

## Course Outline

School Name: KEEWAYTINOOK INTERNET HIGH SCHOOL

Department Name: Science

Ministry of Education Course Title: Chemistry

Grade Level: 11

Ministry Course Code: SCH3U

Teacher's Name: Raj Budhram

Developed by: Raj Budhram      Date: July, 2013

Revision Date: September 2017

Developed from: The Ontario Curriculum, Grade 11 Science, 2008

Text:

Prerequisite: SNC2D

Credits: One

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature)



Approval Date: September 11, 2017

## ***Course Description/Rationale***

This course enables students to deepen their understanding of chemistry through the study of the properties of chemicals and chemical bonds; chemical reactions and quantitative relationships in those reactions; solutions and solubility; and atmospheric chemistry and the behaviour of gases. Students will further develop their analytical skills and investigate the qualitative and quantitative properties of matter, as well as the impact of some common chemical reactions on society and the environment.

## ***Overall Curriculum Expectations***

### A. Scientific Investigation Skills and Career Exploration

- Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analyzing and interpreting, and communicating);
- Identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

### B. Matter, Chemical Trends, and Chemical Bonding

- Analyse the properties of commonly used chemical substances and their effects on human health and the environment, and propose ways to lessen their impact.
- Investigate physical and chemical properties of elements and compounds, and use various methods to visually represent them.
- Demonstrate an understanding of periodic trends in the periodic table and how elements combine to form chemical bonds.

### C. Chemical Reactions

- Analyse chemical reactions used in a variety of applications, and assess their impact on society and the environment.
- Investigate different types of chemical reaction.
- Demonstrate an understanding of the different types of chemical reactions.

### D. Quantities in Chemical Reactions

- Analyse processes in the home, the workplace, and the environmental sector that use chemical quantities and calculations, and assess the importance of quantitative accuracy in industrial chemical processes.
- Investigate quantitative relationships in chemical reactions, and solve related problems.
- Demonstrate an understanding of the mole concept and its significance to the quantitative analysis of chemical reactions.

### E. Solutions and Solubility

- Analyse the origins and effects of water pollution, and a variety of economic, social, and environmental issues related to drinking water.
- Investigate qualitative and quantitative properties of solutions, and solve related problems.

- Demonstrate an understanding of qualitative and quantitative properties of solutions.

#### F. Gases and Atmospheric Chemistry

- Analyse the cumulative effects of human activities and technologies on air quality, and describe some Canadian initiatives to reduce air pollution, including ways to reduce their own carbon footprint.
- Investigate gas laws that explain the behaviour of gases, and solve related problems.
- Demonstrate an understanding of the laws that explain the behaviour of gases.

## Course Content

Unit	Length
<b>1. Matter, Chemical Trends, and Chemical Bonding</b>	19.50 hours
<b>2. Chemical Reactions</b>	19.50 hours
<b>3. Quantities in Chemical Reactions</b>	26.00 hours
<b>4. Solutions and Solubility</b>	22.75 hours
<b>5. Gases and Atmospheric Chemistry</b>	26.00
<b>Total</b>	113.75 hours

## Unit Descriptions

### Unit 1 - Matter, Chemical Trends, and Chemical Bonding

In this unit, students will build molecular models for molecular compounds and an ionic crystalline structure and they will learn that every element has predictable chemical and physical properties determined by its structure. Also they will learn that the type of chemical bond in a compound determines the physical and chemical properties of that compound. Students will realize that it's important to use chemicals properly to minimize the risks to human health and the environment.

### Unit 2 - Chemical Reactions

In this unit, students will learn that chemicals react in predictable ways. Furthermore, they will learn that chemical reactions and their applications have significant implications for society and the environment. Students will conduct investigations on different types of chemical reactions and make predictions on the products of the reactions.

### Unit 3 - Quantities in Chemical Reactions

In this unit, students will learn that relationships in chemical reactions can be described quantitatively and the efficiency of chemical reactions can be determined and optimized by applying an understanding of quantitative relationships in such reactions. Students will analyse

processes in the home, the workplace, and the environmental sector that involve the use of chemical quantities and calculations, and they will assess, on the basis of research, the importance of quantitative accuracy in industrial chemical processes and the potential impact on the environment if quantitative accuracy is not observed.

#### **Unit 4 - Solutions and Solubility**

In this unit, students will learn that the properties of solutions can be described qualitatively and quantitatively, and can be predicted. They will conduct an investigation to analyze the properties of solutions and they will determine the concentration of an acid or base in a solution. Also they will learn that living things depend for their survival on the unique physical and chemical properties of water, and people have a responsibility to protect the integrity of Earth's water resources. Students will conduct an investigation to determine the concentrations of pollutants in their local treated drinking water, and compare the results to commonly used guidelines and standards.

#### **Unit 5 - Gases and Atmospheric Chemistry**

In this unit, students will learn that the properties of gases can be described qualitatively and quantitatively, and can be predicted. They will investigate the gas laws and determine the quantitative and graphical relationships between pressure and volume. They will also learn that air quality can be affected by human activities and technology and people have a responsibility to protect the integrity of Earth's atmosphere.

## ***Teaching/Learning Strategies***

This course is organized into an eight-week series of lessons and activities that will be presented to students in remote northern communities via the internet. The eighth week will be used for course consolidation, review and the final examination. Teacher and students will communicate over the internet, while mentors in the classrooms will assume the role of liaison between the teacher and student.

A variety of strategies will be used in the online delivery of this course. Some instructional strategies include:

- Academic vocabulary and language
- Cooperative learning
- Adapting to learning styles/multiple intelligences
- Analysis of student work
- Conferencing
- Discovery/Inquiry based learning
- Generating and testing hypotheses
- Graphic organizers
- Hands on learning
- Homework and practice
- Identifying similarities and differences
- Modelling
- Sketching to learn

- Mentoring
- Visualization

Learning goals will be discussed at the beginning of each assignment and success criteria will be provided to students. The success criteria are used to develop the assessment tools in this course, including rubrics and checklists.

## ***Evaluation***

The final grade will be determined as follows (Ontario Ministry of Education, 2010):

- Seventy per cent of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student's most consistent level of achievement throughout the course, although special consideration should be given to more recent evidence of achievement.
- Thirty per cent of the grade will be based on a final evaluation administered at or towards the end of the course. This evaluation will be based on evidence from one or a combination of the following: an examination, a performance, an essay, and/or another method of evaluation suitable to the course content. The final evaluation allows the student an opportunity to demonstrate comprehensive achievement of the overall expectations for the course (p. 47).

Ontario Ministry of Education. (2010). *Growing success: Assessment, evaluation and reporting in Ontario schools*. Toronto ON: Queen's Printer for Ontario.

Type of assessment	Category	Details	Weighting (%)
Term Work (70%)	Knowledge/Understanding	<ul style="list-style-type: none"> <li>-Identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields;</li> <li>-Demonstrate an understanding of periodic trends in the periodic table and how elements combine to form chemical bonds;</li> <li>-Demonstrate an understanding of the different types of chemical reactions;</li> <li>-Demonstrate an understanding of the mole concept and its significance to the quantitative analysis of chemical reactions;</li> <li>-Demonstrate an understanding of qualitative and quantitative properties of solutions;</li> <li>-Demonstrate an understanding of the laws that explain the behaviour of gases.</li> </ul>	12
	Thinking	<ul style="list-style-type: none"> <li>- Investigate physical and chemical properties of elements and compounds, and use various methods to visually represent them;</li> <li>-Investigate different types of chemical reactions.</li> <li>-Investigate quantitative relationships in chemical reactions, and solve related problems;</li> <li>-Investigate qualitative and quantitative properties of solutions, and solve related problems;</li> <li>-Investigate gas laws that explain the behaviour of gases, and solve related problems.</li> </ul>	17
	Communication	<ul style="list-style-type: none"> <li>- Expression and organization of ideas and information;</li> <li>- Communication for different audiences and purposes in oral, visual, and/or written forms;</li> <li>- Use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms.</li> </ul>	17
	Application	<ul style="list-style-type: none"> <li>- Analyse the properties of commonly used chemical substances and their effects on human health and the environment, and propose ways to lessen their impact;</li> <li>-Analyse chemical reactions used in a variety of applications, and assess their impact on society and the environment;</li> <li>-Analyse processes in the home, the workplace, and the environmental sector that use chemical quantities and calculations, and assess the importance of quantitative accuracy in industrial chemical processes;</li> <li>-Analyse the origins and effects of water pollution, and a variety of economic, social, and environmental issues related to drinking water;</li> <li>-Analyse the cumulative effects of human activities and technologies on air quality, and describe some Canadian initiatives to reduce air pollution, including ways to reduce their own carbon footprint.</li> </ul>	24
Final Evaluation (30%)	Culminating Activity (15%)	Knowledge/Understanding	2.5
		Thinking	4
		Communication	4
		Application	4.5
	Final Examination (15%)	Knowledge/Understanding	2.5
		Thinking	4
		Communication	4
		Application	4.5
<b>TOTAL</b>			<b>100</b>

# ***Assessment/Evaluation Strategies***

A variety of assessment and evaluation methods, strategies and tools are required as appropriate to the expectation being assessed. These include diagnostic, formative and summative within the course and within each unit.

Assessment for learning and assessment as learning are obtained through a variety of means, including the following:

- Ongoing descriptive feedback
- Small-group conversations to develop their opinions and communication skills
- Mentor observations of student's performance while conducting experiments and scientific research
- Conversations with student on a regular basis to verbalize observations, ask questions, and clarify understanding
- Self-assessment (e.g., weekly self-assessment of learning)

Evidence of student achievement (assessment of learning) is collected from various sources, including the following:

- Ongoing assessment/observations of most consistent work, with consideration given to most recent work
- Culminating Activity
- Final Exam

## ***Resources***

Ontario Ministry of Education. (2010). *Growing success: Assessment, evaluation and reporting in Ontario schools*. Toronto, ON: Queen's Printer for Ontario.

Ontario Ministry of Education. (2008). *The Ontario curriculum grades 11 and 12: Science*. Toronto, ON: Queen's Printer for Ontario.

Ontario Ministry of Education. (2017). *Indigenous education strategy*. Retrieved from <http://www.edu.gov.on.ca/eng/aboriginal/>

### **Websites:**

<https://www.explorellearning.com>

<https://www.youtube.com/watch?v=QSZ-3wScePM>

<http://www.cspinet.org/reports/chemcuisine.htm#acetic%20>

<http://www.youtube.com/watch?v=JBpren-koAw>

<http://varenya.hubpages.com/hub/Seveso-man-made-disaster>

<http://www.winnipeg.ca/waterandwaste/water/treatment/plant.stm>

<https://www.youtube.com/watch?v=20VvpASC2sU>

<https://www.youtube.com/watch?v=6dmtLj2dLi0>

[http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/cando-peuxfair\\_e.php](http://www.lung.ca/protect-protegez/pollution-pollution/outdoor-exterior/cando-peuxfair_e.php)

<http://www.airqualityontario.com/reports/summary.php>

## ***Program Planning***

This course is offered to indigenous students living in isolated northern Ontario communities which do not have access to regular high school facilities, equipment or teachers associated with secondary education. This course uses the internet for instruction, demonstration and research. It utilizes a student-centered semi-virtual classroom which capitalizes on the strengths of internet program delivery to minimize the disadvantages of geographic remoteness.

Students are presented with 1320 minutes of instruction/activity via the internet over the period of one week. All lessons, assignments, questions and course material is presented in this manner, with approved print materials available as a student resource in each classroom. The student and instructor communicate via the internet, while a classroom mentor (a fully qualified teacher) assists students in completing tasks in a timely manner and provides tutoring as required. Students may also receive support from various programs at KIHS, including the First Nation Student Success Program and the Special Education Program.

Indigenous and local content is used throughout the course to meet students' learning needs. Considerations are made to the learning preferences of the student population and lessons can be adjusted for individual students as required.