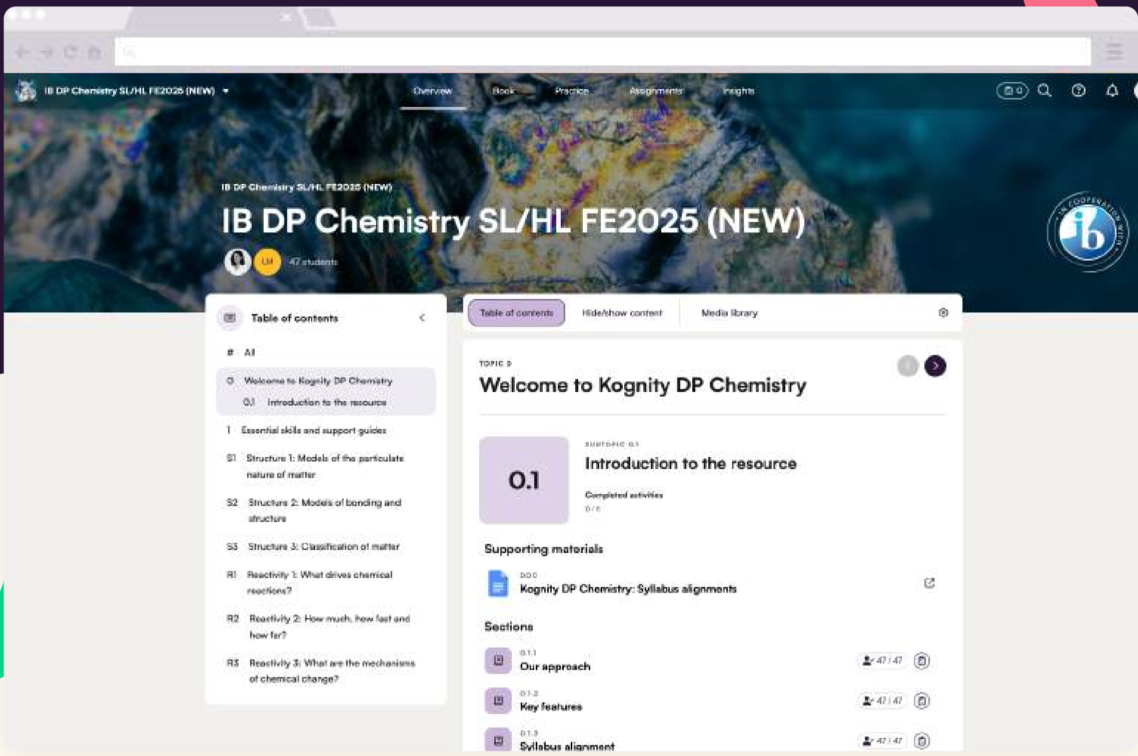
IBDP Chemistry

Our IBDP Chemistry SL/HL subject supports the full DP syllabus for the first examination from 2025.



Key Features

Kognity IBDP Chemistry contains Collected practicals for each of the new Tools and skills. Each experiment has a suggested procedure with apparatus and safety requirements that can be adapted by teachers to use in the classroom. There are also ideas to develop the Inquiry process where students can take their newly developed skills and design their own experiment to prepare for their Chemistry IA .

1. Essential skills and support guides / 1.1 Collected practicals

5a. Determining enthalpy changes in aqueous solutions

Prior learning

Before attempting this practical, you should be familiar with the following concepts:

- The temperature change that accompanies endothermic and exothermic processes (see section R1.1.2-3).
- How to calculate the enthalpy change for a chemical reaction using the formula $Q = mc\Delta T$ (see section R1.1.4).
- How to apply Hess's law to calculate the enthalpy for a multi-step reaction (see section R1.2.1).

Guiding question(s)

- How can energy changes in an aqueous solution be measured?

You learned previously that chemical reactions require chemical bonds to be broken and new bonds to be formed (see section R1.2.1). When the amount of energy required to break bonds (endothermic) differs from the energy released in forming bonds (exothermic), there is an overall net change in energy for the chemical reaction. Changes in energy are evident as a change in temperature, since the chemical reaction will exchange heat to and from the surroundings as the reaction proceeds.

Monitoring the change in temperature during the reaction can provide useful information about the reaction – whether the overall reaction is endothermic or exothermic, the quantity of heat released or absorbed and the length of time required for the chemical reaction. Since a system can never be completely isolated from the surroundings, energy transfer will always occur. How can energy changes be measured?

Diagrams, illustrations, photos and videos add a visual perspective to key concepts of the syllabus. Kognity Chemistry also contains 3D models that are embedded directly into the text so that students can access them while they read. These clickable, interactive resources make learning fun and engaging.

Models are particularly useful in the study of chemistry as they allow us to visualise on a larger scale (the macroscopic scale) that which is usually too small to be seen with the unaided eye (the microscopic scale). However, the use of models in science can also lead to misconceptions. Take the planetary model shown below, for example (**Figure 1**). At first, it could be argued that it is a simple model to help students remember the order of the planets in the solar system. But a closer look at the model may reveal some inconsistencies – can you spot what they are?

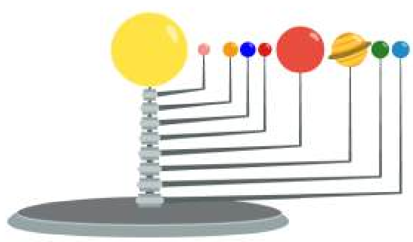


Figure 1. A model of the planets in the solar system – can you spot the inconsistencies in the model?

Within Kognity Chemistry you will find TOK boxes that help students make connections between TOK and chemistry. These provide interesting discussion points together with examples of knowledge questions. Additionally, Nature of Science boxes make clear the application of TOK to the Natural Sciences.

Theory of Knowledge

Water is one of the few substances that we can observe all changes in state in our everyday life. To what extent do you rely on your experience of macroscopic changes to understand what is happening on a microscopic level?

Use the activity in the next section to investigate the states of matter.

As sulfur has six valence electrons, it is energetically more favourable to gain two electrons than to lose six. After gaining two electrons, it will have more electrons surrounding it than protons in the nucleus, giving it an overall charge of 2–. This can be represented as S^{2-}. This means that you can predict the magnitude and sign of the charge of an ion that is formed from an atom of an element in a specific group.

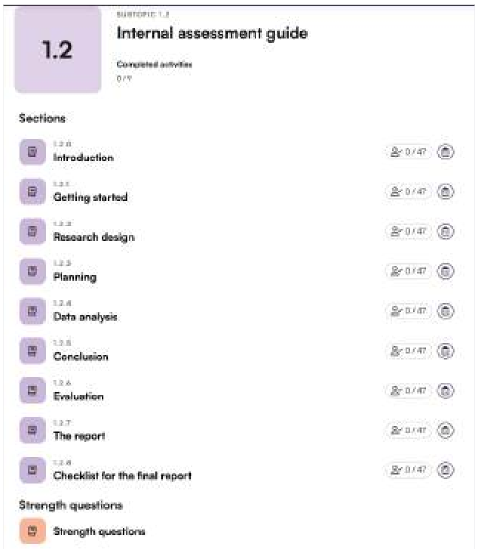
Nature of Science

Show or hide attributes

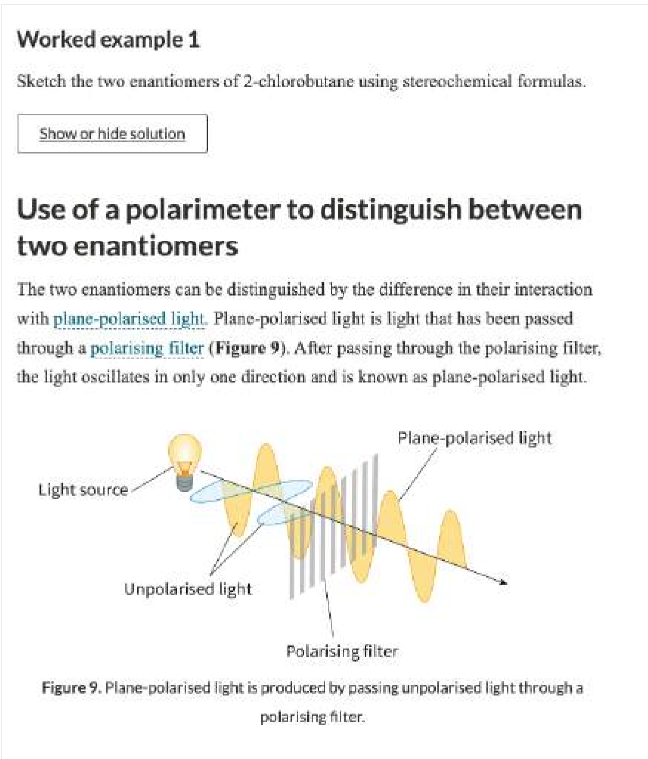
The placement of atoms within groups in the periodic table allows students and scientists to easily deduce how many valence electrons each element has, and therefore, the ion that they are likely to form (or even if they are likely to form an ion). Atoms that form more than one ion with different charges are also located within the same region of the periodic table.

You might have noticed that in **Table 1** silicon and argon were not assigned a charge. This is because silicon has four valence electrons, giving it a low tendency to form ions. Argon already has a full valence shell with a stable electron configuration and also has a low tendency to form ions.

In addition to the fully syllabus-aligned textbook, Kognity Chemistry includes a detailed support guide for the Internal Assessment as well as a fully-equipped practice centre.



Worked Examples and Activities are included throughout Kognity IBDP Chemistry to make clear connections between theory and practice.


Worked example 1

Sketch the two enantiomers of 2-chlorobutane using stereochemical formulas.

Show or hide solution

Use of a polarimeter to distinguish between two enantiomers

The two enantiomers can be distinguished by the difference in their interaction with plane-polarised light. Plane-polarised light is light that has been passed through a polarising filter (**Figure 9**). After passing through the polarising filter, the light oscillates in only one direction and is known as plane-polarised light.

Figure 9. Plane-polarised light is produced by passing unpolarised light through a polarising filter.