St Edmund Hall
Preparatory Material for Incoming Students: Inorganic Chemistry

1. The first-year Inorganic Chemistry tutorials at St Edmund Hall are given by Professor Anna Regoutz.

2. There will be two first-year Inorganic Chemistry tutorials in Michaelmas term on or around the following topics:
    a. *Atomic structure and periodic trends*
    b. *The ionic model*

3. The Inorganic Chemistry lectures in Michaelmas term are as follows:
    a. *Atomic Structure and Periodic Trends by Professor C. R. Timmel*
    b. *Ionic Model and Structures of Solids by Professors A. L. Goodwin and V. Deringer*

    These lectures set up some of the basic principles you will use throughout your course. You can see that the first two tutorials closely support (and are supported by) these lecture courses. A further tutorial, *Structures of Solids*, early on in Hilary term, completes the support of the Michaelmas term lectures.

4. To help prepare for your first-year courses, please buy *Inorganic Chemistry* by M. Weller, T. Overton, J. Rourke and F. Armstrong (2018, 7th edition, published by Oxford University Press, ISBN 978-0-19-876812-8) and read Chapters 1 (*Atomic structure*) and 4 (*The structures of simple solids*) in detail. This is available on *Amazon,* BUT you can get it online at effectively the same price (and also usually with free delivery) from Oxford's excellent academic bookseller, Blackwell's (https://blackwells.co.uk/bookshop/product/Inorganic-Chemistry-by-Martin-Weller-Tina-Overton-Jonathan-Rourke-F-A-Armstrong/9780198768128). Note that there is a 6th edition but this is already several years out of date so do make sure yours is the 7th edition. This book is a helpful starting point for many of your inorganic chemistry topics for the first two years. You will be referred to many specialist books on various topics throughout your course, available in the College and University libraries. Note that College Grant funds are available to support purchasing essential course materials, currently at the rate of £300 per year, of which £100 may be used to purchase books.
    After reading Chapter 1 of Inorganic Chemistry, please attempt the questions overleaf. You will be expected to hand in your answers to these questions when you arrive so that they can be marked before the first tutorial.

Prof Anna Regoutz
Summer 2025

Problems

A1. What do the quantum numbers n, l, m_l, and m_s represent? What are their allowed values?

A2. What is meant by the terms "shielding", "penetration", "the inert pair effect", and "the lanthanide contraction"? Why are these important for understanding the Periodic Table?

A3. Define the following terms: "ionisation energy", "electron affinity", and "electronegativity". Give examples of how these vary down a group and across a row of the Periodic Table.

A4. Explain the variation in the orbital energies of the 2*s* and 2*p* orbitals in Li^{2+} and Li given in the Table below (hint: think about penetration and shielding effects).

	2*s* / kJ mol^{-1}	2*p* / kJ mol^{-1}
Li^{2+}	-2951	-2951
Li	-520	-342

A5. Explain the variations in the first ionisation energies for the elements Na to Ar, as shown in the Figure below. Be sure to think about the importance of exchange energy at the $3p^3$ and $3p^6$ maxima.