Information Bulletin
Chemistry 30

Diploma Examinations Program **2026–2027**

Alberta

This document was primarily written for:		
Students		
Teachers	✓	of Chemistry 30
Administrators		
Parents		
General Audiences		
Others		

2026–2027 Chemistry 30 Information Bulletin

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Introduction

The purpose of this bulletin is to provide teachers of Chemistry 30 with information about the diploma examinations scheduled in the 2026–2027 school year. This bulletin should be used in conjunction with the current Chemistry 30 Program of Studies.

This bulletin includes information about the *Chemistry 30 Examinations* that will be administered in November 2026 and January, April, June, and August 2027; clarifications of some aspects of the examinations; and other subject-specific information.

The mark awarded to a student on the *Chemistry 30 Diploma Examinations* in the 2026–2027 school year will account for 30% of the student's final blended mark, and the school-awarded mark will account for the remaining 70%.

Teachers are encouraged to share the contents of this bulletin with students.

For further information about program implementation, refer to the Alberta Education and Childcare website.

Examination Security

All diploma examinations will be held secure until they are released to the public by the Minister (i.e., no longer confidential). No secure diploma examination is to be previewed until it is released to the public by the Minister. No secure diploma examination is to be previewed, discussed, copied, or removed from the room in which the examination is being written. However, for the January and June administrations only, teachers will be allowed to peruse the diploma examination for review purposes 1 hour after the examination has started.

For mathematics and science diploma examinations, all diploma examinations must be kept secure before, during, and after administration, without exception.

For humanities diploma examinations, the humanities *Part A: Written Response* examinations in the January and June administrations must be kept secure until after they are administered. All other humanities *Part A: Written Response* examinations, and all humanities *Part B* examinations, must be kept secure before, during, and after administration, without exception.

For more information about teacher perusal and examination security, please refer to the Administering diploma exams web page.

Time Limits on Diploma Examinations

All students may use extra time to write diploma examinations. This means that all students have up to 6 hours to complete the *Chemistry 30 Diploma Examination*, if they need it. The examination is nevertheless designed so that the majority of students can complete it within 3 hours. The examination instructions state both the designed time and the total time allowed.

Although extra time is allowed for diploma examinations in all subjects, the total time allowed is not the same in all subjects. For more information about accommodations and provisions for students, please refer to the Administering diploma exams web page.

Equating to Maintain Consistent Standards over Time on Diploma Examinations

A goal of Alberta Education and Childcare is to make scores achieved on examinations within the same subject directly comparable from session to session, to ensure fairness to students across administrations.

To achieve this goal, the examination has a number of questions in common with a previous examination. Common (anchor) items are used to find out if the student population writing in one administration differs in achievement from the student population writing in another administration. Common items are also used to find out if the unique items (questions that have never appeared in a previous examination) differ in difficulty from the unique (non-anchor) items on the baseline examination that sets the standard to which all students are held.

A statistical process called equating adjusts for differences in difficulty between examinations. Examination marks may be adjusted depending upon the difficulty of the examination written relative to the baseline examination. Therefore, the resulting equated examination scores have the same meaning regardless of when and to whom the examination was administered. Equated diploma examination marks are reported to students. More information about equating is available on the Administering diploma exams web page.

Because of the security required to ensure fair and appropriate assessment of student achievement over time, *Chemistry 30 Diploma Examinations* will be fully secured and will not be released at the time of writing.

Diploma Examinations: Multiple Forms

Some subjects may have two distinct forms (versions) of diploma examinations during major administrations (January and June). Like all other diploma examinations, the two forms are equated to the baseline examination to ensure that the same standard applies to both forms. Both forms adhere to the established blueprint specifications and are reviewed by a technical review committee.

To facilitate the analysis of school-level results, each school receives only one examination form per subject. In subjects offering a translated French-language examination, both forms are administered in English and in French.

For more information, contact the following:

Diploma exam format, content, confirming standards,
marking, and results reporting
Diploma.Exams@gov.ab.ca

or

Diploma exam security, diploma exam rules,
scheduling, and policy issues
Exam.Admin@gov.ab.ca

How to Get Involved

High-quality diploma examinations are the product of close collaboration between classroom teachers and Alberta Education and Childcare. Classroom teachers from across Alberta are involved in many aspects of diploma examination development, including the development of items; the building, reviewing, administering, and marking of field tests; the reviewing and validating of diploma examinations; the reviewing of support documents; and the marking of diploma examinations.

The development of test items from when they are written until when they appear on an examination takes at least one year. All items on the *Chemistry 30 Diploma Examinations* are written and/or validated by Chemistry 30 teachers from across Alberta. After provincial implementation of the program of studies, items are field tested to ensure their reliability and validity. Diploma examinations are reviewed by editors, teachers, academic experts, curriculum staff, translators, and a French validation working group.

Alberta Education and Childcare values the involvement of teachers and annually asks school authorities for the names of teachers who are interested in being involved in any of the development processes for diploma examinations. Teachers who are interested in developing items, constructing field tests, or reviewing and validating examinations are encouraged to talk to their principals about how they can submit their names for approval to be involved in these processes. Although the call for submissions for working groups occurs each fall, teachers are welcome to have their names submitted at any time.

Field Testing

Field testing is an essential stage in the development of fair, valid, and reliable provincial examinations. Field testing is a process of collecting data on questions before the questions become part of a diploma examination. Potential diploma examination questions are administered to students in field tests for diploma courses throughout the province to determine the difficulty and appropriateness of the questions. Each field test requires a large student sample to provide the examination developers with reliable information (i.e., statistical data and written validation comments from teachers and students).

How do field tests help teachers and students?

Teachers receive each student's score promptly, gaining useful information about their students' performance. Students benefit from writing a test that duplicates some of the experience of writing a diploma examination. Field tests provide students and teachers with examples of the format and content of questions that may appear on diploma examinations. Finally, because of field testing, students, teachers, and parents can be reassured that the questions on diploma examinations have undergone a rigorous development, improvement, and validation process.

How are field test data used?

The data received from field tests indicate the validity, reliability, and fairness of each question. Questions that meet specific standards are selected for use on future diploma examinations.

Some questions or sets of questions may not initially perform as well as we require. These questions may be revised and tested again in field tests. Revisions are influenced by the written comments of students and teachers, who provide valuable advice about the appropriateness of the questions, the adequacy of writing-time limits, test length, text readability, artwork/graphics clarity and suitability, and question difficulty.

Science field tests

Science field tests are available in digital format on the digital assessment platform.

Students may use paper data booklets or data pages for all science field tests. These resources will also appear in the digital assessment platform. Students should have scrap paper, which may be accessed in the "Forms" section on the Administering diploma exams web page. All paper data sheets and scrap paper with markings must be securely shredded at the end of the field test administration.

Teachers are provided with data on how their students performed. Test items address learning outcomes in the program of studies, which allows teachers to use field test results to learn more about their students' strengths and areas for improvement.

The security of field test items remains vital to the administration of diploma examinations. Participating teachers must commit to maintaining the security of field test items.

More information about field test registration deadlines, administration, and security is available in the *Field Testing Guide 2026–2027* on the Teacher participation in provincial assessments web page.

How can teachers schedule field tests?

Field tests are offered digitally on the digital assessment platform. To schedule a field test, teachers must have a digital assessment platform teacher account.

For information about how to schedule and administer a field test, please refer to the *Field Testing Guide 2026–2027* on the Teacher participation in provincial assessments web page or contact Field.Test@gov.ab.ca.

Detailed instructions for how to schedule a field test can also be found on the digital assessment platform Help web page.

For more information, contact the following:

Diploma exam format, content, confirming standards,
marking, and results reporting
Diploma.Exams@gov.ab.ca

or

Diploma exam security, diploma exam rules,
scheduling, and policy issues
Exam.Admin@gov.ab.ca

Chemistry 30 Field Testing

All Chemistry 30 field tests are offered in a digital format, and two different types are available: end-of-course field tests and unit field tests. End-of-course field tests have questions related to outcomes in all four units of the program of studies; unit field tests have questions related to outcomes in one single unit.

The table below shows the format, number of questions, and length of time for field tests available for the 2026–2027 school year. Teachers may wish to consider this table when requesting a field-test placement.

	Unit Test (Online)	End-of-course Test (Online)
Number of questions	18–22	18–22
Test time (min)	65*	65*

*The field tests are designed to be completed in 65 minutes; however, an additional 15 minutes may be used, if available. These time instructions appear on the field test instructions pages.

Type of Field Test	
Unit test	Unit A: Thermochemical Changes Unit B: Electrochemical Changes Unit C: Chemical Changes of Organic Compounds Unit D: Chemical Equilibrium Focusing on Acid–Base Systems
End-of-course	All four units

The data booklet is available in the digital assessment platform for Chemistry 30 field tests; however, students are still permitted to use paper copies of the data booklet when writing field tests, and teachers should ensure that their class has sufficient unmarked data booklets available for the testing session.

Field Tests can be scheduled either within class time or outside class time up to the day before the C*hemistry 30 Diploma Examination*.

For information about how to schedule and administer a field test, please refer to the *Field Testing Guide 2026–2027* on the Teacher participation in provincial assessments web page or contact Field.Test@gov.ab.ca.

Detailed instructions for how to schedule a field test can also be found on the digital assessment platform Help web page.

Practice Tests

To give students an opportunity to practise answering questions similar to those used on diploma examinations that address learning outcomes in the program of studies, Alberta Education and Childcare produces practice tests for subjects that have a diploma examination. Students can access these practice tests using Alberta Education and Childcare's digital assessment platform.

Special-format Practice Tests

To give students an opportunity to practise answering questions similar to those used on diploma examinations that address learning outcomes in the program of studies in Braille, large print, or coloured print versions, Alberta Education and Childcare produces special-format practice tests for all subjects that have a diploma examination. Alberta schools with registered Alberta K–12 students may place orders for these tests. Braille versions are available in English and, by request, in French. All tests are provided free of charge, but limits may be placed on order volumes to ensure access for all students.

For the greatest benefit, special-format practice tests should be written under conditions similar to those of the corresponding diploma examination. The same rules regarding the use of resources and devices should be followed.

Braille versions must be returned to Alberta Education and Childcare after use.

For more information or to place an order, contact Field.Test@gov.ab.ca.

Audio Descriptions

A support document, *Examples of Descriptions Used in Audio-enabled Versions of Science Diploma Exams*, has been developed to assist teachers and students planning to use an audio version during the administration of a science diploma examination.

A Grade 12 Practice Test (machine scored) and humanities *Part A* (written response) practice tests with text-to-speech enabled can be accessed on Alberta Education and Childcare's digital assessment platform.

Course Objectives

Chemistry 30 is intended to develop students' understanding of the interconnecting ideas and chemistry principles that transcend and unify the natural-science disciplines and of their relationship to the technology that students use in their daily lives. It is of utmost importance to remember that Chemistry 30 is an experimental discipline that develops the knowledge, skills, and attitudes to help students become capable of and committed to setting career and/or life goals, make informed choices, and act in ways that will improve the level of scientific awareness essential for a scientifically literate society. Laboratory experience is an essential component of the Chemistry 30 course.

Students of Chemistry 30 are expected to develop an aptitude for collecting data, observing, analyzing, forming generalizations, hypothesizing, and making inferences from observations. The course is designed to promote students' understanding of chemistry concepts and their ability both to apply these concepts to relevant situations and to communicate in the specialized language of chemistry.

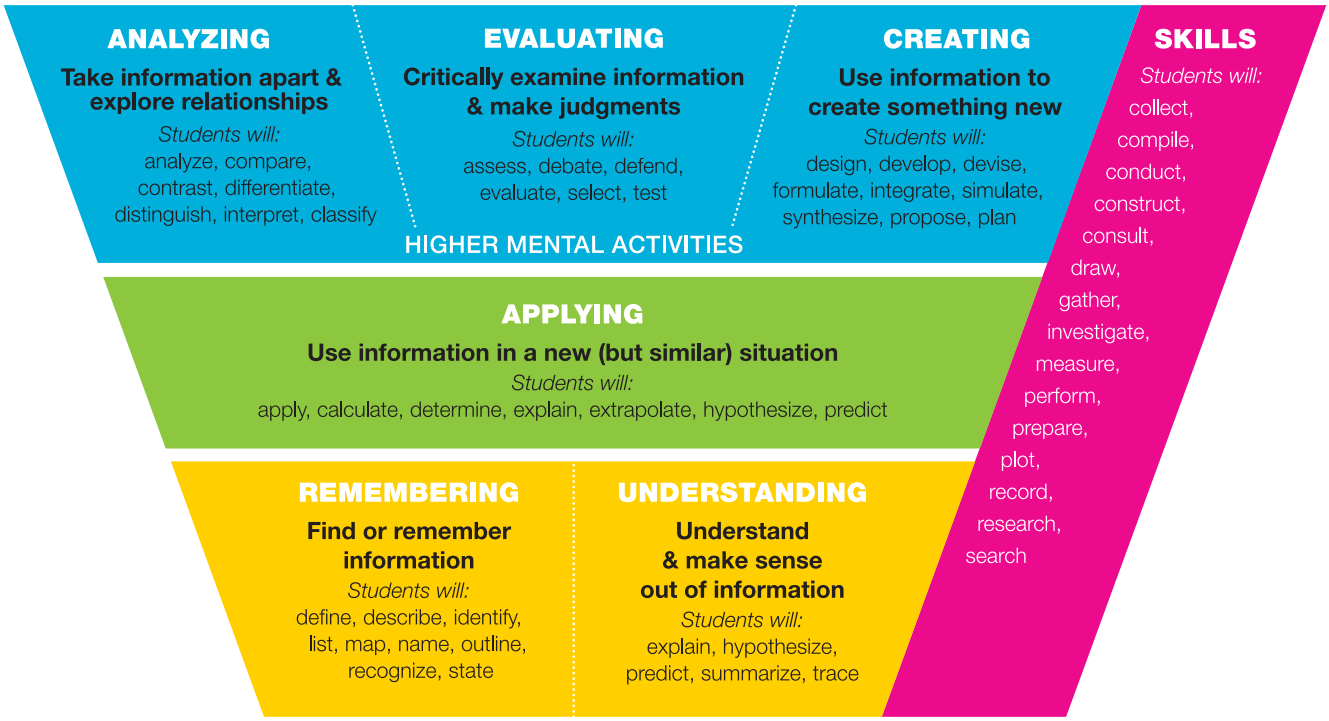
Success in Chemistry 30 requires the successful completion of Science 10, Chemistry 20, and concurrent mathematics courses that develop the requisite knowledge and skills.

The revised Chemistry 30 Program of Studies was implemented in 2008, and the first diploma examination on the revised program was administered in January 2009. The program was updated in 2014 to include links to mathematics.

Cognitive Expectations in the Program of Studies

Outcomes in the Chemistry 30 Program of Studies contain verbs that indicate the cognitive expectation of the outcome. Verbs typically classified as remembering and understanding (R/U) are coded yellow in the chart below; verbs typically classified as applying (A) are coded green; verbs typically classified as higher mental activities (HMA) are coded blue; and those related to skills are coded pink.

The following graphic shows the information arranged in a hierarchy, which is the arrangement used in the revised Bloom's taxonomy. The graphic is used fairly consistently in the four diploma examinations that assess science: Biology 30, Chemistry 30, Physics 30, and Science 30.



*Verbs can have multiple connotations and can therefore indicate more than one cognitive level. The cognitive expectation is communicated by the context.
—based on Anderson, Krathwohl, and Bloom, 2001

The verbs arranged in the graphic shown above are only those that have been used in the Chemistry 30 Program of Studies. Remember that the graphic should serve only as a guideline and that the verbs are not permanently fixed in the categories shown. A verb can indicate a variety of cognitive levels depending on the context in which it is used; the verb and the context together are what determines the cognitive expectation.

Note that difficulty is independent of cognitive level. Outcomes at any of the cognitive levels can be assessed at either the acceptable standard or the standard of excellence.

Performance Expectations

Curriculum standards

Provincial curriculum standards help to communicate how well students need to perform to be judged as having achieved the objectives specified in the Chemistry 20–30 Program of Studies. The specific statements of standards are written primarily to inform Chemistry 30 teachers about the extent to which students must know the Chemistry 30 content and demonstrate the required skills to pass the examination.

Diploma exams are designed to match the program of studies of each subject, but what the diploma exams measure may not be the same in scope as what teachers measure. Diploma exam marks and teacher-awarded marks should reflect the same standard, however, because both assess students based on the same program of studies (curriculum). Alberta Education works with teachers to set and maintain the standards of achievement for diploma exams. This information bulletin is intended to assist teachers in understanding the provincial standards for Chemistry 30.

Acceptable standard

Students who meet the acceptable standard in Chemistry 30 will receive a final course mark of 50% or higher. These students demonstrate a basic understanding of the nature of scientific investigation by designing, observing, performing, and interpreting simple laboratory tests. They can readily interpret data that are presented in simple graphs, tables, and diagrams and can translate symbolic representations into word descriptions. They are able to recognize and provide definitions for key chemical terms and can predict the physical and chemical properties of compounds. They are able to balance simple equations (combustion, formation, neutralization, or oxidation–reduction) and can solve standard, single-step, stoichiometric problems. Following laboratory procedures does not present a problem for these students, nor does using the data booklet to extract relevant information. These students compose clear and logical descriptive or explanatory statements to answer closed-response questions that involve individual chemistry concepts.

Standard of excellence

Students who achieve the standard of excellence in Chemistry 30 will receive a final course mark of 80% or higher. In addition to meeting the expectations for the acceptable standard of performance, these students demonstrate an interest in chemistry and can articulate chemistry concepts well. They can readily interpret interrelated sets of data such as complex graphs, tables, and diagrams. When presenting scientific data, they select the most appropriate and concise format. These students can analyze and evaluate experimental designs. They generate their own laboratory procedures when given a clearly defined problem, recognize weaknesses in laboratory work, and find ways to correct the weaknesses. They are able to formulate their own equations for formation, combustion, neutralization, redox, and equilibrium reaction expression and can solve many variations of stoichiometric problems based upon these equations. They transfer what they observe in a laboratory setting into equation form and express scientific ideas clearly. They solve problems that involve the overlapping of two or more concepts. The most significant characteristic of this group is that they solve problems of a new and unique nature and extrapolate these solutions to higher levels of understanding. Open-ended questions do not pose problems for them. These students communicate clearly and concisely, using appropriate scientific vocabulary and conventions.

For more details on the relationship between the program of studies and the performance standards, see *Chemistry 30 Student-Based Performance Standards*, available on the Writing diploma exams web page. The student-based performance standards document provides examples of some behaviours exhibited by students at the acceptable standard and at the standard of excellence. The document should be used in conjunction with the program of studies, as it is not intended to replace the program of studies.

Examination Specifications and Design

Each *Chemistry 30 Diploma Examination* is designed to reflect the general outcomes outlined in the Chemistry 30 Program of Studies and is blueprinted to the same specifications. The general outcomes are expressed in more detail by the specific outcomes, which are organized into four units. Some questions on each diploma examination will assess achievement of particular outcomes, and other questions will be based on the integration of several outcomes.

General Outcomes	Units of Study	Emphasis
A1 and A2	**Thermochemical Changes** Students will determine and interpret energy changes in chemical reactions and will explain and communicate energy changes in chemical reactions.	**20–22%**
B1 and B2	**Electrochemical Changes** Students will explain the nature of oxidation–reduction reactions and apply the principles of oxidation–reduction to electrochemical cells.	**29–32%**
C1 and C2	**Chemical Changes of Organic Compounds** Students will explore organic compounds as a common form of matter and describe chemical reactions of organic compounds.	**20–22%**
D1 and D2	**Chemical Equations Focusing on Acid–Base Systems** Students will explain that there is a balance of opposing reactions in chemical equilibrium systems and determine the quantitative relationships in simple equilibrium systems.	**29–32%**

Questions on the diploma examination will require students to demonstrate knowledge of science concepts and to apply skills in a context that supports making Science, Technology, and Society (STS) connections.

Scientific Process and Communication Skills	Science, Technology, and Society Connections (STS)
Students will • formulate questions about observed relationships and plan investigations of questions, ideas, problems, and issues • conduct investigations into relationships among observable variables and use a broad range of tools and techniques to gather and record data and information • analyze data and apply mathematical and conceptual models to develop and assess possible solutions • work collaboratively in addressing problems and apply the skills and conventions of science in communicating information and ideas and in assessing results	The student can • explain that technological problems often require multiple solutions that involve different designs, materials, and processes and that have both intended and unintended consequences • explain that scientific knowledge may lead to the development of new technologies and that new technologies may lead to or facilitate scientific discovery • explain that the goal of technology is to provide solutions to practical problems • explain that scientific knowledge and theories develop through hypotheses, the collection of evidence, investigation, and the ability to provide explanations • explain that the goal of science is knowledge about the natural world • explain that the products of technology are devices, systems, and processes that meet given needs; however, these products cannot solve all problems • explain that the appropriateness, risks, and benefits of technologies need to be assessed for each potential application from a variety of perspectives, including sustainability • describe science and technology applications that have developed in response to human and environmental needs • explain that science and technology have influenced, and have been influenced by, historical development and societal needs • explain how science and technology are developed to meet societal needs and expand human capability • explain how science and technology have both intended and unintended consequences for humans and the environment • explain that technological development may involve the creation of prototypes, the testing of prototypes, and the application of knowledge

Most of the examination questions are context-based. This means questions are organized into sets related to contexts associated with topics in the program of studies. A particular context may be used for one or more questions.

Context-based questions are necessary to assess the cognitive expectations of the program of studies. Students should expect to see some chemical contexts that are completely new to them. They can be confident that the knowledge, skills, and attitudes they acquired in Chemistry 30 have prepared them for these questions.

The order of questions in a diploma examination typically follows the order of units in the program of studies; however, a question could appear on the examination in another unit if the question's context relates to outcomes in more than one unit.

Questions that require skill in applying scientific processes and questions that require STS connections are distributed throughout the examination.

The digital format of the *Chemistry 30 Diploma Examination* consists of 60 machine-scored questions worth 1 mark each.

Chemistry 30 Diploma Examination Instructions Page: Digital Format

Chemistry 30

Grade 12 Diploma Examination

Description

Time: 3 hours. This closed-book examination was developed to be completed in 3 hours; however, you may take an additional 3 hours, should you need it.

This examination consists of 60 questions, each worth 1 mark.

Data sheets can be viewed by clicking the Resources icon at the right side of the screen.

A paper version of the data sheets is also permitted.

Instructions

- You may use **one** approved calculator: **either** a scientific calculator that does **not** have prohibited properties **or** a graphing calculator approved by Alberta Education and Childcare.
- You **must** clear your calculator of all information that is stored in the programmable or parametric memory both before and after the examination.
- You are permitted to use scrap paper for your rough work. **No marks** will be given for work done on scrap paper.
- When necessary, use the values of constants provided on the data sheets or in the information included with the question.
- If you change an answer, your examination will be automatically updated.
- To submit your **final** answers, click "Submit" on the left side of the screen.

Chemistry Data Booklet

The most current version of the *Chemistry Data Booklet* has a publication date of 2010. It is posted on the Writing diploma exams web page. Permission is granted to Alberta educators to reproduce the data booklets for educational purposes and on a non-profit basis.

Students are permitted to use the print version of the *Chemistry Data Booklet* on digital-format field tests and diploma exams.

Ordering the *Chemistry Data Booklet*

Print copies of the *Chemistry Data Booklet* are available from Alberta King's Printer. Search by title or keyword within the online catalogue. Visa, MasterCard, and American Express are accepted. Many schools will already have an account with Alberta King's Printer and can use this account to make a purchase order. Shipping charges will apply and orders can be shipped collect or on account with designated couriers.

Using Calculators

The *Chemistry 30 Diploma Examination* requires the use of a calculator that does not have prohibited properties or a graphing calculator approved by Alberta Education and Childcare. The calculator rules, list of prohibited properties, criteria, and keystrokes for clearing approved graphing calculators are found in *2026–27 Calculator Information and Rules for Mathematics and Science Diploma Exams* on the Writing diploma exams web page.

Teachers should be aware of the capabilities of approved graphing calculators that are available when the calculator is not configured for exam purposes, as these capabilities may impact classroom instruction and assessment. These capabilities may also be applicable to other high school math and science courses.

Using Scrap Paper

Students are permitted to use scrap paper for rough work; however, all blank and graph scrap paper must be provided to students by examination supervisors. Students are not permitted to bring in blank pieces of paper, including sticky or Post-it® notes, for rough draft work. Alberta Education and Childcare blank and graph scrap paper can be accessed and printed from the "Forms" section on the Administering diploma exams web page.

No marks will be given for work done on scrap paper. All scrap paper must be securely shredded after the administration of the examination.

Assessment of Skills and STS Outcomes

Chemistry 30 Diploma Examination questions are intended to measure students' understanding of chemistry concepts. It is important to remember that some questions will measure students' understanding and use of skills associated with scientific inquiry, and some questions have been designed to measure students' understanding of the connections between science and technology, as well as between science, technology, and society. As a result, many questions measure how well students can apply the skills and knowledge they have acquired in science to everyday life. The appearance of questions on the diploma examination that assess STS outcomes should be expected.

Trends in Student Performance

In the thermochemistry unit, some students always use the specific heat capacity of water, not recognizing that often they need to use a different value. The students show a basic competence in those questions that assess calculations of enthalpies of formation and reaction, using either Hess's law or data from a calorimetry experiment. However, in a calorimetry experiment, the students often forget to subtract the final mass of a substance used in the calorimetry chemical reaction from the initial mass given in the design or observation table of the experiment. Students have difficulty identifying liquid water as a product of combustion in a closed system and gaseous water as a product of combustion in an open system. Students are able to interpret enthalpy diagrams that either include or exclude representations of the activation energy. However, they have more difficulty in relating these enthalpies to the breaking and forming of bonds. Students commonly use the heat of reaction of an equation instead of the molar enthalpy when determining the enthalpy change of a reaction after being given a specific mass or number of moles that react.

In the electrochemistry unit, students can identify redox reactions and produce balanced equations for the overall reactions where there is no disproportionation. They can identify oxidizing and reducing agents but have difficulty producing equations for half-reactions when presented with an overall reaction involving species that are not in the Table of Standard Electrode Potentials in the data booklet. Students are very successful at determining oxidation numbers, with the exception of oxygen in peroxides. They are able to balance redox reactions in acidic solutions if all of the species are given but experience difficulty if given a skeleton equation where $H^+(aq)$ and $H_2O(l)$ are not identified as products or reactants. They can calculate concentrations involved in redox titrations when the overall reaction equation is given, as well as calculate the potential differences associated with overall reactions whose constituent half-reactions are in the Table of Standard Electrode Potentials. However, when half-reactions are not in the table, or a different reference half-reaction is used, students are much less successful in calculating concentrations, reduction potentials, or potential differences. Students are successful doing calculations involving Faraday's law when the mole-to-mole ratio is 1:1, but they have difficulty with other mole ratios. Students are successful at identifying and labelling a voltaic cell, but they have difficulty identifying and labelling electrolytic cells.

The organic chemistry unit is divided into three sections: the naming and classifying of compounds, the physical properties of organic compounds, and chemical reactions involving organic compounds. Students are very successful at naming and classifying compounds, somewhat successful at questions involving physical properties, and less successful at questions involving chemical properties. Students also have a hard time relating variations in boiling point to differences in intermolecular bonding. Students are very capable of identifying the region where different hydrocarbons are collected in a fractional distillation tower but are weak at identifying the processes that occur to separate the organic compounds from natural mixtures and solutions. They have little success with questions that involve solvent extraction. Students succeed at identifying polymers when the monomers are given, but struggle with determining the monomers from a given polymer.

In the equilibrium unit, students have difficulty in identifying the criteria that apply to a chemical system at equilibrium. They are very successful in using Le Châtelier's principle to make predictions if the stresses are explicitly stated—except in the case of a volume or pressure stress—and in predicting the stress when the data are expressed graphically. They have more difficulty if the stresses are stated implicitly, as in the use of hydroxide ions as a means of removing hydronium ions, or the use of silver ions to remove chloride or bromide ions. In questions involving the use of ICE tables, students are able to use ICE tables to calculate equilibrium concentrations but often do not use them to calculate initial concentrations, especially for weak acids and bases whose pH and either K_a or K_b are given. Calculations linking pH and pOH, or linking K_a and K_b, are completed successfully, but students have more trouble linking pH with either concentration, K_a or K_b for weak acids or weak bases, respectively. When working with graphs, students can identify the regions of a titration curve but find it hard to make qualitative predictions of the pH at the equivalence points associated with weak acid–strong base and strong acid–weak base titrations. Students are able to choose an appropriate buffer when given a selection, but have difficulty determining the result of using the buffer.

Clarifications

In chemistry, experiments are planned and performed, observations and measurements are made, and then either an inference is drawn or values are calculated. Many students do not distinguish between an observation and an inference when they are asked to analyze a laboratory experiment. For example, if asked to list the observations made during the electrolysis of aqueous sodium bromide, NaBr(aq), students may list as observations that hydrogen gas was released at the cathode, that bromine liquid was formed at the anode, and that the hydroxide ion concentration in the electrolyte increased. These are not observations; these are inferences drawn from the observations of a gas being released at one electrode, an orange liquid being formed at the other electrode, and the solution turning red litmus paper blue.

When identifying the variables required to investigate a given problem statement or to test a given hypothesis, students often choose quantities that were derivable from measured quantities, rather than quantities that are directly measurable. For example, when testing a hypothesis related to acid–base equilibrium, students choose quantities such as K_a, K_b, or hydronium ion concentration as an appropriate responding variable, rather than pH. The variables K_a, K_b, and hydronium ion concentration are not directly measurable, as they have to be calculated from the observed pH. Thus, pH is the responding variable in this investigation.

Students understand that controlled variables take on constant values during the course of an experiment. However, they may not understand the concept that a controlled variable is a variable that the experimenter could have varied, but chose not to. For example, in an experiment investigating the boiling points of alcohols as a function of the molar mass, one possible controlled variable is the atmospheric pressure, another might be the number of branches in the structure of the alcohol, and another might be the location of the hydroxyl functional group in the alcohol. The older term for controlled variables, variables held constant, shows the meaning in the two steps. First, the quantity is selected, and it could possibly vary. Second, the experimenter arranges their experimental setup so that this variable can be shown to remain fixed in value.

Controlled variables cannot include any parameter that is not under the direct control of the experimenter. In this instance, the type of compound, alcohol, cannot be considered a controlled variable, as varying this parameter will change the essential nature of the hypothesis being investigated.

Unit A

In the assessment of outcomes A1.8k and A1.1s:

- Students should be familiar with different designs that can be used for the measurement of energy changes in a chemical system. These include designs where the temperature change of the container is accounted for, not just that of its contents.
- Some detailed calculations will include the temperature change of the calorimeter, but some may be answered qualitatively. As one example, a calorimeter composed of a material with a large specific heat capacity will undergo a smaller temperature change than a calorimeter composed of a material with a significantly lower specific heat capacity. Another example relies on the insulating properties of polystyrene to predict that any temperature change of the cup calorimeter can be assumed to be negligible.
- In experiments using polystyrene calorimeters, the limiting measurement is the measurement of temperature using liquid-in-glass thermometers, where the errors can be on the order of 10%. When volumes of liquids used in calorimetry are measured, any error reduction due to the precision obtained by using a volumetric pipette rather than a graduated cylinder is smaller than the error introduced by temperature measurements. Accordingly, the use of a volumetric pipette is not necessary and is not considered standard practice for calorimetry experiments.
- When a small amount (less than 10% of the mass of the solvent) of solute is added to a solvent, the mass m in the formula $Q = mc\Delta T$ or $\Delta H = mc\Delta T$ can be taken as the mass of the solvent, and c taken as the specific heat capacity of the solvent. Answers that use the mass of the solution for m require the use of the specific heat capacity of the solution for c, and this quantity may or may not be similar to the specific heat capacity of the solvent.
- Outcome A1.8k states that the students are to use calorimetry data to determine the enthalpy change in chemical reactions. This includes various types of chemical reactions, including combustion and neutralization.

In the assessment of outcomes A1.8k and A1.9k:

- When enthalpies of combustion are determined empirically, they are determined in a bomb calorimeter and the water produced is in liquid form. In the open environments that are familiar in everyday life, the combustion of most substances releases heat sufficient to convert any water produced from the reaction into water vapour. Often a diploma examination question refers to an enthalpy of combustion for a fuel such as propane in a barbecue or butane in a lighter. Since these examples represent reactions that are performed in an open environment, students should use water vapour as a product to determine acceptable values for the enthalpy of combustion.
- On diploma examinations, the general principle that will be followed is that if combustion reactions are performed in a closed system, liquid water will be the product; and if the combustion occurs in an open system, water vapour will be the product. Students are not required to have existing knowledge of or exposure to a bomb calorimeter.

In the assessment of outcomes A2.3k, A1.3s, and A2.3s:

- On the diploma examination, enthalpy diagrams will be similar to the two figures shown below. Enthalpy diagrams can be used to indicate relative positions for exothermic or endothermic reactions (see Figure 1). We cannot determine an exact value for the potential energy of a substance, but we can determine values for enthalpies of reaction, using enthalpies of formation (see Figure 2).

Figure 1

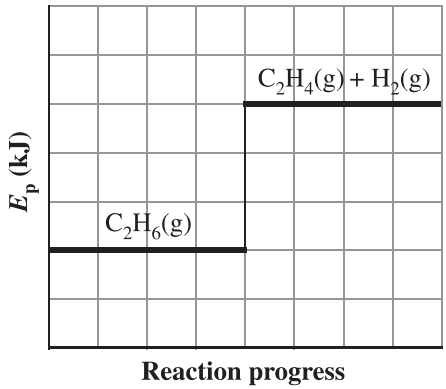
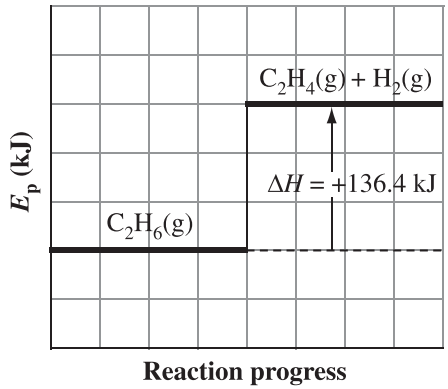


Figure 2



In the assessment of outcome A2.3s:

- Students will be expected to calculate the efficiency of a thermal energy source and to explain the discrepancies between theoretical and measured values obtained from calorimetry experiments. They are expected to predict whether a given source of error will lead to a lower or to a higher calculated value for an enthalpy of reaction, as well as predict whether an observed enthalpy or temperature change is lower or higher than the theoretical enthalpy or temperature change.

In the assessment of outcome A2.4k:

- Catalyst questions may involve biological enzymes as well as catalysts in non-living systems, but any discussion of enzyme mechanisms is beyond the scope of the program of studies.

Unit B

In the assessment of outcome B1.2k:

- The term *disproportionation* will be used to describe a redox reaction in which an entity is both reduced and oxidized. A disproportionation reaction is represented below.

$$2\,H_2O_2(l) \rightarrow 2\,H_2O(l) + O_2(g)$$

In the assessment of B1.4k and B1.1sts:

- When corrosion takes place in the presence of air, students are expected to recognize that water and oxygen gas are also present.

In the assessment of outcomes B1.2k and B1.7k:

- For assigning oxidation numbers, the following guidelines will be used:
  - Oxygen always has an oxidation number of –2, except for peroxides, where oxygen's oxidation number is –1. For example, in hydrogen peroxide, $H_2O_2(l)$, or barium peroxide, $BaO_2(s)$, oxygen's oxidation number is –1.
  - Hydrogen always has an oxidation number of +1, except for hydrides of metals in groups 1 and 2 of the Periodic Table, where hydrogen's oxidation number is –1.
  - Carbon can have fractional oxidation numbers, and the oxidation number of carbon in any of its compounds will represent an average oxidation number. For example, in the case of propane, C_3H_8, the oxidation number is $-\frac{8}{3}$. Considering the oxidation number of each of the two end carbons as –3, and of the middle carbon as –2, is beyond the scope of the program of studies.

In the assessment of outcome B1.7k:

- Students are expected to devise a balanced half-reaction in an acidic or a neutral, but **not** a basic, solution. They are expected to balance chemical equations that occur in basic environments given the species but not to devise their own half-reactions. Students are expected to balance disproportionation reaction equations.

In the assessment of outcome B1.2s:

- Students are expected to select the glassware used in standard best-practice volumetric analysis. Shortcuts, such as the use of burettes or graduated cylinders in place of volumetric pipettes, are not considered best practice.

In the assessment of outcomes B2.1k and B2.3k:

- Line or cell notation can be used to represent electrochemical cells.
  - A voltaic cell requires a porous barrier or salt bridge to separate the half-cells. The convention is that the substance constituting the anode is listed at the far left, and the substance constituting the cathode is listed at the far right. The line notation of a copper–silver voltaic cell could be represented as

$$Cu(s) \mid Cu^{2+}(aq) \mid\mid Ag^{+}(aq) \mid Ag(s)$$

  - An electrolytic cell does not require a porous barrier or salt bridge to separate the half-cells. The line notation of a cobalt(II) nitrate electrolytic cell could be represented as

$$C(s) \mid Co^{2+}(aq), NO_3^{-}(aq) \mid C(s)$$

In the assessment of outcome B2.1s:

- In addition to a labelled diagram, students are expected to predict the observations (e.g., pH changes and colour changes in the electrolyte, mass changes and colour changes at the electrodes) for an electrochemical cell.

In the assessment of outcome B2.4k:

- Students are expected to recognize that predicted reactions do not always occur; for example, the chloride anomaly occurs during the electrolysis of solutions containing chloride ions and water as the strongest reducing agents. A common misconception is that if the minimum voltage for the electrolysis of water were applied, then the oxidation of water would occur rather than the oxidation of chloride ions. **This is not correct**. The reduction potentials found on the reduction potential table are determined by comparing the reduction potential of a given half-cell to the standard hydrogen half-cell. The standard hydrogen reduction potential is the reference potential against which all half-reaction potentials are assigned. This is how the reduction potentials for oxygen and hydrogen ions (+1.23 V) and chlorine (+1.36 V) half-cells are obtained. During electrolysis, the theoretical minimum voltage is the difference in reduction potential between the oxidizing agent and the reducing agent. An excess voltage, called the overvoltage, is required in order for a reaction to occur. For example, as the voltage to a standard sodium chloride electrolytic cell is increased, the chloride ions are oxidized first. The reason for this is that the overvoltage for the oxidation of water is greater than the overvoltage for the oxidation of chloride ions. A much higher potential than expected is required to oxidize water. Basically, the phenomenon is caused by difficulties in transferring electrons from the species in the solution to the atoms of the electrode across the electrode–solution interface. Because of this situation, $E°$ values must be used cautiously when one is predicting the actual order of oxidation or reduction of species in an electrolytic cell.

In the assessment of outcomes B2.5k and B2.6k:

- All $E°$ values refer to reduction potentials, whether associated with an oxidation half-reaction equation or a reduction half-reaction equation.

In the assessment of outcomes B2.5k and B2.3s:

- Standard state conditions and corresponding potential difference values imply the use of 1.0 mol/L reagents. The larger the concentration of the reactants, the larger the potential difference value. The Nernst equation would be required to calculate potential difference values as a function of reactant and product concentrations in a redox reaction and is beyond the scope of the program of studies. However, students should know that as the reaction proceeds, the voltage generated will decrease as reactants are converted to products until reaching equilibrium, at which point the battery does not deliver any noticeable current.
- Biological and other systems sometimes involve species that are not at 25 °C and 1.0 mol/L. Therefore, the $E°$ values given in any question involving these systems may not be the same as those shown in the data booklet, where standard temperature is 25 °C and standard concentration is 1.0 mol/L.

Unit C

In the assessment of outcome C1.3k:

- Use of the term *hydrocarbon* should be strictly limited to describing molecules composed of only carbon and hydrogen atoms. For organic molecules that include other atoms, including oxygen and halogens, the term *hydrocarbon derivative* is appropriate.
- An aromatic compound contains one or more benzene rings. The benzene ring may be represented as shown in diagrams 1 and 2 below.

Diagram 1

Diagram 2

- When one of the hydrogen atoms in a hydrocarbon is replaced by a hydroxyl group, either an alcohol or a phenol may be produced. The term *alcohol* will be used whenever the original hydrocarbon is aliphatic. The term *phenol* will be used whenever the hydroxyl group is attached directly to the benzene ring. Benzyl alcohols, where both a benzene ring and a hydroxyl group are attached to a straight side chain, and not to the benzene ring, are outside the scope of the program of studies.
- For the *Chemistry 30 Diploma Examination*, when determining whether a compound is saturated or unsaturated, only the presence of carbon–carbon double or triple bonds makes a compound unsaturated. Double bonds in a functional group **will not** characterize a compound as being unsaturated. For example, propanoic acid is classified as a saturated compound because all of its carbon atoms are joined to each other by single bonds. The double bond between carbon and oxygen does **not** make propanoic acid unsaturated.
- The bromine test will be negative for cyclohexane, $C_6H_{12}(l)$, and positive for cyclohexene, $C_6H_{10}(l)$, where the double bond is carbon–carbon, but will be negative for ethanoic acid, $CH_3COOH(aq)$, where the double bond is carbon–oxygen, not carbon–carbon.
- A negative bromine test with a saturated organic compound does not mean that there is no reaction with bromine. It means that there is no immediate or fast reaction between the saturated compound and the bromine. However, there will be a slow substitution reaction if the bromine reacts in the presence of UV light. For most saturated compounds, this substitution reaction will take 24 hours or more to go to completion.
- Aromatic compounds are not considered to be either saturated or unsaturated. Compounds with both benzene rings and carbon–carbon double bonds, such as phenylethene, are outside the scope of the program of studies.
- The wording of outcome C1.3k puts clear limits on the compounds that can be named or drawn. However, these limits do **not** apply to outcomes C1.4k, C1.5k, C1.6k, C2.1k, and C2.2k. In assessing these outcomes, students will be asked to consider compounds outside the limits set by outcome C1.3k, but only when **both** a name and a structural diagram have been given.

In the assessment of outcome C1.5k:

- Formulas such as $C_2H_6(g)$, $C_2H_5Cl(l)$, and $C_6H_6(l)$ will be referred to as molecular formulas.

In the assessment of outcome C1.6k:

- For an organic compound to be highly soluble in water, there must be significant hydrogen bonding present. It is **not** sufficient for the molecule to be polar. For example, the polar molecule 1-chloropropane cannot form hydrogen bonds, so it is not soluble in water. The solubility rules based on an empirical generalization, such as like is soluble in like, are reasonable only with a three-way classification such as non-polar, polar, and hydrogen-bonded. However, on the diploma examinations, students are expected to predict the solubility of organic molecules only in non-polar solvents, such as hexane, and in hydrogen-bonded solvents, such as water.

In the assessment of outcome C1.3s:

- Interpreting the results of a test using aqueous bromine or a potassium permanganate solution to distinguish between saturated and unsaturated aliphatic hydrocarbons can be done in various ways. One way is to analyze the original and final colours of the organic sample before and after the aqueous bromine or potassium permanganate solution has been added. Another way is to analyze the original and final colours of the aqueous bromine or potassium permanganate solution before and after it is added to the organic sample.

In the assessment of outcomes C2.1k and C2.2k:

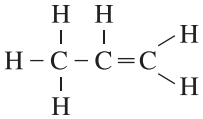
- For the diploma examination, elimination is considered a type of chemical reaction in which atoms are removed from adjacent carbons in a single reactant. The organic product of an elimination reaction will have a carbon–carbon double bond. Cracking reactions, in which alkanes are reduced to alkenes, are included as elimination reactions, as the alkenes all have carbon–carbon double bonds. This definition distinguishes this reaction type from a condensation reaction, in which two molecules react and their interaction produces a water molecule.

In the assessment of outcome C2.2k:

- For the diploma examination, students are expected to know two types of substitution reaction. The first is a reaction in which a hydrogen atom in a hydrocarbon or a hydrocarbon derivative is replaced by another atom or by a functional group. One such example is the production of chloromethane and hydrogen chloride from the reaction of methane and chlorine. The second is a reaction in which an atom or a functional group in a hydrocarbon derivative is replaced by another atom or functional group. One such example is the reaction of 1-bromoethane in a basic solution to produce ethanol and bromide ions.

In the assessment of outcome C2.3k:

- Knowledge of both types of polymerization reaction (addition and condensation) will be tested, either by identifying the monomers involved in the production of a given polymer or by identifying the polymer formed from given monomers.
- The naming of polymers on the *Chemistry 30 Diploma Examination* will be limited to the monomer name being given (e.g., the given monomer name *chloroprene* will result in the polymer name *polychloroprene*) or the monomer represented will be one that the students will be expected to name

(e.g., the monomer representation  will result in the polymer name *polypropene*).

Unit D

In the assessment of outcome D1.1k:

- In a closed system, mass is conserved, but conservation of mass does not confirm that equilibrium has been established in a chemical system.

In the assessment of outcome D1.3k:

- There is some confusion about the ways in which pressure can be increased and how it will affect an equilibrium system. Three methods to increase pressure are reducing the volume of the reaction container, adding an inert gas, and adding a reactant or product gas.
  - Increasing the pressure by reducing the volume of the container causes the system to alleviate the increased pressure by reducing the total number of gaseous molecules in the system. Equilibrium will therefore shift to the side with the lesser number of gas molecules.
  - Adding an inert gas increases the total pressure but has no effect on the concentration or partial pressures of the individual reactants or products. Therefore, there is no shift in the equilibrium.
  - Adding a reactant or product gas will shift the equilibrium away from what is added, whereas removing a reactant or product gas will shift the equilibrium toward what is removed.
- If the total volume available to an equilibrium system is adjusted, the value of the equilibrium constant for that system will not change, provided there is no change in temperature. The only stress that can change the value of the K_c for an equilibrium is a change in the system temperature. Although the equilibrium constant does not change when a system undergoes a change in pressure due to a change in volume, the position of the equilibrium can still change. A particular equilibrium set of reactant and product equilibrium concentrations is called an equilibrium position. At any particular temperature, there are many equilibrium positions but only one value for K_c.
- A change in temperature of an equilibrium system changes the value of the equilibrium constant, which is a measure of the extent to which a given reaction occurs. If the temperature of the equilibrium system below is decreased, the equilibrium constant value will increase.

$$\mathrm{A(g) + B(g) \rightleftharpoons C(g) + energy}$$

- If the temperature of the equilibrium system above is increased, the equilibrium constant value will decrease.

In the assessment of outcomes D1.3k and D1.4k:

- There is a common misconception that when the total pressure of a gaseous equilibrium is changed, the value of the K_c for that equilibrium will also change.

In the assessment of outcome D1.4k:

- Students are expected to predict how a wide range of factors affect equilibrium and/or the equilibrium constant.
- Students are expected to write equilibrium constant expressions for homogeneous and non-homogeneous (Brønsted–Lowry acids and bases) equilibria. The diploma examination will employ the convention of including in equilibrium expressions only substances that can vary in concentration. Gases must be included since the concentration of a gas can be altered by varying the pressure on it. For example,

$$\mathrm{CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)}$$

$$K_c = \frac{[\mathrm{H_2(g)}][\mathrm{CO_2(g)}]}{[\mathrm{CO(g)}][\mathrm{H_2O(g)}]}$$

- Aqueous ions and/or gases in solution must be included since the concentration of aqueous ions and/or gases can be altered by varying the volume of solvent.
- In heterogeneous equilibria pure liquids and solids are not included since their concentration (density) cannot be varied significantly. For example,

$$CH_3COOH(aq) + H_2O(l) \rightleftharpoons CH_3COO^-(aq) + H_3O^+(aq)$$

$$K_c = \frac{[CH_3OO^-(aq)][H_3O^+(aq)]}{[CH_3COOH(aq)]}$$

- In homogeneous equilibria of liquids, all liquids are included since the concentrations can be varied by changing the relative amounts of the mixed liquids. For example,

$$CH_3COOH(l) + CH_3CH_2OH(l) \rightleftharpoons CH_3COOCH_2CH_3(l) + H_2O(l)$$

$$K_C = \frac{[CH_3COOCH_2CH_3(l)][H_2O(l)]}{[CH_3COOH(l)][CH_3CH_2OH(l)]}$$

- For predictions of whether reactants or products are favoured in reversible reactions, the magnitude of the K_c value is only a general guideline. A K_c value greater than 1 does not always mean products are favoured, and a K_c value less than 1 does not always mean that the reactants are favoured. This is valid if a reaction has the same number of reactant and product molecules in the balanced chemical equation. When the numbers of reactant and product molecules are not the same, the K_c value may be misleading in determining the extent of reaction. An analysis of the extent to which reactants are converted to products may be a better indication of whether reactants or products are favoured.
- Students are not expected to be able to predict whether or not a reaction is quantitative.

In the assessment of outcome D1.6k:

- The terms *monoprotic* and *polyprotic* need to be used with care with amphiprotic species, as such a species may be polyprotic as an acid yet monoprotic as a base. For example, the dihydrogen phosphate ion $H_2PO_4^-(aq)$ is polyprotic as an acid, capable of donating two protons, yet monoprotic as a base because it can accept only one proton. In contrast, the hydrogen phosphate ion $HPO_4^-(aq)$ is monoprotic as an acid, capable of donating only one proton, yet polyprotic as a base because it can accept two protons. In diploma examinations, every attempt will be made to define the context in which amphiprotic species are reacting, so that it can be determined precisely whether a species is monoprotic or polyprotic. The terms *monobasic* and *polybasic*, although less ambiguous than the terms *monoprotic* and *polyprotic*, will not be used on any diploma examination.

In the assessment of outcome D1.7k:

- The terms *amphiprotic* and *amphoteric* are used synonymously to describe substances that can act as either proton acceptors or proton donors. In the diploma examinations, the term *amphiprotic* will be used.
- Amphiprotic species are species that have an ability to act as either an acid or a base; for example, $H_2PO_4^-(aq)$ or $HCO_3^-(aq)$. Because of this property, the pH of an amphiprotic species cannot be determined with the simple K_a expression used to determine the pH of a weak acid. Students are **not** expected to determine the pH of an amphiprotic species and will **not** be asked to do so on the diploma examination.

In the assessment of outcome D1.8k:

- Students are required to recognize that a buffer system is composed of relatively equal amounts of a weak acid and its conjugate base and maintains a nearly constant pH when diluted or when small amounts of strong acid or strong base are added. Students are not expected to calculate the pH of a buffer solution given the concentration of the conjugate acid and its base pair and/or when utilizing the value of K_a.

In the assessment of outcomes D1.8k and D1.3s:

- On a titration curve representing the titration of a weak acid with a strong base (or a strong acid with a weak base), one or more buffer regions occur. For these graphs, the buffer regions are the flatter portion of the titration curve that occurs before and between the equivalence point(s). In these regions, the strong base is added to the weak acid, resulting in the acid converting into its conjugate base until both are present in similar concentrations. The flat region after the final equivalence point is not a buffering region and is due to the large amount of strong base in the solution resulting in a consistent pH.
- A buffer is defined as the presence of a conjugate acid–base pair that is in an equilibrium state. The addition of an acid or a base will react with the buffer system, maintaining a relatively constant pH.
- A buffer region is not defined as being any area on a pH graph where the titration graph of pH as a function of added titrant is essentially flat. A strong monoprotic acid–strong monoprotic base titration would exhibit flat regions at the beginning of the titration and at the end, separated by a near-vertical portion containing the single equivalence point. The reason that these regions are flat is that there is excess strong acid or strong base present.

In the assessment of outcomes D2.1k, D2.2k, and D2.4s:

- The K_a values provided in the Relative Strengths of Acids and Bases at 298.15 K table in the data booklet are experimental values that have two significant figures. As a result, calculated values resulting from the use of these data will generally be to two significant figures for a calculation of K_b and to two decimal places for a calculation of pH or pOH.
- Teachers may find it necessary to review the proper use of scientific notation and the use of the quantities millimoles and millimoles per litre when completing calculation-based problems.

In the assessment of outcome D2.2k:

- Students are expected to be as familiar with calculations involving K_b as they are with calculations involving K_a.
- Students are expected to know that $K_a \times K_b = K_w$.

In the assessment of outcome D2.3k:

- Students will not be expected to solve questions involving the pH of weak acids and bases by using the quadratic equation. When such questions are asked in numerical-response form, the question will be double-keyed, so both the answer calculated using the quadratic formula and the answer based on the approximation method would be marked as correct.
- The use of the approximation method to solve acid–base equilibrium expressions is acceptable only when solving the equilibrium-law equation results in a quadratic expression and the original concentration of the acid or base is one-thousand-fold greater than the value of K_a or K_b.
- If the student is given the pH or pOH of an acid or a base whose value of K_a or K_b is known, the approximation method should not be used to calculate the equilibrium concentration or the initial concentration.

In the assessment of outcome D1.3s:

- Students are expected to know the terms *equivalence point* and *endpoint*. *Equivalence point* refers to the point at which the reactants are stoichiometrically equivalent. Thus, students may be asked to indicate on a graph where the equivalence point for a reaction occurs. The term *endpoint* will be used within the context of an indicator; for example, 40.2 mL was used to titrate a sample to the bromothymol blue (indicator) endpoint.
- Students are expected to know that the pH at the equivalence point is not always equal to 7. They should be able to explain when and why the pH at the equivalence point will be equal to 7 (strong acid–strong base), greater than 7 (weak acid–strong base), and less than 7 (strong acid–weak base). The computation of the exact pH at the equivalence point is beyond the scope of the program of studies.

WHMIS 2015

The Workplace Hazardous Materials Information System (WHMIS) has been used in Canada since 1988 for the labelling and classification of hazardous workplace chemicals. The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is being adopted by countries around the world in order to enable a consistent international chemical classification and labelling system. In Canada, WHMIS 1988 was amended in February 2015 to incorporate the GHS.

Any WHMIS pictograms that appear on provincial assessments will be WHMIS 2015 pictograms.

WHMIS 2015

Flame

For fire hazards

Flame Over Circle

For oxidizing hazards

Gas Cylinder

For gases under pressure

Exploding Bomb

For explosion or reactivity hazards

Biohazardous Infectious Materials

For organisms or toxins that can cause diseases in people or animals

Corrosion

For corrosive damage to metals, as well as skin, eyes

Exclamation Mark

May cause less serious health effects

Health Hazard

May cause or suspected of causing serious health effects

Skull and Crossbones

Can cause death or toxicity with short exposure to small amounts

Publications and Supporting Documents

The following documents are published by Alberta Education and Childcare and are available on the Writing diploma exams web page:

- *Chemistry 30 Archived Bulletin*
- *Chemistry 30 Student-Based Performance Standards*
- *Chemistry 30 Released Items*
- *Chemistry 30 Exemplars*
- *Examples of Descriptions Used in Audio-enabled Versions of Science Diploma Exams*
- *2026–2027 Calculator Information and Rules for Mathematics and Science Diploma Exams*
- *A Guide for Students Preparing to Write the Diploma Examination: Biology 30 / Chemistry 30 / Physics 30 / Science 30*

Website Links

Alberta Education and Childcare

Curriculum and Programs of study

General Information Bulletin
contains specific directives, guidelines, and procedures of diploma examinations

Diploma exams

Writing diploma exams
contains Guides for Students, exemplars, and other support documents

Digital Assessment Platform
contains practice questions and questions from previous diploma examinations

Help page
contains guides to help users of digital assessments access and administer secured tests and exams

Teacher participation in provincial assessments
contains information about marking, field testing, item development, and examination validation

Contacts 2026–2027

Provincial Assessment

Provincial Assessment,
Alberta Education and Childcare
44 Capital Boulevard
10044 108 Street NW
Edmonton AB T5J 5E6

Alberta Education and Childcare website: alberta.ca/education-and-childcare

Provincial Assessment

Diploma exam security, diploma exam rules, scheduling, and policy issues
780-427-1857
Email: exam.admin@gov.ab.ca

Results statements and rescores
780-427-1857
Email: exam.admin@gov.ab.ca

Special cases, accommodations, and exemptions
780-415-9242
780-427-4215
780-427-9795
Email: special.cases@gov.ab.ca

Field testing
Email: field.test@gov.ab.ca

Diploma exam format, content, confirming standards, marking, and results reporting
Email: diploma.exams@gov.ab.ca

Digital Assessment
780-641-8987
780-415-0824
Email: online.assessment@gov.ab.ca

***myPass* Access**
Alberta Education and Childcare Help Desk
780-427-5318
Email: AE.helpdesk@gov.ab.ca

Inquiries about transcripts, credentials, detailed academic reports, and rewrite fees
780-427-5732
Email: studentrecords@gov.ab.ca

Inquiries about student enrollment and marks and mature student status
780-422-9337
Email: studentrecords@gov.ab.ca

For a toll-free call to any Alberta government office, dial 310-0000 followed by the 10-digit phone number of the office that you would like to reach.

When contacting Alberta Education and Childcare, please include your name, title, school name, school code, and, if referring to a student, include the student's Alberta Student Number.

Contacts 2026–2027

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