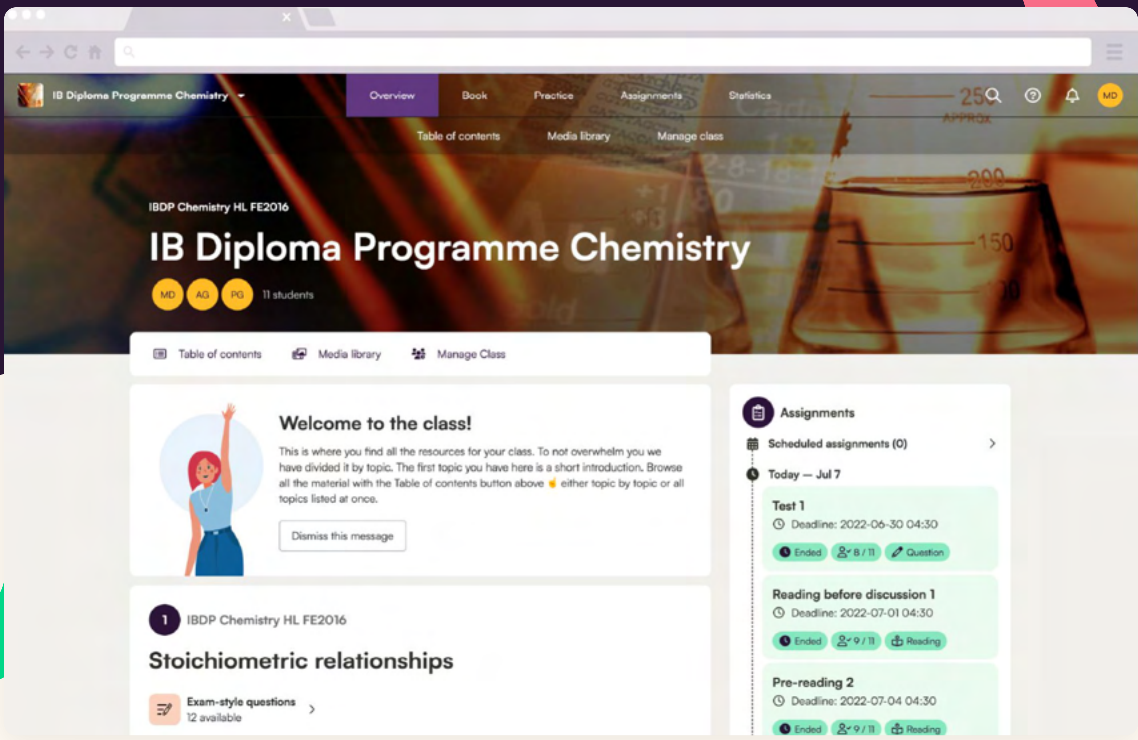
Kognity

IBDP Chemistry

Our IBDP Chemistry SL/HL subject supports the full DP syllabus for the first examination from 2016.



Key Features

Kognity IBDP Chemistry contains example experiments for each of the required practicals. Each experiment has a detailed procedure with apparatus and safety requirements that can be followed by teachers and students alike. There are also example calculations and practice questions for students to answer as they work through the experiment.

Deriving the empirical formula for a compound using mass changes

Background information

When a chemical reaction occurs, the mass of the reactant(s) must equal the mass of the product(s) to obey the Law of Conservation of Mass. When a compound contains an unknown ratio of atoms, experimental data can be used to determine the empirical formula of that compound. This experiment will determine the empirical formula of copper oxide.

State the two possible empirical formulae for copper oxide.

» Hide answer

Cu_2O (copper(I) oxide) and CuO (copper(II) oxide)

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.

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

This section invites the following Knowledge Question:

- Which WOK allow us to move from the macroscopic to the microscopic?

The concept of chemical equilibrium requires an understanding of both macroscopic and microscopic properties of a reaction system. This dual investigation is quite common in science, where scientists study both macroscopic and microscopic scales, although not always together. In an equilibrium system, it looks as if nothing is happening. In fact, it can be pretty boring! However, as you have just discovered in this section, the reality is far from this. At a microscopic level, the forward and backward reactions are continuing to take place.

So, how do we know this? What WOK are related here? Macroscopically there's nothing, but microscopically there's a lot – how do we know?

In equilibrium, even though the features differ, the parts do at least make up the whole perfectly, as they balance out. Taking this further, other AOKs also share this duality – but sometimes the parts and the whole don't always match. Consider, as an example, the Human Sciences when we apply this concept to ourselves and to our life stories, and when we recognise how there is a compelling nature to tell the story of the whole, even if the parts do not always fit. Read it here.

Do you think it is possible that you have told someone about yourself, and, without knowing it, have missed some parts or 'made' some parts fit what you want to say?

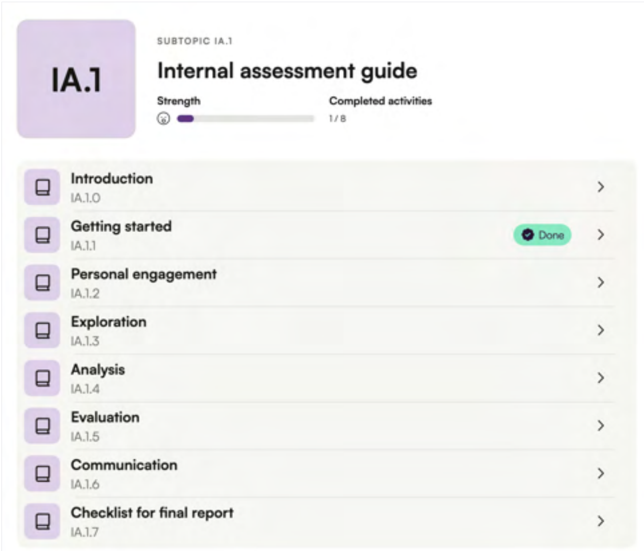
Nature of Science

Controlling variables

A key feature of the sciences is that the development of knowledge and understanding is based on experimental evidence. Essential to this approach is the need to focus the analysis on one component of a possibly complex problem at any one time and the control of any other variables that may confuse interpretation. Reaction kinetics is an area of study that exemplifies this essential part of the scientific approach to experimentation.

In the examples covered in this topic, we have seen how the concentration of all of the reactants but one must be kept constant so that the order with respect to that one under study can be found. The overall order of reaction is then found as the sum of the individual orders. The approach embodied in establishing a pseudo first-order situation (where the concentration of all but one of the reactant(s) is in substantial excess) is an alternative practical way of achieving the same end and can be used to determine an order of reaction.

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

Worked example

50.0 cm^3 of a 0.500 mol dm^{-3} solution of aqueous copper(II) sulfate was reacted with 3.00 g of zinc powder, according to the equation:

$$Zn\ (s) + CuSO_4\ (aq) \rightarrow ZnSO_4\ (aq) + Cu\ (s)$$

The results are shown in **Table 1** below. Use this data to determine the enthalpy change (ΔH) for the reaction.

Table 1. Results from zinc and copper sulfate experiment

Volume of 0.500 mol dm^{-3} $CuSO_4$ (aq) used (cm^3)	50.00
Mass of Zn powder added (g)	3.00
Initial temperature of solution (°C)	21.0
Maximum temperature of solution (°C)	43.5