



COURSE OUTLINE – CHEMISTRY 12

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LEARNING OUTCOMES:

This course enables students to deepen their understanding of chemistry by using blended learning technique which includes face to face and online instruction with the help of various digital tools to enhance student learning and promote meaningful student participation in the classroom. Students will further develop their creative thinking, critical thinking, problem-solving, laboratory skills and their ability to communicate scientific information based on the topics of reaction rates, equilibrium, solubility, acids and bases, and electrochemistry. This course aligns with new curriculum pedagogical principles giving students an opportunity to become independent learners.

TEXTBOOK: Hebden Chemistry 12 Workbook

SUPPLIES: Notebook, Binder, Scientific Calculator, Workbook, Data Booklet

COURSE WEBSITE: <https://c4.coquitlamcollege.com/course/view.php?id=354>

TOPICS

- Reaction Kinetics
- Dynamic Equilibrium
- Saturated Solutions
- Acids and Bases
- Oxidation and reduction

BIG IDEAS:

By the end of this course students will be expected to understand the following big ideas:

- **Reaction Kinetics**
 - o Reactants must collide with sufficient energy and geometry to react
 - o Conditions surrounding a reaction determine its rate
- **Dynamic Equilibrium**
 - o Some chemical reactions are reversible and proceed to equilibrium
 - o Dynamic equilibrium can be altered by changing the system's conditions.
- **Saturated Solutions**

o Saturated solutions are in equilibrium

• **Acid-Base Equilibrium**

o The strength of an acid or base depends on the degree of dissociation of its ions

o Weak acids, weak bases, and buffers are systems in equilibrium.

• **Electrochemistry**

o Reduction and oxidation are complementary processes that involve the gain or loss of electrons

o Redox reactions and implications in resource development and for the environment.

CORE COMPETENCIES:

By the end of this course students will be expected to:

- Acquire and communicate scientific ideas using appropriate language, conventions, and representation
- Collaboratively develop, analyze, and carry out experiments and research based scientific activities
- Reflect on experiences and accomplishments to demonstrate one's own progress in learning
- Demonstrate self-determination and self-regulation

For more information, visit: <https://curriculum.gov.bc.ca/competencies>

CURRICULAR COMPETENCIES:

By the end of this course students will be expected to:

- Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal, local, or global interest
- Formulate multiple hypotheses and predict multiple outcomes
- Collaborative and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
- Apply the concepts of accuracy and precision to experimental procedures and data (significant figures, uncertainty, scientific notation)
- Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations and identifying inconsistencies
- Construct, analyze, and interpret graphs, models, and/or diagrams
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
- Describe specific ways to improve their investigation methods and the quality of their data
- Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
- Demonstrate an awareness of assumptions, question information given, and identify bias in their work and in primary and secondary sources
- Assess risks in the context of personal safety and social responsibility
- Recognize the importance of indigenous knowledge that led to understanding of various chemistry principles.

For more information, visit: https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/pdf/10-12/science/en_s_12_che_elab.pdf

Students are expected to know the following:

- reaction rate
- collision theory
- energy change during a chemical reaction
- reaction mechanism
- catalysts
- dynamic nature of chemical equilibrium
- Le Châtelier's principle and equilibrium shift
- equilibrium constant (K_{eq})
- saturated solutions and solubility product (K_{sp})
- relative strength of acids and bases in solution
- water as an equilibrium system
- weak acids and weak bases
- titration
- hydrolysis of ions in salt solutions
- applications of acid-base reactions
- the oxidation-reduction process
- electrochemical cells
- electrolytic cells
- quantitative relationships

For a full description on the changes to BC's curriculum please refer to <https://curriculum.gov.bc.ca/>.

COURSE REQUIREMENTS:

- Attendance is mandatory. If you are late to class by more than 15 minutes, you will be marked as an Absent.
- Students are not allowed to use their cellphones in the classroom.
- Be sure to check C4 regularly for updates and announcements related to course.
- Homework needs to be completed and is due at the beginning of class.
- Behave responsibly in the class. Show consideration and respect for your fellow classmates, and your teacher.

TESTING/FINAL EXAM POLICY:

- Tests **MUST** be written during the times scheduled. It is the student's responsibility to be aware of scheduled test dates and of any changes to these dates. It is your responsibility to ensure you arrive on time – no extra time will be given.
- A score of zero will be assigned to any missed test. If a valid reason (**medical note**) is provided, the Instructor may allow make up tests. If you miss an exam due to illness contact your instructor as soon as possible.
- No rewrites are allowed for low test marks.
- Students are required to write the **Final Exam** in order to receive course credit. There is no make up for final exams.

- A student caught cheating on a quiz, test or exam will receive an automatic “0”. A second cheating offence may result in expulsion from Coquitlam College.

A NOTE ON PLAGIARISM:

- Plagiarism is easy to do but can come with harsh consequences – from a zero (0) grade to an expulsion with academic misconduct on your record. When working in groups make sure each group member submits their own unique assignment/worksheet/lab report, written in their own words. Use a reference list to identify any information, images, etc. gathered from other sources.

ASSESSMENT:

Formative

Think Pair Share, Oral Quizzes, Self Assessment, Homework, Presentation, Exit Slips, Quick Summaries, Open Ended Questions, Mind maps.

Summative

Unit Tests, Formal Lab Reports, Research Project, Midterm and Final Exam

EVALUATION:

Unit Tests	15%
Labs	20%
Mid-Term Exam	20%
Final Exam	25%
Project 1	10%
Project 2	5%
Class Participation	<u>5%</u>
Total	100%

LETTER GRADES AND THEIR EQUIVALENTS

- A (86-100%) Excellent
- B (73-85%) Very Good
- C+ (67-72%) Good
- C (60-66%) Average
- C- (50-59%) Minimal Achievement
- F (0-49%) Fail (Final Grade)

To avoid an undeserved low grade, if you stop attending class, it is your responsibility to officially withdraw through the office.

UNIT INSTRUCTIONAL PLAN

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

<p>BIG IDEAS</p> <ul style="list-style-type: none"> Developing problem solving skills by calculating reaction rates Understanding the significance of collision theory with respect to reaction rates Interpreting the information from experimental data (e.g zinc in hydrochloric acid, iodine clock reaction) Analyzing reaction mechanisms Graphically representing energy changes in reactions 		
<p>FIRST PEOPLES PRINCIPLES OF LEARNING. https://firstpeoplesprinciplesoflearning.wordpress.com/</p>		
<p>First Peoples Principles of Learning</p> <ul style="list-style-type: none"> Learning involves patience and time. Learning is holistic, reflexive, reflective, experimental, and relational (focused on connectedness, on reciprocal relationships, and a sense of place). 		
<p>CORE COMPETENCIES</p>		
<p>Communication</p> <ul style="list-style-type: none"> Connect and engage with others (to share and develop ideas) Acquire, interpret and present information (include inquiries) Collaborate to plan, carry out and review constructions and activities Explain, recount and reflect on experience and accomplishments <p>Assessments Self Assessment</p>	<p>Creative Thinking</p> <ul style="list-style-type: none"> Novelty and value Generating ideas Developing ideas <p>Critical Thinking</p> <ul style="list-style-type: none"> Analyze and critique Question and investigate Develop and design <p>Problem-Solving</p> <ul style="list-style-type: none"> Analyze and critique Question and investigate Develop and design 	<p>Positive Personal and Cultural Identity</p> <ul style="list-style-type: none"> Relationships and cultural contexts Personal values and choices Personal strengths and abilities <p>Personal Awareness and Responsibilities</p> <ul style="list-style-type: none"> Self-determination Self-regulation Well-being <p>Social Responsibilities</p> <ul style="list-style-type: none"> Contributing to community and caring for the environment Solving problems in peaceful ways Valuing diversity Building relationships

UNIT INSTRUCTIONAL PLAN

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

CORE COMPETENCIES IN ACTION

- In the first week, students are introduced to the **core competencies** by the instructor followed by a group activity where students discuss among themselves about three core competencies i.e. Communication, Thinking and Personal and Social Development. It is important to explain to the students the core competencies as they will be assessing their performance based on these.
- **Big ideas** are taught to the students using realia, demonstrations, simulations, videos and projects.
- **Weekly self - assessment** is being done by the students which helped to inform the instructor and students about the progress in the teaching learning process. Planning to introduce self -assessment checklist form as it is easy for the students to use.
- **Think-Pair-Share:** The **group work** is encouraged where students get to share their ideas, analyze, compare and make conclusions of the specific problems given to them which really improves their communication skills and help them develop critical thinking skills leading to their personal and social development. So far, this has been the most successful!
- Students are encouraged to use “**I can statements**” to describe their learning experiences.
- **Formative Assessment** tools such as quick summaries, open ended questions, self -assessment, worksheet, homework, oral quiz, quick feedback, Think Pair Share, exit slips have been used.

Student-Self Assessment Strategies – Checklists, Rubrics, Exit Slips, Self Reflection

QUESTIONS TO SUPPORT INQUIRY

- Why do you think rusting of iron is a slow process while burning is a fast process?
- What affects the speed of the reaction?
- What do you think about the relationship between the kinetics and industrial processes?
- What factors influence the way reactant molecules, atoms, and ions collide?
- How does collision theory explain reaction rate?

LEARNING STANDARDS. <https://curriculum.gov.bc.ca/curriculum>

UNIT INSTRUCTIONAL PLAN

Teacher: Sheenam Girdhar

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Approximate Length of Unit: 2 Weeks

Curricular Competencies	Content
<p><i>Students are expected to DO the following:</i></p> <ul style="list-style-type: none"> • Questioning and predicting • Make observations aimed at identifying their own questions about the reaction kinetics. • demonstrate awareness that reactions occur at differing rates • Formulate multiple hypotheses and predict multiple outcomes • Planning and conducting • Collaboratively and individually plan, determine rate of a reaction experimentally • Demonstrate knowledge of collision theory • Processing and analyzing data and information describing the energies associated with reactants becoming products • Construct, analyze, and interpret graphs, models, and/or diagrams related to rates of reactions • Use knowledge of scientific concepts to draw conclusions that are consistent with evidence • Describe the uses of specific catalysts in a variety of situations • Apply collision theory to explain how reaction rates can be changed • Connect scientific explorations to careers in science • Critically analyze the reaction mechanism for a reacting system • Co-operatively design projects with local and/or global connections and applications • Implement multiple strategies to solve problems in real-life, applied, and conceptual situations • Represent graphically the energy changes associated with catalyzed and uncatalyzed reactions • Communicate scientific ideas, information, and phenomenon to the others 	<p><i>Students are expected to KNOW the following:</i></p> <ul style="list-style-type: none"> • reaction rate: — heterogeneous and homogeneous reactions — factors that affect reaction rate — controlling reaction rate • collision theory: — collision geometry — relationship between successful collisions and reaction rate — relationship of activated complex, reaction intermediates, and activation energy to PE diagrams • energy change: relationship between PE, KE, enthalpy (H), and catalysis • reaction mechanism: — relationship of the overall reaction to a series of steps (collisions) — rate-determining step • catalysts: applications (e.g., platinum in automobile catalytic converters, catalysis in the body, chlorine from CFCs in ozone depletion)

UNIT INSTRUCTIONAL PLAN

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Approximate Length of Unit: 2 Weeks

Learning Targets	Formative Assessment	Lesson Progression						
<p>Learning Target 1: To demonstrate awareness that reactions occur at differing rates</p> <ul style="list-style-type: none"> • give examples of reactions proceeding at different rates • recognize that rate is described in terms of some quantity (produced or consumed) per unit of time/identify properties that could be monitored in order to determine a reaction rate 	<p>Worksheets Discussion Pop Quizzes</p>	<p>Core Competency Focus (Highlight)</p> <table border="1"> <thead> <tr> <th data-bbox="337 682 402 823">Communication</th> <th data-bbox="337 546 402 682">Critical Thinking</th> <th data-bbox="337 409 402 546">Creative Thinking</th> <th data-bbox="337 273 402 409">Personal/Cultural Identity</th> <th data-bbox="337 109 402 273">Personal Awareness and Responsibilities</th> <th data-bbox="337 109 402 109">Resp</th> </tr> </thead> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I am an active listener; I support and encourage the person speaking. ✓ I present information clearly and in an organized way. ✓ I can take on roles and responsibilities in a group. ✓ I can reflect on and evaluate my thinking, products, and actions. ✓ I can ask open-ended questions and gather information. ✓ I can take ownership of my goals, learning, and behaviour. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Resp
Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Resp			

UNIT INSTRUCTIONAL PLAN

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

Core Competency Focus (Highlight)				
Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities
<p>Worksheets Questioning Group Work</p>				
<p>Learning Target 2: To determine experimentally rate of a reaction</p> <ul style="list-style-type: none"> recognize some of the factors that control reaction rates compare and contrast factors affecting the rates of both homogeneous and heterogeneous reactions describe situations in which the rate of reaction must be controlled <p>calculate the rate of a reaction using experimental data</p>				
<p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> I present information clearly and in an organized way. I can work with others to achieve a common goal; I do my share. I can recount simple experiences and activities and tell something I learned. I build on others' ideas and add new ideas of my own, or combine other people's ideas in new ways to create new things or solve straightforward problems. I can ask open-ended questions and gather information. I can solve some problems myself and can identify when to ask for help. 				
<p>Worksheets Think Pair Share</p>				
<p>Learning Target 3: To demonstrate knowledge of collision theory</p> <ul style="list-style-type: none"> identify the following principles as aspects of collision theory: <ul style="list-style-type: none"> reactions are the result of collisions between reactant particles not all collisions are successful sufficient kinetic energy (KE) and favourable geometry are required to increase the rate of a reaction, one must increase the frequency of successful collisions energy changes are involved in reactions as bonds are broken and formed 				
<p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> I can take on roles and responsibilities in a group. I get ideas when I use my senses to explore. I can experiment with different ways of doing things. can solve some problems myself and can identify when to ask for help. 				

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Approximate Length of Unit: 2 Weeks

Core Competency Focus (Highlight)		Personal Awareness and Responsibilities	Personal/Cultural Identity	Creative Thinking	Critical Thinking	Communication
<p>Learning Target 4: To describe the energies associated with reactants becoming products</p> <ul style="list-style-type: none"> – a KE distribution curve can explain how changing temperature or adding a catalyst changes the rate describe the activated complex in terms of its potential energy (PE), stability, and structure define activation energy correctly describe the relationship between activation energy and rate of reaction describe the changes in KE and PE as reactant molecules approach each other draw and label PE diagrams for both exothermic and endothermic reactions, including ΔH, activation energy, and the energy of the activated complex relate the sign of ΔH to whether the reaction is exothermic or endothermic write chemical equations that describe energy effects in two ways: <ul style="list-style-type: none"> – a chemical equation that includes the energy term (thermochemical equation) – a chemical equation using ΔH notation explain why most reactions involve more than one step describe a reaction mechanism as the series of steps (collisions) that result in the overall reaction and describe the role of the <ul style="list-style-type: none"> rate-determining step explain the significance and role of a catalyst 	<p>Worksheets Self-Assessment, Homework, Quiz,</p>					
<p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I get ideas that are new to my peers. deliberately learn a lot about something (e.g. by doing research, talking to others) so that I can generate new ideas. ✓ I can solve some problems myself and can identify when to ask for help. ✓ I can analyze evidence from different perspectives. ✓ I can identify problems and compare potential problem-solving strategies. 						

UNIT INSTRUCTIONAL PLAN

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

		Core Competency Focus (Highlight)					
		Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Respect
<p>Learning Target 5: To apply collision theory to explain how reaction rates can be changed</p> <ul style="list-style-type: none"> • identify reactant, product, reaction intermediate, activated complex, and catalyst from a given reaction mechanism • compare the PE diagrams for a catalyzed and uncatalyzed reaction in terms of <ul style="list-style-type: none"> – reactants – products – activated complex – reaction intermediates – reaction mechanism – ΔH – activation energy 	<p>Worksheets Observation Quick Feedback, Oral Quiz</p>	<p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I can reflect on and evaluate my thinking, products, and actions. ✓ I can consider more than one way to proceed in an investigation. ✓ I can take on roles and responsibilities in a group. 					
<p>Learning Target 6: To analyse the reaction mechanism for a reacting system</p> <ul style="list-style-type: none"> • describe a reaction mechanism as the series of steps (collisions) that result in the overall reaction and describe the role of the rate-determining step • explain the significance and role of a catalyst • identify reactant, product, reaction intermediate, activated complex, and catalyst from a given reaction mechanism 	<p>Worksheets Observation Exit Slips</p>	<p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I give, receive, and act on feedback. ✓ I build on others' ideas and add new ideas of my own, or combine other people's ideas in new ways to create new things or solve straightforward problems. ✓ I can ask open-ended questions and gather information. ✓ I can consider more than one way to proceed in an investigation. ✓ I can solve some problems myself and can identify when to ask for help. 					

UNIT INSTRUCTIONAL PLAN

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

		Core Competency Focus (Highlight)				
		Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities
<p>Learning Target 7:</p> <p>To describe the uses of specific catalysts in a variety of situations</p> <ul style="list-style-type: none"> • identify platinum in automobile catalytic converters as a catalyst • describe the effect of a catalyst on a number of reactions, such as <ul style="list-style-type: none"> – decomposition of hydrogen peroxide (catalysts: manganese (IV) oxide, raw liver, raw potato) – the reaction of the oxalate ion with acidified potassium permanganate solution (catalyst: Mn²⁺) 	<p>Worksheets</p> <p>Quiz</p> <p>Homework</p>	<p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I can reflect on and evaluate my thinking, products, and actions. ✓ I can consider more than one way to proceed in an investigation. ✓ I can take on roles and responsibilities in a group. 				
<p>UNIT ASSESSMENT</p>		<p>FORMATIVE ASSESSMENT: What formative assessment strategies will you use to assess student learning?</p>				
<p>FOR LEARNING</p>		<p><i>Quick Summaries, Open Ended Questions, Self-Assessment, Worksheet, Homework, Oral Quiz, Practice Exams, Quick Feedback, Oral Presentation, Think Pair Share, Exit Slips</i></p> <p>Formative assessment is ongoing in the classroom. Teacher assessment, student self-assessment, and/or student peer assessment involves both teacher and student in a process of continual reflection and review about progress</p> <ul style="list-style-type: none"> • Teacher adjusts the plans and engage in corrective teaching in response to formative assessment <p>Self-assessment:</p> <ul style="list-style-type: none"> • provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning • student-determined criteria based on previous learning and personal learning goals • students use assessment information to make adaptations to their learning process and to develop new understandings 				

UNIT INSTRUCTIONAL PLAN

Unit Title: Reaction Kinetics
Curriculum Area: Chemistry

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

<p>AS LEARNING</p>	<p>REFLECTION/SELF-ASSESSMENT: What opportunities will there be for students to reflect on their thinking and feelings as part of their learning (partner talk, self-assessment, reflection log)?</p>	<p>Refer to Kids, Competencies and Student Self-assessment Resource for Reflective thinking strategies.</p> <p>Self-assessment:</p> <ul style="list-style-type: none"> • provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning • student-determined criteria based on previous learning and personal learning goals • students use assessment information to make adaptations to their learning process and to develop new understandings
<p>OF LEARNING</p>	<p>SUMMATIVE ASSESSMENT: How will students demonstrate their understanding of the curricular connections listed above (performance task, project, portfolio, test, etc.)? How will the assessment criteria be communicated to or created with students? To parents?</p>	<p>Teacher assessment used to make judgments about students' performance in relation to provincial standards</p> <p>Unit Tests, Formal Lab Reports , Exams, Practice Exam</p>
<p>TRANSFER/EXTENSION: How will student learning be extended into the real world?</p> <ul style="list-style-type: none"> • The study of chemical kinetics unlocks the secret to many things in our everyday lives. Chemistry is, by its very nature, concerned with change. Chemical reactions convert substances with well-defined properties into other materials with different properties. Much of our study of chemical reactions is concerned with the formation of new substances from a given set of reactants. However, it is equally important to understand how rapidly chemical reactions occur. Our everyday experience tells us that some reactions are fast while others are slow, and we wish to understand the factors that control their rates. • Understanding of chemical kinetics helps to explain many daily life problems. • The bacterial reactions that lead to the spoiling of milk proceed much more rapidly at room temperature than they do at the lower temperatures of a refrigerator. • A medicine in the form of a tablet will dissolve in the stomach and enter the bloodstream more slowly than the same medicine in the form of a fine powder. • 		

UNIT INSTRUCTIONAL PLAN

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2 Weeks

Unit Title: Reaction Kinetics

Curriculum Area: Chemistry

MATERIALS AND RESOURCES:

- PowerPoint
- YouTube Videos
- Simulations
- Demonstrations
- Periodic Table
- Lab demonstrations

YOUR OWN PERSONAL REFLECTION:

- Students usually take some time to understand the application of kinetics in industry.
- More Demonstrations for rate of reactions.
- Rate of reaction problems as a group work.
- It would be great if students get a chance to do a group presentation to understand industrial applications better.

UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Physics, Mathematics, Biology, Economics (Refers to the balance)

BIG IDEAS <https://curriculum.gov.bc.ca/curriculum>

Some chemical reactions are reversible and proceed to equilibrium
 Dynamic equilibrium can be altered by changing the surrounding conditions.
 Le Châtelier’s principle (dynamic equilibrium and equilibrium shifts – significance and application)
 Predicting effect on equilibrium when changes are made (e.g., chromate-dichromate, iron (III) thiocyanide equilibria)
 Performing calculations involving Keq, initial concentrations, and equilibrium concentration

FIRST PEOPLES PRINCIPLES OF LEARNING. <https://firstpeoplesprinciplesoflearning.wordpress.com/>

First Peoples Principles of Learning

- Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits and the ancestors.
- Learning is holistic, reflexive, reflective, experimental, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).

CORE COMPETENCIES <https://curriculum.gov.bc.ca/competencies>

Communication

- ✓ Connect and engage with others (to share and develop ideas)
- Acquire, interpret and present information (include inquiries)
- ✓ Collaborate to plan, carry out and review constructions and activities
- ✓ Explain, recount and reflect on experience and accomplishments

Assessments

- What?
- How?
- Reporting?

Creative Thinking

- Novelty and value
- ✓ Generating ideas
- ✓ Developing ideas

Critical Thinking

- ✓ Analyze and critique
- ✓ Question and investigate
- Develop and design

Problem-Solving

- Analyze and critique
- ✓ Question and investigate
- Develop and design

Positive Personal and Cultural Identity

- ✓ Relationships and cultural contexts
- Personal values and choices
- Personal strengths and abilities

Personal Awareness and Responsibilities

- ✓ Self-determination
- Self-regulation
- Well-being

Social Responsibilities

- Contributing to community and caring for the environment
- Solving problems in peaceful ways
- ✓ Valuing diversity
- ✓ Building relationships

UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium Teacher: Sheenam Girdhar Approximate Length of Unit: 2-3 Weeks
 Curriculum Area: Chemistry Interdisciplinary: Physics, Mathematics, Biology, Economics (Refers to the balance)

CORE COMPETENCIES IN ACTION

- Introduce the Core Competency focus.
- Have students discuss how they will use the competency throughout the unit.
- Share with students how the competency learning is relevant to real-world situations.
- Refer students to the '1 can statements' on the competency posters. *Include only the "1 can statements", which be assessed in the unit.*
- Introduce the learning target for the lesson and discuss with students how they will use the core competency to attain the learning target.
- Engineer effective classroom discussions, activities, and tasks that elicit evidence of the competency.
- Challenge students to apply the competency '1 statements' to examples during the lesson.
- Use questioning strategies throughout instruction and or inquiry to prompt REFLECTIVE THINKING.

Student-Self Assessment Strategies – Checklists, Rubrics

QUESTIONS TO SUPPORT INQUIRY

- How can you apply principles of equilibrium to daily life situations?
- What so you understand from reversible reactions?
- What are the applications of Le Châtelier's principle?

LEARNING STANDARDS. <https://curriculum.gov.bc.ca/curriculum>

Curricular Competencies

Students are expected to DO the following:

- Questioning and predicting
 Make observations aimed at identifying their own questions about the Equilibrium
- Formulate multiple hypotheses and predict multiple outcomes
- Collaboratively and individually plan, select, and use appropriate explanation of equilibrium.
- Processing and analyzing data and information
 Construct, analyze, and interpret graphs, models, and/or diagrams
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Evaluating

Students are expected to KNOW the following:

Dynamic nature of chemical equilibrium: reversible nature of reactions, relationship to PE diagram
• Le Châtelier's principle and equilibrium shift:
 concentrations of reactants and products
 enthalpy and entropy
 presence of a catalyst
 applications (e.g., Haber process, hemoglobin and oxygen in the blood)
• equilibrium constant (K_{eq}):
 homogeneous and heterogeneous systems
 pure solids and liquids
 effect of changes in temperature, pressure, concentration, surface area, and a catalyst

UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Physics, Mathematics, Biology, Economics (Refers to the balance)

<p>dynamic nature of chemical equilibrium: reversible nature of reactions, relationship to PE diagram</p> <ul style="list-style-type: none"> • Le Châtelier's principle and equilibrium shift: <ul style="list-style-type: none"> -concentrations of reactants and products -enthalpy and entropy -presence of a catalyst -applications (e.g., Haber process, hemoglobin and oxygen in the blood) • equilibrium constant (K_{eq}): <ul style="list-style-type: none"> -homogeneous and heterogeneous systems -pure solids and liquids -effect of changes in temperature, pressure, concentration, surface area, and a catalyst 	<ul style="list-style-type: none"> • Consider the changes in knowledge over time as tools and technologies have developed • Critically analyze the atoms and molecules • Applying and innovating • Implement multiple strategies to solve problems in real-life, applied, and conceptual situations • Consider the role of scientists in innovation • Communicating • Formulate physical or mental theoretical models to describe a phenomenon • Communicate scientific ideas, information, and phenomenon to the others 							
<p>Lesson Progression</p> <p>Include only the sequence of instructional intentions in the unit lesson. The lesson will be developed in your dayplan.</p>	<p>Formative Assessment</p>							
<p>Core Competency Focus (Highlight)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Communication</td> <td style="width: 25%;">Critical Thinking</td> <td style="width: 25%;">Creative Thinking</td> <td style="width: 25%;">Personal/Cultural Identity</td> <td style="width: 25%;">Personal Awareness and Responsibilities</td> <td style="width: 25%;">Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I am an active listener, I support and encourage the person speaking. ✓ I present information clearly and in an organized way. ✓ I can take on roles and responsibilities in a group. ✓ I can reflect on and evaluate my thinking, products, and actions. ✓ I can ask open-ended questions and gather information. ✓ I can take ownership of my goals, learning, and behaviour. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities	<p>Worksheets</p> <p>Discussion</p> <p>Pop Quizzes</p> <p>Exit slips</p>	<p>Learning Target 1:</p> <p>To explain the concept of chemical equilibrium with reference to reacting systems</p> <p>describe the reversible nature of most chemical reactions and how it can be represented on a PE diagram q describe the dynamic nature of chemical equilibrium q relate the changes in rates of the forward and reverse reactions to the changing concentrations of the reactants and products as equilibrium is established q describe chemical equilibrium as a closed system at constant temperature: – whose macroscopic properties are constant – where the forward and reverse reaction rates are equal – that can be achieved from either</p>
Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities			

UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Physics, Mathematics, Biology, Economics (Refers to the balance)

<p>direction – where the concentrations of reactants and products are constant q infer that a system not at equilibrium will tend to move toward a position of equilibrium</p>								
<p>Learning Target 2: To predict, with reference to entropy and enthalpy, whether reacting systems will reach equilibrium explain the significance of enthalpy and entropy q determine entropy and enthalpy changes from a chemical equation (qualitatively) q predict the result when enthalpy and entropy factors – both favour the products – both favour the reactants – oppose one another</p>	<p>Worksheets Questioning Group Work Self Assessment</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="430 115 503 924"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/ Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I present information clearly and in an organized way. ✓ I can work with others to achieve a common goal; I do my share. ✓ I can recount simple experiences and activities and tell something I learned. ✓ I build on others' ideas and add new ideas of my own, or combine other people's ideas in new ways to create new things or solve straightforward problems. ✓ I can ask open-ended questions and gather information. ✓ I can solve some problems myself and can identify when to ask for help. 	Communication	Critical Thinking	Creative Thinking	Personal/ Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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<p>Learning Target 3: To apply Le Châtelier's principle to the shifting of equilibrium explain the term shift as it applies to equilibria q describe shifts resulting from the following: – temperature change – concentration change – volume change of gaseous systems q explain equilibrium shifts using the concepts of reaction</p>	<p>Worksheets Think Pair Share Oral Test</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="1055 115 1128 924"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/ Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I can take on roles and responsibilities in a group. ✓ I get ideas when I use my senses to explore. ✓ I can experiment with different ways of doing things. 	Communication	Critical Thinking	Creative Thinking	Personal/ Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium **Teacher:** Sheenam Girdhar **Approximate Length of Unit:** 2-3 Weeks
Curriculum Area: Chemistry **Interdisciplinary:** Physics, Mathematics, Biology, Economics (Refers to the balance)

<p>kinetics & identify the effect of a catalyst on dynamic equilibrium</p>		<p>✓ can solve some problems myself and can identify when to ask for help.</p>						
<p>Learning Target 4: To apply the concept of equilibrium to a commercial or industrial process describe the Haber process for the production of ammonia (NH₃)</p>	<p>Worksheets Self-Assessment, Homework, Quiz,</p>	<p align="center">Core Competency Focus (Highlight)</p> <table border="1" data-bbox="467 126 535 928"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I get ideas that are new to my peers. deliberately learn a lot about something (e.g. by doing research, talking to others) so that I can generate new ideas. ✓ I can solve some problems myself and can identify when to ask for help. ✓ I can analyze evidence from different perspectives. ✓ I can identify problems and compare potential problem-solving strategies. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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<p>Learning Target 5: To draw conclusions from the equilibrium constant expression gather and interpret data on the concentration of reactants and products of a system at equilibrium & write the expression for the equilibrium constant when given the equation for either a</p>	<p>Worksheets Observation Quick Feedback, Oral Quiz</p>	<p align="center">Core Competency Focus (Highlight)</p> <table border="1" data-bbox="1143 126 1211 928"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I can reflect on and evaluate my thinking, products, and actions. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium **Teacher: Sheenam Girdhar** **Approximate Length of Unit: 2-3 Weeks**
Curriculum Area: Chemistry **Interdisciplinary: Physics, Mathematics, Biology, Economics (Refers to the balance)**

<p>homogeneous or heterogeneous equilibrium system q explain why certain terms (i.e., pure solids and liquids) are not included in the equilibrium constant expression q relate the equilibrium position to the value of K_{eq} and vice versa q predict the effect (or lack of effect) on the value of K_{eq} of changes in the following factors: temperature, pressure, concentration, surface area, and catalyst</p> <p>Learning Target 6:</p> <p>To perform calculations to evaluate the changes in the value of K_{eq} and in concentrations of substances within an equilibrium system</p> <p>perform calculations involving the value of K_{eq} and the equilibrium concentration of all species q perform calculations involving the value of K_{eq}, the initial concentrations of all species, and one equilibrium concentration q perform calculations involving the equilibrium concentrations of all species, the value of K_{eq}, and the initial concentrations q determine whether a system is at equilibrium, and if not, in which direction it will shift to reach equilibrium when given a set of concentrations for reactants and products</p>	<p align="center">Worksheets Peer Assessment Exit Slips</p>	<ul style="list-style-type: none"> ✓ I can consider more than one way to proceed in an investigation. ✓ I can take on roles and responsibilities in a group. 						
<p align="center">Core Competency Focus (Highlight)</p> <table border="1" data-bbox="625 126 695 934"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I give, receive, and act on feedback. ✓ I build on others' ideas and add new ideas of my own, or combine other people's ideas in new ways to create new things or solve straightforward problems. ✓ I can ask open-ended questions and gather information. ✓ I can consider more than one way to proceed in an investigation. ✓ I can solve some problems myself and can identify when to ask for help. 			Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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<p align="center">UNIT ASSESSMENT</p>								

UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium
Curriculum Area: Chemistry

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks
Approximate Length of Unit: 2-3 Weeks
Approximate Length of Unit: 2-3 Weeks

<p>FOR LEARNING</p>	<p>FORMATIVE ASSESSMENT: What formative assessment strategies will you use to assess student learning?</p>	<p><i>Quick Summaries, Open Ended Questions, Self-Assessment, Worksheet, Homework, Oral Quiz, Practice Exams, Quick Feedback, Oral Presentation, Think Pair Share, Exit Slips</i></p> <p>Formative assessment is ongoing in the classroom. Teacher assessment, student self-assessment, and/or student peer assessment involves both teacher and student in a process of continual reflection and review about progress</p> <ul style="list-style-type: none"> • Teacher adjusts the plans and engage in corrective teaching in response to formative assessment <p>Self-assessment:</p> <ul style="list-style-type: none"> • provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning • student-determined criteria based on previous learning and personal learning goals • students use assessment information to make adaptations to their learning process and to develop new understandings
<p>AS LEARNING</p>	<p>REFLECTION/SELF-ASSESSMENT: What opportunities will there be for students to reflect on their thinking and feelings as part of their learning (partner talk, self-assessment, reflection log)?</p>	<p>Refer to Kids, Competencies and Student Self-assessment Resource for Reflective thinking strategies.</p> <p>Self-assessment:</p> <ul style="list-style-type: none"> • provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning • student-determined criteria based on previous learning and personal learning goals • students use assessment information to make adaptations to their learning process and to develop new understandings
<p>OF LEARNING</p>	<p>SUMMATIVE ASSESSMENT: How will students demonstrate their understanding of the curricular connections listed above (performance task, project, portfolio, test, etc.)? How will the assessment criteria be</p>	<p>Teacher assessment used to make judgments about students' performance in relation to provincial standards</p> <p>Unit Tests, Formal Lab Reports , Exams, Practice Exam</p>

UNIT INSTRUCTIONAL PLAN

Unit Title: Equilibrium

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Physics, Mathematics, Biology, Economics (Refers to the balance)

communicated to or created with students? To parents?

TRANSFER/EXTENSION: How will student learning be extended into the real world?

- the results of chemical equilibrium can be seen in processes involving human health, hemoglobin and oxygen and carbon monoxide
- The cooling of food with refrigerators, along with means of food preservation that do not involve changes in temperature, maintains chemical equilibrium in the foods and thereby prevents or at least retards spoilage

Read more: <http://www.scienceclarified.com/everyday/Real-Life-Chemistry-Vol-2/Chemical-Equilibrium-Real-life-applications.html#ixzz5b3pY0awL>

MATERIALS AND RESOURCES:

- PowerPoint
- YouTube Videos
- Simulations
- Demonstrations
- Periodic Table
- Lab Materials

YOUR OWN PERSONAL REFLECTION: How did it go? What do you need to change and or add to the unit?

- The unit went well as planned. Students usually take some time to understand the Le Châtelier's Principle and ICE tables.
- Do a more detailed Math skills review
- More Demo for Le -Châtelier's Principle
- ICE table problems as a group work.

UNIT INSTRUCTIONAL PLAN

Unit Title: Solubility **Teacher:** Sheenam Girdhar **Approximate Length of Unit:** 2-3 Weeks
Curriculum Area: Chemistry **Interdisciplinary:** Pharmacy

BIG IDEAS		
<p>Study of solute-solvent interactions is very important to understand the solubility of ionic compounds in water. Solubility of a compound in aqueous solution varies with the temperature Formulate equilibrium constant expressions for various saturated solutions Devise a method for determining the concentration of a specific ion</p>		
FIRST PEOPLES PRINCIPLES OF LEARNING.		
<p>First Peoples Principles of Learning</p> <ul style="list-style-type: none"> • Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits and the ancestors. • Learning recognizes the role of indigenous knowledge. • Learning is embedded in memory, history, and story. 		
CORE COMPETENCIES		
<p>Highlight the CC focus, which will be self- assessed by students. https://curriculum.gov.bc.ca/competencies</p>		
<p>Communication</p> <ul style="list-style-type: none"> ✓ Connect and engage with others (to share and develop ideas) □ Acquire, interpret and present information (include inquiries) ✓ Collaborate to plan, carry out and review constructions and activities ✓ Explain, recount and reflect on experience and accomplishments <p>Assessments</p> <ul style="list-style-type: none"> ✓ What? ✓ How? □ Reporting? 	<p>Creative Thinking</p> <ul style="list-style-type: none"> ✓ Novelty and value ✓ Generating ideas ✓ Developing ideas <p>Critical Thinking</p> <ul style="list-style-type: none"> ✓ Analyze and critique ✓ Question and investigate ✓ Develop and design <p>Problem-Solving</p> <ul style="list-style-type: none"> ✓ Analyze and critique ✓ Question and investigate ✓ Develop and design 	<p>Positive Personal and Cultural Identity</p> <ul style="list-style-type: none"> ✓ Relationships and cultural contexts □ Personal values and choices □ Personal strengths and abilities <p>Personal Awareness and Responsibilities</p> <ul style="list-style-type: none"> ✓ Self-determination □ Self-regulation □ Well-being <p>Social Responsibilities</p> <ul style="list-style-type: none"> □ Contributing to community and caring for the environment □ Solving problems in peaceful ways ✓ Valuing diversity ✓ Building relationships

UNIT INSTRUCTIONAL PLAN

Approximate Length of Unit: 2-3 Weeks

Teacher: Sheenam Girdhar

Unit Title: Solubility

Interdisciplinary: Pharmacy

Curriculum Area: Chemistry

CORE COMPETENCIES IN ACTION

- Introduce the Curricular competencies focus.
- Have students discuss how they will learn the competencies throughout the unit
- Share with students how the competency learning is relevant to real-world situations.
- Make students familiar to the '1 can statements' on the competency posters.
- Introduce the learning target to the lesson and discuss with students how they will use the curricular competency to attain the learning target.
- Use effective classroom discussions, activities, and tasks that elicit evidence of the competency.
- Use questioning strategies throughout instruction and or inquiry to prompt REFLECTIVE THINKING.

Student-Self Assessment Strategies – Checklists, Core Competency assessment sheets (descriptive).

QUESTIONS TO SUPPORT INQUIRY

- How is the solubility constant useful in studying chemical processes?
- How can ions (e.g., calcium, magnesium) be removed from hard water?

LEARNING STANDARDS. <https://curriculum.gov.bc.ca/curriculum>

Curricular Competencies

Content

Students are expected to DO the following:

- Questioning and predicting
 - Make observations aimed at identifying their own questions about the Equilibrium
 - Formulate multiple hypotheses and predict multiple outcomes
 - Collaboratively and individually plan, select, and use appropriate explanation of solubility equilibrium.
 - Processing and analyzing data and information
 - Construct, analyze, and interpret graphs, models, and/or diagrams
 - Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
 - Critically analyze the solubility equilibrium problems.
 - Implement multiple strategies to solve problems in real-life, applied, and conceptual situations

Students are expected to KNOW the following:

- saturated solutions and solubility product (K_{sp})
- solubility product (K_{sp}): K_{sp} as a specialized Keq expression
- qualitative changes in the solubility equilibrium upon the addition of a common ion or the removal of an ion.
- Study the qualitative relationships in solutions (e.g., K_{sp}, prediction of precipitate formation, calculating the maximum allowable concentration)

UNIT INSTRUCTIONAL PLAN

Unit Title: Solubility

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Pharmacy

- Formulate physical or mental theoretical models to describe a phenomenon
- Communicate scientific ideas, information, and phenomenon to the others

	Lesson Progression							
Learning Targets	Formative Assessment							
<p>Learning Target 1: Determine the solubility of a compound in aqueous solution classify a solution as ionic or molecular, given its conductivity or the formula of the solute describe the conditions necessary to form a saturated solution describe solubility as the concentration of a substance in a saturated solution use appropriate units to represent the solubility of substances in aqueous solutions</p>	<p>Worksheets Discussion Pop Quizzes Exit slips Mindmap</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="470 1297 714 1480"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I am an active listener; I support and encourage the person speaking. ✓ I present information clearly and in an organized way. ✓ I can take on roles and responsibilities in a group. ✓ I can reflect on and evaluate my thinking, products, and actions. ✓ I can ask open-ended questions and gather information. ✓ I can take ownership of my goals, learning, and behavior. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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<p>Learning Target 2: describe a saturated solution as an equilibrium system describe the equilibrium that exists in a saturated aqueous solution describe a saturated solution using a net ionic equation</p>	<p>Worksheets Questioning Group Work Self Assessment</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="470 1297 714 1480"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I present information clearly and in an organized way. ✓ I can work with others to achieve a common goal; I do my share. ✓ I can recount simple experiences and activities and tell something I learned. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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UNIT INSTRUCTIONAL PLAN

Unit Title: Solubility

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Pharmacy

		<ul style="list-style-type: none"> ✓ I build on others' ideas and add new ideas of my own, or combine other people's ideas in new ways to create new things or solve straightforward problems. ✓ I can ask open-ended questions and gather information. ✓ I can solve some problems myself and can identify when to ask for help. 						
<p>Learning Target 3: determine the concentration of ions in a solution. write dissociation equations q calculate the concentration of the positive and negative ions given the concentration of a solute in an aqueous solution</p>	<p align="center">Worksheets Think Pair Share OralTest</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="544 96 613 926"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I can take on roles and responsibilities in a group. ✓ I get ideas when I use my senses to explore. ✓ I can experiment with different ways of doing things. ✓ I can solve some problems myself and can identify when to ask for help. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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<p>Learning Target 4: determine the relative solubility of a substance, given solubility tables describe a compound as having high or low solubility relative to 0.1 M by using a solubility chart q use a solubility chart to predict if a precipitate will form when two solutions are mixed, and identify the precipitate q write a formula equation, complete ionic equation, and net ionic equation that represent a precipitation reaction</p>	<p align="center">Worksheets Self-Assessment, Homework, Quiz</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="1040 96 1110 926"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I get ideas that are new to my peers. deliberately learn a lot about something (e.g. by doing research, talking to others) so that I can generate new ideas. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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UNIT INSTRUCTIONAL PLAN

Unit Title: Solubility

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Pharmacy

<p>Learning Target 5: formulate equilibrium constant expressions for various saturated solutions q use a solubility chart to predict if ions can be separated from solution through precipitation, and outline an experimental procedure that includes – compound added – precipitate formed – method of separation q predict qualitative changes in the solubility equilibrium upon the addition of a common ion or the removal of an ion q identify an unknown ion through experimentation involving a qualitative analysis scheme q devise a procedure by which the calcium and/or magnesium ions can be removed from hard water. describe the Ksp expression as a specialized Keq expression q write a Ksp expression for a solubility equilibrium</p>	<p align="center">Worksheets Observation Quick Feedback, Oral Quiz</p>	<ul style="list-style-type: none"> ✓ I can solve some problems myself and can identify when to ask for help. ✓ I can analyze evidence from different perspectives. ✓ I can identify problems and compare potential problem-solving strategies. 						
<p>Learning Target 6: perform calculations involving solubility equilibrium concepts and devise a method for determining the concentration of a specific ion</p>	<p align="center">Worksheets Peer Assessment Exit Slips</p>	<p>Core Competency Focus (Highlight)</p> <table border="1" data-bbox="581 121 651 926"> <tr> <td>Communication</td> <td>Critical Thinking</td> <td>Creative Thinking</td> <td>Personal/Cultural Identity</td> <td>Personal Awareness and Responsibilities</td> <td>Social Responsibilities</td> </tr> </table> <p>Core Competency in Action: Indicate how Core Competencies will be developed in unit.</p> <ul style="list-style-type: none"> ✓ I can reflect on and evaluate my thinking, products, and actions. ✓ I can consider more than one way to proceed in an investigation. ✓ I can take on roles and responsibilities in a group. 	Communication	Critical Thinking	Creative Thinking	Personal/Cultural Identity	Personal Awareness and Responsibilities	Social Responsibilities
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UNIT INSTRUCTIONAL PLAN

Unit Title: Solubility

Teacher: Sheenam Girdhar

Approximate Length of Unit: 2-3 Weeks

Curriculum Area: Chemistry

Interdisciplinary: Pharmacy

determine the concentration of chloride ion (by titration or gravimetric methods) using a precipitation reaction with silver ion

- ✓ I give, receive, and act on feedback.
- ✓ I build on others' ideas and add new ideas of my own, or combine other people's ideas in new ways to create new things or solve straightforward problems.
- ✓ I can ask open-ended questions and gather information.
- ✓ I can consider more than one way to proceed in an investigation.
- ✓ I can solve some problems myself and can identify when to ask for help.

UNIT ASSESSMENT

FOR LEARNING

FORMATIVE ASSESSMENT:
What formative assessment strategies will you use to assess student learning?

Quick Summaries, Open Ended Questions, Self-Assessment, Worksheet, Homework, Oral Quiz, Practice Exams, Quick Feedback, Oral Presentation, Think Pair Share, Exit Slips
Formative assessment is ongoing in the classroom.
Teacher assessment, student self-assessment, and/or student peer assessment involves both teacher and student in a process of continual reflection and review about progress
• Teacher adjusts the plans and engage in corrective teaching in response to formative assessment
Self-assessment:
• provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning
• student-determined criteria based on previous learning and personal learning goals
• students use assessment information to make adaptations to their learning process and to develop new understandings

AS LEARNING

REFLECTION/SELF-ASSESSMENT: What opportunities will there be for students to reflect on their thinking and feelings as part of their learning (partner talk, self-assessment, reflection log)?

Competencies and Student Self-assessment Resource for Reflective thinking strategies.
Self-assessment:
• provides students with information on their own achievement and prompts them to consider how they can continue to improve their learning
• student-determined criteria based on previous learning and personal learning goals

UNIT INSTRUCTIONAL PLAN

Teacher: Sheenam Girdhar Approximate Length of Unit: 2-3 Weeks

Interdisciplinary: Pharmacy

Unit Title: Solubility

Curriculum Area: Chemistry

		<ul style="list-style-type: none"> students use assessment information to make adaptations to their learning process and to develop new understandings
<p>OF LEARNING</p>	<p>SUMMATIVE ASSESSMENT: How will students demonstrate their understanding of the curricular connections listed above (performance task, project, portfolio, test, etc.)? How will the assessment criteria be communicated to or created with students? To parents?</p>	<p>Unit Tests, Formal Lab Reports, Exams, Practice Exam, Projects</p>
<p>MATERIALS AND RESOURCES:</p>		
<ul style="list-style-type: none"> PowerPoint YouTube Videos Simulations Demonstrations Periodic Table Lab Materials Crystals 		
<p>PERSONAL REFLECTION:</p>		
<ul style="list-style-type: none"> Using the crystal project was a good practical experience for the students to understand the concept of solubility. Application of removing ions from hard water can be demonstrated in the lab. 		



CHEMISTRY 12

Course Weekly Schedule

Curriculum Organizer	Teaching Strategies and Assessment	Big Ideas	Curricular Competencies
Chemistry 11 Review Week 1	<ul style="list-style-type: none"> • Introduction to core competencies • Group activity • Review of some of the important topics in Chemistry 11 such as: • Significant Figures/Uncertainty • Mole Concept • Limiting Reagents • Balancing of equations • Nomenclature • Worksheets/Quizzes • Formative Assessment • Self -Assessment 	<ul style="list-style-type: none"> • The mole is a quantity used to make atoms and molecules measurable • Matter and energy are conserved in chemical reactions. • Stoichiometric calculations involving chemical reactions are important • Stoichiometry involves relationships between reactants and/or products in a chemical reaction to determine desired quantitative data 	<ul style="list-style-type: none"> • explain the significance and use of the mole • perform calculations involving the mole • determine relationships between molar quantities of gases at STP • perform calculations involving molecular and empirical formulae to identify a substance • describe concentration in terms of molarity • perform calculations involving molarity • apply the law of conservation of mass to balance formula equations • devise balanced equations for various chemical reactions • write the names and formulae for ionic and covalent compounds, given appropriate charts or data tables
Kinetics Week 2-3	<ul style="list-style-type: none"> • Draw a map of all safety features in the classroom • Laboratory tour emphasizing safety features • Kinetics worksheets/quizzes • Lab 1 Rates of reaction • Lab 2: The Iodine Clock – lab report is assessed. • Unit test • Online quiz/Worksheets 	<ul style="list-style-type: none"> • Demonstrate their knowledge of reaction rates – how to monitor, change factors and asses them. • Apply the principles and aspects of the collision theory. • Be able to draw and analyze energy diagrams and understanding the use of enthalpy in a reaction. • Analyze a reaction mechanism in a reaction. • Describe uses of a catalyst. 	<ul style="list-style-type: none"> • demonstrate awareness that reactions occur at differing rates • experimentally determine rate of a reaction • demonstrate knowledge of collision theory • describe the energies associated with reactants becoming products • apply collision theory to explain how reaction rates can be changed • analyze the reaction mechanism for a reacting system • represent graphically the energy changes associated with

	<ul style="list-style-type: none"> • Group work • Element Project • Formative Assessment • Self -Assessment 		<p>catalyzed and uncatalyzed reactions</p> <ul style="list-style-type: none"> • describe the uses of specific catalysts in a variety of situations
<p>Equilibrium</p> <p>Week 4-5</p>	<ul style="list-style-type: none"> • Project Submission and presentation • Lab 3 – Investigating Chemical Equilibrium • Hebden workbook questions • Driving forces video • Quizzes and unit test • Demonstration of Le Chatelier's Principle • Lab 19B – Equilibrium Expression • Formative Assessment • Self -Assessment • Bioplastic project • Unit test 	<ul style="list-style-type: none"> • Analyze dynamic equilibrium and know what the necessary requirements are for an equilibrium to exist. • Explain the driving forces in a chemical equilibrium, and describe the result of such factors on an equilibrium • Apply the concept of equilibrium to an industrial process • Explain the results of an equilibrium constant expression • Perform calculations to evaluate the changes in K_{eq} 	<ul style="list-style-type: none"> • explain the concept of chemical equilibrium with reference to reacting systems • predict, with reference to entropy and enthalpy, whether reacting systems will reach equilibrium • apply Le Châtelier's principle to the shifting of equilibrium • apply the concept of equilibrium to a commercial or industrial process • draw conclusions from the equilibrium constant expression • perform calculations to evaluate the changes in the value of K_{eq} and in concentrations of substances • within an equilibrium system
<p>Solubility</p> <p>Week 6-8</p>	<ul style="list-style-type: none"> • Lab 19C – Solubility Constant Expression • Quizzes and unit test • Introduce titration techniques • Self -Assessment • Crystal Preparation • Midterm Exam • Formative Assessment • Unit test • Worksheets • Indigenous knowledge in Chemistry 	<ul style="list-style-type: none"> • Study of solute-solvent interactions is very important to understand the solubility of ionic compounds in water. • Solubility of a compound in aqueous solution varies with the temperature • Formulate equilibrium constant expressions for various saturated solutions • Devise a method for determining the concentration of a specific ion • Describe a saturated solution as an equilibrium • Determine the solubility of a substance using solubility tables. • Apply solubility procedures – quantitative analysis • Demonstrate various K_{sp}/solubility calculations • Determine the concentration of chloride ion using precipitation methods 	<ul style="list-style-type: none"> • determine the solubility of a compound in aqueous solution • describe a saturated solution as an equilibrium system • determine the concentration of ions in a solution • determine the relative solubility of a substance, given solubility tables • apply solubility rules to analyze the composition of solutions • formulate equilibrium constant expressions for various saturated solutions • perform calculations involving solubility equilibrium concepts • devise a method for determining the concentration of a specific ion
<p>Acids and Bases</p>	<ul style="list-style-type: none"> • Assess a household 	<ul style="list-style-type: none"> • Outline the general 	<ul style="list-style-type: none"> • identify acids and bases through

<p>Week 9-10</p>	<p>chemical</p> <ul style="list-style-type: none"> • Use the principles of Lab 20A to look at nature of Acids and Bases. • Quizzes/worksheets • Lab 20B- Bronsted-Lowry Acid Base Equilibria • Lab 20G/20C Acid Base Titrations • Lab 20D Hydrolysis • Acid Rain presentation • Self -Assessment 	<p>characteristics of Acids and Bases.</p> <ul style="list-style-type: none"> • Identify various models of Acids and Bases • Analyze balanced equations of Acids or Bases in water • Compare relative strengths of Acids and Bases • Analyze the equilibrium of water • Perform calculations using pH, pOH and concentrations of H^+ and OH^- • Perform calculations using K_a and K_b • Demonstrate titration techniques • Describe an indicator as an equilibrium system • Understand and analyze hydrolysis of a ions in a salt solution • Describe buffer systems • Discuss what happens to oxides that dissolve in water 	<p>experimentation</p> <ul style="list-style-type: none"> • identify various models for representing acids and bases • analyze balanced equations representing the reaction of acids or bases with water • classify an acid or base in solution as either weak or strong, with reference to its electrical conductivity • analyze the equilibria that exist in weak acid or weak base systems • identify chemical species that are amphiprotic • analyze the equilibrium that exists in water • perform calculations relating pH, pOH, $[H_3O^+]$, and $[OH^-]$ • explain the significance of the K_a and K_b equilibrium expressions • perform calculations involving K_a and K_b • applications of acid-base reactions • demonstrate an ability to design, perform, and analyse a titration experiment involving the following: <ul style="list-style-type: none"> – primary standards – standardized solutions – titration curves – appropriate indicators • describe an indicator as an equilibrium system • perform and interpret calculations involving the pH in a solution and K_a for an indicator • describe the hydrolysis of ions in salt solutions • analyze the extent of hydrolysis in salt solutions • describe buffers as equilibrium systems • describe the preparation of buffer systems • predict what will happen when oxides dissolve in rain water
<p>Oxidation and reduction Week 11-13</p>	<ul style="list-style-type: none"> • Demonstrate copper and silver nitrate • Lab 21A – Introduction to Electrochemistry 	<ul style="list-style-type: none"> • Describe oxidation and reduction • Analyze strengths of reducing and oxidizing agents • Balance redox reactions 	<ul style="list-style-type: none"> • describe oxidation and reduction processes • analyze the relative strengths of reducing and oxidizing agents • balance equations for redox

	<ul style="list-style-type: none">• 21D – Making an Electrochemical cell• Presentation of electrochemical applications – batteries, fuel cells, and the electric car• Unit test and worksheets• Self -Assessment	<ul style="list-style-type: none">• Perform calculations of redox titrations• Analyze an electrochemical cell• Present a practical application of an electrochemical cell• Understand the concept of corrosion• Analyze an electrolytic cell and look at how they are used practically.	<p>reactions</p> <ul style="list-style-type: none">• determine the concentration of a species by performing a redox titration• applications of redox reactions• analyze an electrochemical cell in terms of its components and their functions• describe how electrochemical concepts can be used in various practical applications• analyze the process of metal corrosion in electrochemical terms• analyze an electrolytic cell in terms of its components and their functions• describe how electrolytic concepts can be used in various practical applications
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