Prelab Questions--Experiment 2: Fluorescence Quenching

Answer **three** (3) of the following questions, based on the last digit of your student ID number.*
ID ending in: 0 or 1: ab&c *2 or 3*: de&f *4 or 5*: gh&i *6*: jk&l *7:* mn&o 8 or 9: pq&r
For the True/False questions, if the statement is false provide the correct statement

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a. Calculate the mass of KI required to make a 1.00 M solution in a 25-mL volumetric flask.

b. A stock solution of 0.989 M KI is provided. An accurate volume of the stock solution is added to a 10-mL volumetric flask and then water is added to bring the total solution volume to the calibration mark. The final concentration is 0.2967 M. What volume of stock solution is used to make up this solution? (The volume of a 10-mL volumetric flask is calibrated to better than 10.00 ± 0.02 mL, which is to 4-significant figures.)

c. (True/False) The intercept of a plot of the unquenched intensity divided by the quenched intensity of a fluorescent molecule, I^o/I, versus the concentration of iodide ion should be zero.

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d. Calculate the mass of KI required to make a 1.00 M solution in a 25-mL volumetric flask.

e. The slope of a plot of the unquenched intensity divided by the quenched intensity of a fluorescent molecule, I^o/I, versus the concentration of iodide ion is 2.36 M^{-1}. What is the quenching constant, K_Q?

f. A solution is made by transferring 2.00 mL of a 0.982 M solution of KI into a 10-mL volumetric flask. Calculate the final concentration. (The volume of a 10-mL volumetric flask is calibrated to better than 10.00 ± 0.02 mL, which is to 4-significant figures).

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g. Calculate the mass of KI required to make a 1.00 M solution in a 25-mL volumetric flask.

h. A solution is made by transferring 4.00 mL of a 1.062 M solution of KI into a 10-mL volumetric flask. Calculate the final concentration. (The volume of a 10-mL volumetric flask is calibrated to better than 10.00 ± 0.02 mL, which is to 4-significant figures).

i. (True/False) A quencher with a large K_Q is more efficient at quenching than a quencher with a small K_Q.

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j. Calculate the mass of KI required to make a 1.00 M solution in a 25-mL volumetric flask.

k. The absorption spectrum of a dye is unaffected by the addition of quencher. Is the quenching static or dynamic?

l. A solution is made by transferring 3.00 mL of a 1.162 M solution of KI into a 10-mL volumetric flask. Calculate the final concentration. (The volume of a 10-mL volumetric flask is calibrated to better than 10.00 ± 0.02 mL, which is to 4-significant figures).

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m. Calculate the mass of KI required to make a 1.00 M solution in a 25-mL volumetric flask.

n. (True/False) The quenching constant is determined by determining the fluorescence intensity of a series of solutions with increasing amounts of the fluorescent dye.

o. (True/False) The concentration of the KI solution must be exactly 1.00 mol/L.

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p. Calculate the mass of KI required to make a 1.00 M solution in a 25-mL volumetric flask.

q. What is the purpose of taking the absorption spectra of the dye, with and without quencher?

a. To determine the quenching rate constant.
b. To determine if the quencher interacts with the ground state of the molecule.
c. To determine if the quencher interacts with the excited state of the molecule.
d. To determine if the quencher has an absorption spectrum.

r. A solution is made by transferring 1.00 mL of a 0.968 M solution of KI into a 10-mL volumetric flask. Calculate the final concentration. (The volume of a 10-mL volumetric flask is calibrated to better than 10.00 ± 0.02 mL, which is to 4-significant figures).

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* The student ID number is the 6-digit number on the front of your ID card at the right-hand side