Intro

Ruthenium

Researchers: Jakub Polanowski, Austin Croke, Fhaheem Tadamarry\ **Date:** Thursday, October 3, 2019

Goal

The goal for the lab is to explore the relations ship between the fluorescence quenching of Ruthenium (II) tris 2,2’-Bipyridine and the conditions under which it is under. The reason for this being that Ruthenium (II) tris 2,2’-Bipyridine can be used for staining cells and solar cells, however as the fluorescence properties of the complex are tied to environmental conditions, it is important to understand the relationship so that it can be better utilized within its use cases.

Pre-Lab Questions

1. A Sample has a density of 1.5 g/mL. You have 5g. How many mL do you have?

3.33 mL

1. Glycerol is similar to Honey or Karo Syrup. The viscosity of a variety of materials can be found here: http://www.vp-scientific.com/Viscosity_Tables.htm Why do you want to prepare samples gravimetrically rather than volumetrically?

This is because the density of glycerol changes with temperature, therefore measuring glycerol volumetrically will be unreliable.

1. What volume/mass of solution will you need to prepare?

2.5 µM – 1.424 mg per 1 liter 0.1 mM – 56.96 mg per 1 liter

1. What is the quencher in this system?

Oxygen

1. As the concentration of quencher increase, do you think the lifetime will increase or decrease? Why? Remember to use the information provided in the introduction and your understanding of what is happening at the molecular level to inform your prediction.

As the concentration of the quencher (oxygen) increases the lifetime decreases. This occurs as there is a direct relationship between lifetime and [Quencher]

kabs=1τobs=kr+kq[Q]kabs=1τobs=kr+kq[Q]

1. As the viscosity of the solution increases, do you think the lifetime will increase or decrease? Why? Remember to use the information provided in the introduction and your understanding of what is happening at the molecular level to inform your prediction.

As the viscosity of the solution increase, the lifetime would increase, this is because as the viscosity increases,
kdiffkdiff decreases which is related to the inverse of the lifetime, so the greater the viscosity the greater the lifetime.

kdiff=8RT3000η(M−1s−1)

Materials

Item	How much/How many?
Ruthenium (II) tris 2,2’-Bipyridine	60 mg
Ethanol	1 Liter
Glycerol	1 Liter
Plastic Cuvetttes	2
Ar (or N 22) Gas Canister	1
O 22 Gas Canister	1
5 mL vials	4

Safety

Compound/Structure	(CAS-No.)	Hazards Classification (section 2 of SDS summary:)	Handling (section 7 of SDS What PPE is needed, ventalation, other considerations?)	Disposal
Ruthenium (II) tris 2,2’-Bipyridine	50525-27-4	Irritant	PPE: lab coat, googles, gloves	EH&S waste
Ethanol	64-17-5	Flammable	PPE: lab coat, googles, gloves; Keep Away from flames or sparks	EH&S waste
Glycerol	56-81-5	Compressed Gas	PPE: lab coat, googles, gloves	EH&S waste
Argon	7440-37-1	Compressed Gas	PPE: lab coat, googles, gloves	Fume Hood
Nitrogen Gas	7727-37-9	Compressed Gas	PPE: lab coat, googles, gloves	Fume Hood
Oxygen	7782-44-7	COmpressed Gas, Oxidizer	PPE: lab coat, googles, gloves; Keep away from flames or sparks	Fume Hood

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