SOUTH CENTRAL INTERIOR DISTANCE EDUCATION SCHOOL

Student Name _____ Date Submitted _____

Chemistry 12 (v3)

Section 1.0 Send-In

Please complete this send-in as part of your course enrollment as soon as possible. This will be your first mark entered for the course.

This send-in consists of:

- Chemistry 12 Course Planner _____/13 marks
- Guided Practice 1A _____/37 marks

TOTAL: _____/40 marks _____%

Mail:

1) This **Cover Sheet**
2) **Comment Sheet** (page 2) – Fill out with your complete name and address.
3) **Send-In Assignments** – Complete above noted assignments. Note: If you downloaded this assignment from the Website, you do not need to print the Resource Pages.

Be sure to put proper **postage** on the envelope (if necessary) and add your **return address**.

When this assignment has been received by SCIDES, your course materials will be sent to you. You may see this assignment again in the first module— you are not required to repeat this work.

[This page intentionally left blank.]

You are REQUIRED to fill out your return address on this page if you DOWNLOADED this Assignment. [If the Assignment was mailed to you, please fill out the back of the white page of the 3 part District Education Comment Sheet.]

Please Print Clearly

NAME	
ADDRESS	
CITY / TOWN	
PROVINCE / COUNTRY	
POSTAL CODE	

Complete your MAILING address.

Is this a change of address? ☐ **Yes** ☐ **No**

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Chemistry 12 Course Planner

____ / 13 marks

Name: _____

Complete <u>all</u> this following contact information that applies to you and check the one that is the best way to contact you during the day:

❑ Home Phone: _____ ❑ Work Phone: _____ ❑ Cell: _____

❑ Email: _____

❑ other way to contact you (explain) _____

When is the best time for your teacher to contact you? ____:_____ AM PM

Check your Grade:

❑ Grade 10 ❑ Grade 11 ❑ Grade 12 ❑ Adult Learner ❑ Graduated Learner

One of the keys to being successful in anything that you do is to take the time to plan carefully. The objective of this section is to help you create a timetable for managing your schoolwork and enable you to set goals for finishing all of your courses by your desired completion date. **Most full-time students complete 3 to 5 assignments each week.**

Part 1: Timetable Options

The normal school year is approximately 44 weeks from the beginning of September to the end of June. Most students try to complete their school year by the end of June but your program may not fit these parameters. Students on a linear system usually work on all of their courses at the same time, taking the full year to complete. Those on a semester system work on half of their courses during each semester. And finally, those students in a four-term system complete two courses per term. The flexibility of our distributed learning program offers you many choices but a plan for completion is essential to success.

After reading about the timetable options above, check the system that best describes your program.

Timetable Option: ❑ Four-Term System (11 weeks) ❑ Semester System (22 weeks) ❑ Linear System (44 weeks)

Part 2: Course Plan

What is your intended completion date for this course? _____ (month) _____ (year)

How many courses are you taking with us this year? _____ How many with other schools/programs? _____

Chemistry 12 consists of 18 send-in assignments and 4 tests. How many assignments per week must you do to complete this course as planned? _____

Mark target submission dates on a calendar. Add this same information from other courses to help you create a schedule for completion. Record the actual dates you submit work so you can track your progress.

What is the Delivery Method? ❑ Paper ❑ Online-supported Print ❑ Online

Is this a Provincially Examinable course? ❑ No ❑ Yes – in which session do you intend to write?

❑ November ❑ January ❑ April ❑ June ❑ August

Part 3: Student Course Profile

What are some of your strengths and weaknesses in this subject area?

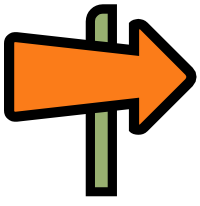
Strengths: ❑ I have always liked this subject. ❑ I am very organized. ❑ I am an independent learner.
❑ I am a good listener. ❑ I have good reading skills. ❑ I have good writing skills.

Anything else you would like us to know about your strengths?

Weaknesses: ❑ I struggle with this subject. ❑ I have poor organizational skills. ❑ I seldom complete what I start.
❑ I need to work on my social skills. ❑ I struggle with reading. ❑ I have trouble following directions.

Anything else you would like us to know about your weaknesses?

How can we best support you in this course? The more specific the ideas you provide, the better we will be able to support you. Give us your suggestions in the space below.



IMPORTANT NOTE: This Course Planner has a value of 13 marks. DO NOT LEAVE ANY SECTIONS BLANK. For example, if you cannot identify your strengths/weaknesses with the check boxes, be sure to write at least a brief note about these in the boxes following each question.

Section 1 Lesson A

REVIEW OF CHEMICAL EQUATIONS

Chemistry 12 is concerned with the detailed study of several classes of chemical reactions. In order to understand the chemistry involved in any class of reactions under study, we will develop a model of the process followed by all reactions. Before we can begin the development of the model, however, it is appropriate to consider a review of chemical reactions and their equations.

We know that a **chemical reaction** is the process by which a substance or substances undergoes a rearrangement of molecules to produce a new substance (or substances). The beginning materials, called the **reactants**, are consumed in the reaction. The new substances produced, called the **products**, are formed in the reaction. Usually the reaction is accompanied by the absorption or evolution of energy in the form of heat. A **chemical equation**, which provides a written description of the reaction, imparts much information about the reaction. For example, consider the equation describing the formation of water from its elements:

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$$

We learn from this equation that:

- the reactants are hydrogen and oxygen.
- water is the product.
- hydrogen and oxygen are reacting in the gas phase, while water is produced in the liquid phase.
- when 2 molecules of hydrogen are reacted, 1 molecule of oxygen also reacts, and 2 molecules of water are produced. (We may also interpret this equation in terms of **molecules**, i.e., when 2 molecules of hydrogen react, 1 molecule of oxygen also reacts, producing 2 molecules of water.)

An energy term may be included to communicate even more information about the reaction. The reaction above is known to release

283 kJ of heat energy for every mole of water formed. In other words, as you learned in Chemistry 11, the energy change, which we call the **enthalpy change** (given the symbol, ΔH) is $^{-}283$ kJ/mol H_2O. Since the reaction equation above shows 2 moles of water as the product, the total amount of energy released would be 566 kJ. This information can be communicated in one of several ways along with the balanced equation for the reaction.

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g) + 566\ kJ$$

$$\text{or } 2H_2(g) + O_2(g) \rightarrow 2H_2O(g) \quad \Delta H = {}^{-}566\ kJ$$

$$\text{or } H_2(g) + \tfrac{1}{2}O_2(g) \rightarrow H_2O(g) \quad \Delta H = {}^{-}283\ kJ$$

Recall that the term **exothermic** describes a reaction which releases energy, while the term **endothermic** describes a reaction which absorbs energy. For an exothermic reaction such as this one, the energy term is written on the right-hand side of the equation as a product. When the enthalpy change is written as a ΔH, the negative sign indicates that the reaction is exothermic, i.e., that the products possess less enthalpy (energy) than the reactants. We will further investigate energy changes occurring in a chemical reaction in future sections.

Clearly, the balanced equation of a chemical reaction, and its associated enthalpy change, gives us considerable information about the reaction. But the equation tells us nothing about four areas of interest to the chemist:

1. How difficult is it to cause the reaction to occur?

2. How rapidly does the reaction proceed?

3. How do the molecules interact in proceeding from reactants to products?

4. Does the reaction go to completion?

These questions are the concern of **reaction kinetics**, a branch of chemistry devoted to the study of chemical reactions. It is important to understand at the outset that reaction kinetics makes conclusions about reactions based on some assumptions about how molecules behave when reacting. In addition, extensive experimentation of a complex nature is necessary in order for the chemist to apply and modify his assumptions about molecular behavior. Eventually, answers to the four questions above begin to evolve.

In our study of reaction kinetics, we will not have access to elaborate laboratory equipment, but we will still be able to understand some of the processes of chemical reactions.

This lesson, which is a review of material from Chemistry 11, contained some underlined terms and their definitions. They are listed below. Read the list and make sure you understand the meaning of each term.

chemical reaction
reactants
products
chemical equation
enthalpy change
exothermic
endothermic
reaction kinetics

Now proceed to Guided Practice 1 A.

Guided Practice 1 A

For each of the equations of chemical reactions in questions 1 - 4:

(a) Give the mole ratio.
(b) Rebalance each equation showing the presence of 1 mol of water.
(c) Write a ΔH term for each rebalanced equation.

1. $H_2SO_4(aq) + 2NaOH(aq) \rightarrow 2H_2O(l) + Na_2SO_4(aq) + 125\ kJ$

(a) _____

(b) _____

(c) _____

2. $4H_2O(l) + 1130\ kJ \rightarrow 4H_2(g) + 2O_2(g)$

(a) _____

(b) _____

(c) _____

3. $BaCl_2 \cdot 2H_2O(s) + 360\ kJ \rightarrow BaCl_2(s) + 2H_2O(g)$

(a) _____

(b) _____

(c) _____

4. $2CO_2(g) + 4H_2O(l) \rightarrow 2H_3O^+(aq) + 2HCO_3^-(aq) + 64\ kJ$

(a) _____

(b) _____

(c) _____

5. State whether each of the equations in questions 1 - 4 is exothermic or endothermic.

1. _____ 2. _____

3. _____ 4. _____

6. Consider the following reaction:

$CaCO_3(s) + 400\ kJ \rightarrow CaO(s) + CO_2(g)$

(a) State six pieces of information that are given by the equation. (0.5 marks each)

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(b) Write the enthalpy change as a ΔH term.

_____

(c) If 5.0 mol of $CaCO_3$ were to react, how many moles of each product would be formed, and how many kJ of heat are required?

_____

(d) If 200 g of $CaCO_3$ were to react, how many grams of each product would be formed? (Hint: convert 200 g of $CaCO_3$ to moles, then use the molar ratio.) (2 marks)

(e) State three pieces of information that the equation does not provide.

(1) _____

(2) _____

(3) _____

7. Consider the reaction:

$2Sb(s) + 3I_2(g) \rightarrow 2SbI_3(s) \quad \Delta H = 75.6\ kJ$

(a) Is this reaction exothermic or endothermic?

_____

(b) Write the ΔH term in terms of **each mole** of SbI_3 produced.

_____

(c) Rewrite the equation including the energy.

_____

8. The reaction which produces mercury(I) sulphate, $Hg_2SO_4(s)$, from mercury(II) oxide, $HgO(s)$, and sulphur dioxide, $SO_2(g)$, requires 165 kJ of energy for each mole of Hg_2SO_4 produced.

(a) Write the balanced equation showing 1.0 mole of Hg_2SO_4 being produced. Include an energy term in the equation.

_____

(b) Is it possible to tell how rapidly this reaction occurs? Explain. (2 marks)

_____

_____

(c) If it were necessary to produce 50.0 g of Hg_2SO_4, how many grams of HgO must react? (3 marks)

(d) How many kilojoules of energy are required to produce 1.0 kg of Hg_2SO_4? (2 marks)

Total _____ marks out of a possible 37