisotropy decay of the fluorescence i.e.the rotational correlation time (at both measured temperatures)

-Fit exponential decay function

-The volume of the molecule at the two temperatures (Stokes-Einstein-Debye -equation)

-You can calculate the temperature dependence of the viscosity from[1]

$$\ln \eta = -7.10566 * + \frac{1675}{T} + 0.0103679 * T - 1.71008 * 10^{-5} * T^2$$

where η is the viscosity (mPa*s) and T is the temperature (K)

-Discuss on the results?

+Other remarks and comments on the experiments and the results

Literature values for eosin Y in ethanol at room temperature:

Fluorescence lifetime 3.620 +- 0.225 ns (Fleming et al. J.Am.Chem.Soc., 99, 4306 (1977)

Rotational correlation time 420 +- 30 ps (Jena and Lessing, Chem.Phys., 40, 245 (1979)

(1) Perry, R.H., Green, D.W., 1997, *Perry’s Chemical Engineers’ Handbook*. New York, USA.