University of St Andrews

MAY 2015 EXAMINATION DIET

SCHOOL OF CHEMISTRY

MODULE CODE: **CH5517**

MODULE TITLE: Advanced Molecular Inorganic Chemistry

EXAM DURATION: 2 Hours

EXAM INSTRUCTIONS

(a) Answer **ALL** questions.

(b) Note the distribution of marks within questions.

(c) Answer using the script book provided. Additional script books can be obtained from the Invigilator.

(d) A chemical data card is provided.

(e) Non-programmable calculators may be used.

(f) A set of (fully disassembled) molecular models may be used.

PLEASE DO NOT TURN OVER THIS EXAM PAPER UNTIL YOU ARE INSTRUCTED TO DO SO.

2. (a) What is the difference between electroluminescence and photoluminescence?

[6 marks]

(b) Name **FOUR** other forms of luminescence.

[4 marks]

3. (a) What is Kasha's rule?

[4 marks]

(b) What is the definition of a Stokes' shift?

[4 marks]

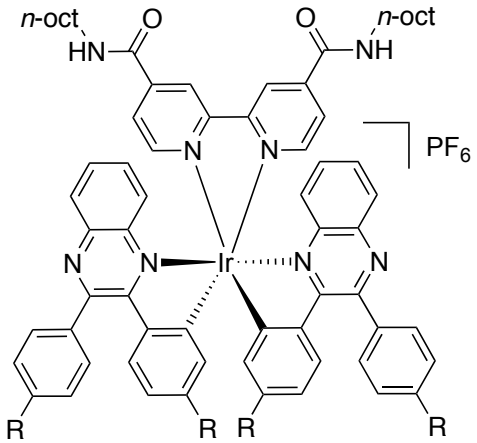
4. (a) For the series of iridium complexes below, the one with L^4 has the highest energy HOMO while the complex with L^2 has the lowest energy HOMO. Rationalise this observation.

[6 marks]

(b) If the emission is unstructured then what would you expect to happen to the emission spectrum when taken in acetonitrile compared to toluene? Justify your answer.

[6 marks]

(c) Assume the LUMO is localised on the bipyridine unit. What would happen to the emission if the amide functional groups were removed and the ligand is simply 2,2'-bipyridine? Justify your answer.



R = H **$[Ir(L^1)_2(Diobpy)]PF_6$**
R = Br **$[Ir(L^2)_2(Diobpy)]PF_6$**
R = Me **$[Ir(L^3)_2(Diobpy)]PF_6$**
R = OMe **$[Ir(L^4)_2(Diobpy)]PF_6$**

[4 marks]