Photochemistry and Photophysics

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Welcome

The notes have been prepared in a package called BookDown for RStudio so that the equations are accessible to screen readers. However, by providing the notes as a .html webpage I have also been able to embed short concept bite videos to further describe some of the topics and you can download the notes (top left of the screen) in a format that suits you to view offline.

Version history

The initial commit of this book is dated 6th September 2020. Updated with learning outcomes for each chapter and some new content in chapter 5. 7th September 2020.

Chapter 1

Introduction to Photochemistry & Photophysics

Photochemistry is by definition from IUPAC 'the branch of chemistry concerned with the chemical effects of light'[1]. However, in this course we are going to explore beyond just chemical reactions to also examine some of the fundamental photo physics of systems. Photophysics is closely related to what you have previously studied in your first and second years, in that it is a study of the processes of absorption and emission of light and the kinetics of these processes.

Light is the very reason why there is life on earth, the outstanding beauty of processes such as photosynthesis or vision speak to the power of this branch of chemistry. Photochemistry offers a way for us to 'cheat' traditional chemical reactions, in that we no longer need thermal energy to get over an activation barrier, instead we use the energy of a photon. It is only by understanding how we can best utilise the bounteous resource of the sun's light that we as a species can hope to to have a long and fruitful future on this planet.

It is just over 100 years since quantum theory revolutionised our understanding of matter and light, not quite 125 years since the discovery of the electron, but in that time we have achieved wonderful things, things that have revolutionised the way we live. From lasers in cd and blue ray players to their use in scanning bar codes, glow sticks - fun at festivals, essential in emergencies, or more prosaic uses such as sun creams, self cleaning windows or display technology. In this course you will learn about a range of photochemical and photophysical processes that underpin our modern lives and also learn about some of the current challenges and interest in the field.

[1] IUPAC Goldbook, http://goldbook.iupac.org/terms/view/P04588 (accessed July 2020).