

School of Chemistry

Aims and Objectives: Session 2023-2024, Semester 2

Module CH1402: Inorganic and Physical Chemistry 1

Course Title: Fundamentals of States of Matter

Duration: 7 hours

Lecturer: Dr R. M. Smith

Aims: To gain a working chemical understanding of the states of matter and their intrinsic chemical properties. The course is an introduction to the interactions between atoms, molecules and ions, which lead to the occurrence of gases, liquids and solids.

Objectives:

Students should be able to:

1. **Introduction** – Define and describe the states of matter. Be able to apply the gas laws.
2. **Kinetic theory of gases** – Understand the principal results. For probability density functions, understand the concept and demonstrate uses to derive useful quantities. Sketch the Maxwell distribution of molecular speeds and derive the most probable speed, mean speed and root mean square speed. Understand Bosman distribution for molecular energies and possible uses.
3. **Real gases** – Understand the term ideal gas and how real gas deviate from an ideal gas including using the van der Waals equation.
4. **Intermolecular forces** – Describe the different types of interactions between atoms, molecules and ions. Consider the Lennard Jones potential for atom-atom interactions.
5. **Phases** – Understand and interpret one-component and simple binary phase diagrams. Familiarity with mechanisms that change phases of matter including crystallisation and solid-solid phase transitions.