Preparatory material for incoming students: organic chemistry

1. The organic chemistry tutorials at St Edmund Hall are given by Dr Paul Roberts and Dr Matt Rattley.

2. The organic chemistry lectures in Michaelmas term are as follows:
    Introduction to Organic Chemistry (7 lectures)
    Introduction to Organic Spectroscopy (2 lectures)
    Orbitals and Mechanisms (7 lectures)

3. Please buy a copy of 'Organic Chemistry', either the first edition by Clayden, Greaves, Warren and Wothers, or the second edition by Clayden, Greaves and Warren. Both editions will be fine and are available on Amazon for about £40-45 new (although used versions, particularly of the first edition, are substantially cheaper). This book will be invaluable throughout the whole of the course.

4. The first lecture course and the first tutorial are specifically intended to bridge gaps between knowledge required for A-level and that required for the first year course. In order to help with this, it is a good idea if you are able to read Foundations of Organic Chemistry (Oxford Chemistry Primers, No. 9) by Hornby and Peach.

5. Please note that College Grant funds are available to support the purchase of essential course materials, currently at the rate of £300 per year, of which £50 may be used to purchase books.

6. Additional information is contained within the accompanying document 'Introduction to Organic Chemistry Tutorials'.

PMR, 8 August 2019

Introduction to Organic Chemistry Tutorials

General

The first year course will cover the following areas:

1. Basic concepts – Molecular Structure and Shape
2. Stereochemistry
3. Acidity and Basicity of Organic Compounds
4. Reaction at Saturated Carbon: Nucleophilic Substitution and Elimination
5. Chemistry of Multiple Bonds: Alkenes and Alkynes
6. Chemistry of Multiple Bonds: Aromatic Chemistry
7. Chemistry of the Carbonyl Group Part I: Synthesis, Reactivity and Simple Interconversions
8. Chemistry of the Carbonyl Group Part II: Nucleophilic Addition Reactions
9. Chemistry of the Carbonyl Group Part III: Enolisation
10. Organometallic Chemistry
11. Organonitrogen Chemistry
12. Biological Chemistry

Tutorial Work

You will be given the tutorial work at least one week in advance of the tutorials. The tutorial work will consist of a list of topics that you must research and make ***concise*** revision notes on. This will be followed by some problems. **The emphasis here is on understanding the underlying principles and concepts, and being able to apply them to unfamiliar examples: don't just copy out pages and pages of text from your books and learn examples by rote**. When you attempt the problems, be sure to give ***full answers*****, i.e., you must explain how you arrive at your answer**, not just state it! You must hand in your completed tutorial work (i.e., notes and answers to problems) by the deadline – this is usually 9.00 am the day before the tutorial. You should aim for high quality in your tutorial work, and write on good quality paper. Don't hand in work with lots of crossing out – do it again. Tutorial work which is not of a sufficient standard will need to be repeated. Tutorials will generally be in groups of 2-4, and will last about one and a half hours. In the tutorials, we will discuss the most salient aspects of the topic, and you will be expected to go to the white board and discuss your answers.

Bibliography

There are a number of standard books that will come in useful for the Organic Chemistry course. The "Organic Chemistry" text book by Clayden, Greaves, Warren and Wothers is a 'must-have' for the whole three year course. Other books which will be very useful are "Advanced Organic Chemistry" by Jerry March, and "Named Reactions" by Jie Jack Lie. These two are written in a style which makes them much more reference books rather than text books but they become invaluable reference sources as the course progresses. Which other books you use is a matter of choice, but you may like to have a look at the following, all of which should be in the college library or the Radcliffe Science Library (RSL):

1. D. S. Kemp and A. Vallachio, 'Organic Chemistry'.
2. R. O. C. Norman and J. M. Coxon, 'Principles of Organic Synthesis'.
3. J. E. McMurray, 'Introduction to Organic Chemistry'.
4. Carey and Sundberg 'Advanced Organic Chemistry'.

Other books, especially the "Oxford Chemistry Primer" series of books, which may be more relevant to a particular tutorial, will be referenced in your tutorial sheets.

Contacting Me

The best way to contact me is by email:

paul.roberts@chem.ox.ac.uk

I check email several times daily and so will usually respond to simple questions within a few hours. If there are any other more involved issues about anything at all, I am quite happy to arrange to meet with you to discuss further.

Named Reactions

Quite often, you will find that a particular transformation or class of reaction in organic chemistry bears the name of the person who first reported performing it. So for instance, you might hear people refer to the "Wittig Reaction" or the "Robinson Ring Annulation" and so on. You will never be expected to learn all the names for the various reactions, but they do act as a rather useful "handle" to enable you to assimilate a list of some of the most common transformations of organic chemistry. You will see some of the "named reactions" listed on the tutorial sheets as the course progresses, and you should make sure that you know what they are. When you learn them, try to attach a sentence or two to each of them, which describes in words what the transformation achieves in terms of the types of compounds which react, which functional groups are involved, and what the overall outcome is – again remember you need to understand the principles behind the chemistry, and not just learn the

example(s) in the text books by rote! It is a good idea to collect the named reactions together, perhaps on revision cards or on A4 paper in a folder, so that it builds into a handy reference guide for you over the 3 years of the Part I course. A good book for "named reactions" is the one by Jie Jack Lie (called "Named Reactions", funnily enough….).

Nomenclature

Finally, a quick note on nomenclature: the recommended naming system by the IUPAC is the one which you should adopt, but you will find that many organic compounds have names that pre-date this naming system. These so called "trivial" names are often used more frequently than the IUPAC names for certain compounds. For instance, an organic chemist will always refer to 'acetone' rather than 'propanone'. To further complicate matters, the trivial/historic and IUPAC names are often used interchangeably – for example, the alkene family of compounds is often referred to as the olefins. Try to get a feel of some of the more common trivial names, and be able to use the IUPAC naming system to transfer the names of relatively simple organic compounds to the corresponding structures, and vice-versa.