VCE Chemistry

Units 3 and 4 key science skills mapping grid

A set of key science skills apply across Units 1 to 4. The table below provides a planning template for teachers to map how the contextualised key science skills on pages 11 and 12 of the *VCE Chemistry Study Design* will be developed by students across Units 3 and 4.

| Key science skill | VCE Chemistry contextualised skills for Units 3-4 | Unit 3 | Unit 4 |
| --- | --- | --- | --- |
| AoS1 | AoS2 | AoS1 | AoS2 | AoS3 |
| Develop aims and questions, formulate hypotheses and make predictions  | * identify, research and construct aims and questions for investigation
 |  |  |  |  |  |
| * identify independent, dependent and controlled variables in experiments
 |  |  |  |  |  |
| * formulate hypotheses to focus investigations
 |  |  |  |  |  |
| * predict possible outcomes of investigations
 |  |  |  |  |  |
| Plan and conduct investigations  | * determine appropriate investigation methodology: case study; classification and identification; controlled experiment; correlational study; fieldwork; literature review; modelling; product, process or system development; simulation
 |  |  |  |  |  |
| * design and conduct investigations; select and use methods appropriate to the selected investigation methodology, including consideration of sampling technique and size, equipment and procedures, taking into account potential sources of error and causes of uncertainty; determine the type and amount of qualitative and/or quantitative data to be generated or collated
 |  |  |  |  |  |
| * work independently and collaboratively as appropriate and within identified research constraints, adapting or extending processes as required and recording such modifications in a logbook
 |  |  |  |  |  |
| Comply with safety and ethical guidelines | * demonstrate safe laboratory practices when planning and conducting investigations by using risk assessments that are informed by safety data sheets (SDS), and accounting for risks
 |  |  |  |  |  |
| * apply relevant occupational health and safety guidelines while undertaking practical investigations
 |  |  |  |  |  |
| * demonstrate ethical conduct when undertaking and reporting investigations
 |  |  |  |  |  |
| Generate, collate and record data  | * systematically generate and record primary data, and collate secondary data, appropriate to the investigation, including use of databases and reputable online data sources
 |  |  |  |  |  |
| * record and summarise both qualitative and quantitative data, including use of a logbook as an authentication of generated or collated data
 |  |  |  |  |  |
| * organise and present data in useful and meaningful ways, including schematic diagrams, flow charts, tables, bar charts and line graphs
 |  |  |  |  |  |
| Analyse and evaluate data and investigation methods  | * process quantitative data using appropriate mathematical relationships and units, including calculations of ratios, percentages, percentage change and mean
 |  |  |  |  |  |
| * use appropriate numbers of significant figures in calculations
 |  |  |  |  |  |
| * plot graphs involving two variables that show linear and non-linear relationships
 |  |  |  |  |  |
| * identify and analyse experimental data qualitatively, handling, where appropriate, concepts of: accuracy, precision, repeatability, reproducibility, resolution, and validity of measurements; and errors (random and systematic)
 |  |  |  |  |  |
| * identify outliers, and contradictory, provisional or incomplete data
 |  |  |  |  |  |
| * repeat experiments to evaluate the precision of data
 |  |  |  |  |  |
| * evaluate investigation methods and suggest ways to improve precision, and to reduce the likelihood of errors
 |  |  |  |  |  |
| Construct evidence-based arguments and draw conclusions | * distinguish between opinion and evidence, and between scientific and non-scientific ideas
 |  |  |  |  |  |
| * evaluate data to determine the degree to which the evidence supports the aim of the investigation, and make recommendations, as appropriate, for modifying or extending the investigation
 |  |  |  |  |  |
| * evaluate data to determine the degree to which the evidence supports or refutes the initial prediction or hypothesis
 |  |  |  |  |  |
| * use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with evidence and relevant to the question under investigation
 |  |  |  |  |  |
| * identify, describe and explain the limitations of conclusions, including identification of further evidence required
 |  |  |  |  |  |
| * discuss the implications of research findings
 |  |  |  |  |  |
| Analyse, evaluate and communicate scientific ideas | * use appropriate chemical terminology, representations and conventions, including standard abbreviations, graphing conventions, algebraic equations, units of measurement and significant figures
 |  |  |  |  |  |
| * discuss relevant chemical information, ideas, concepts, theories and models and the connections between them
 |  |  |  |  |  |
| * analyse and explain how models and theories are used to organise and understand observed phenomena and concepts related to chemistry, identifying limitations of selected models/theories
 |  |  |  |  |  |
| * critically evaluate and interpret a range of scientific and media texts (including journal articles, mass media communications and opinions in the public domain), processes, claims and conclusions related to chemistry by considering the quality of available evidence
 |  |  |  |  |  |
| * apply sustainability concepts (green chemistry principles, development goals and the transition from a linear towards a circular economy) to analyse and evaluate responses to chemistry-based scenarios, case studies, issues and challenges
 |  |  |  |  |  |
| * identify and explain when judgements or decisions associated with chemistry-related issues may be based on sociocultural, economic, political, legal and/or ethical factors and not solely on scientific evidence
 |  |  |  |  |  |
| * use clear, coherent and concise expression to communicate to specific audiences and for specific purposes in appropriate scientific genres, including scientific reports and posters
 |  |  |  |  |  |
| * acknowledge sources of information and assistance, and use standard scientific referencing conventions
 |  |  |  |  |  |