MENNONITE BRETHREN COLLEGIATE INSTITUTE

Grade 12

CHEMISTRY 40S

Taught by: Mr. Andrew Hiebert

2016-2017

Course Description

This Chemistry 40S program provides a continuation of the studies that began in the 30S program. The course is designed to prepare students for post-secondary studies in Chemistry. The rigor of the course is designed to ease the transition between high school and post-secondary studies.

The topics include chemical kinetics, equilibriums, acids & bases, atomic theory, & redox. In addition to the theory, the student will be experience numerous activities, labs, as well as projects. The first project will be to create an exothermic hot pack [hot shot]. The second, design and create a vegetable/fruit battery [brightest bulb]. A third project will require the student to create a comprehensive review on a pillow case [sleep on it periodically pillow].

Chemistry 40S will also provide a solid base of scientific literacy with regard to the understanding the impact chemistry has on society and the world around us.

Course Rationale

Chemistry 40S is contains an extensive study of kinetics and equilibriums. These two processes are active all around us everyday, in our bodies, foods, earth, plants & animals, air, water, fashions, and medicines, just to name a few. Understanding chemistry will increase your ability to understand, predict, and wisely use chemicals of all kinds.

Chemistry 40S can open the door to a wide variety of professional careers. [like: medical, pharmaceutical, agricultural, commercial, research, or educational]. {See page 7.}

General Objectives

1. To inspire student's interest in chemistry
2. To equip student's with problem solving skills, study skills, lab technique skills, and their ability to work through concepts with precision and accuracy.
3. To establish understanding of the material in the curriculum
4. To promote attributes such as curiosity, diligence, flexible thinking, respect for precision & accuracy,
5. To provide a well balanced course that includes theory, lab work, and a group project, that allow students to engage with the material in a hands-on way.
6. To develop a habit and skill in self-reflection and evaluation so that they can do become successful self directed learners who live life well.

Course Methodology

Lectures
Problem solving
Questions and Answer discussions
Demonstrations
Labs & Lab Activities
Teacher interviews
Tests

Group Project:	"Hot Shot" Project
Individual Project:	"Sleep On It Periodically Pillow" Project
Field Trip:	TBA
Final Comprehensive Exam	In June

Materials Needed:

[Note – Marks may be lost if those items are absent]

What	When
1- Student Planner	Every class
4- different coloured pens/pencils	Every class
1- Three ringed binder for notes & handouts	Every class
1-School Issued Text **[Chemistry 12]**	Every class
6- Slim labeled folders for homework & labs	whenever work is handed in.
1- Scientific calculator	Every class
1- tri-fold large presentation boards	Gallery walk

- **IMPORTANT CLARIFICATION**:
  Authored work must always represent the individual understanding and processing of the author(s) submitting it.
  Maintain your academic integrity.

CHM 40S Course Outline

1. Chemical Kinetics I 6.1-page 377 {~13 lessons}
   - a Determining the rate of reaction Activity
   - b Reaction rates Pop Your Lid LAB
   - c. Kinetics I Test [~October 26, 2016]

"Hot Shot" Group Project **Gallery Walk Due:** **~Nov. 9th 2016**
Game Day: **~Nov. 18th 2016**

2. Chemical Kinetics II p.378- end of chp 6 {~10 lessons}
   - a Alum Crystal Making Activity
   - b Kinetics I Test [~December 12, 2016]

3. Chemical Equilibrium 7.1- 7.4 {~13 lessons}
   - a. Iodine Clock LAB (2 classes)
   - b. Chem. Equilibrium I test [~February 3, 2017]
   - b. The Coin (bean) Exchange Activity [equilibrium analogy]
   - c. Determining the equilibrium constant K Activity
   - d. Le Chatelier's Principle LAB (2 classes)

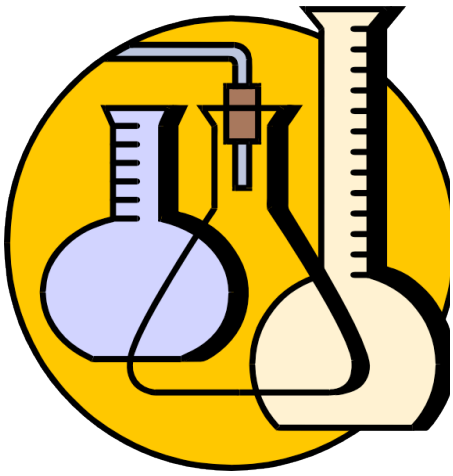
4. Chemical/Solubility Equilibrium 7.5 – 7.7 {~9 lessons}
   - a. Chem. Equilibrium II test [~ March 17, 2017]
   - b. Predicting Precipitates Activity

5. Acid and Base Equilibrium 8.1- 8.5 {~13 lessons}
   - a. Acid/Base I equilibrium Test [~May 12, 2017]
   - b. Titration lab [4 lessons][done after Structure of the atom unit, due after the musical]

"Sleep On It Periodically Project" **the completed pillow is due: May 29th 2016**

6. Atomic Model Units {~5 lessons}

7. Final Comprehensive Examination



CHEMISTRY 40S ASSESSMENT CATEGORIES

MBCI has shifted toward a radically different way of defining the categories of assessment. Instead of evaluating learning based on the *tool* [homework, quizzes, labs, tests, and projects] , the new system will evaluate learning based on the *type of learning* involved. A description of the *types of learning* used in this course are described below:

Knowledge and Understanding [KU]

30% WEIGHT

- the bottom two levels of Bloom's taxonomy
- facts, implications, deductions, simple step(s)
- processing of content
- involving remembering and comprehension
- HOMEWORK question check
- *Multiple choice, fill in the blanks, & chart reading part of TESTS*

Application and Problem Solving [APS]

40% WEIGHT

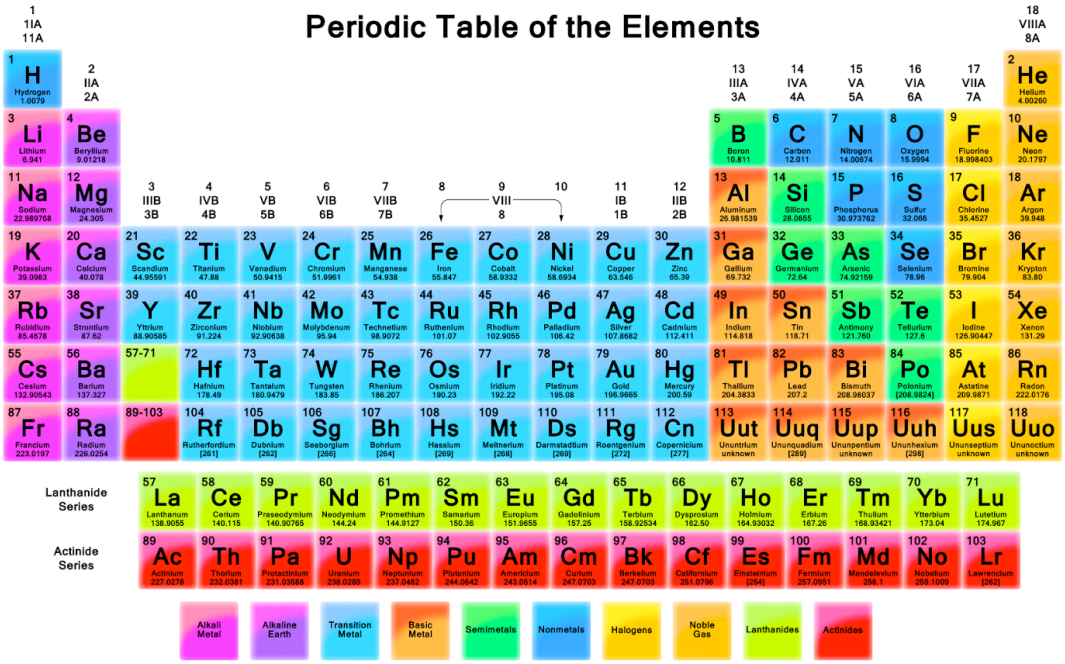
- Middle two levels of Bloom's taxonomy
- involving the analysis and application of ideas to new contexts/situations
- The mathematical analysis part of PROJECTS
- *long answer questions the plan, work, & answer part of TESTS*
- **The ANALYSIS portion of activity reports & LABS**

Communication, Inquiry & Design [CID]

30% WEIGHT

- The correct use of language, terms, technicalities of form, and ability to communicate ones' learning.
- *The layout of the solution in long answer part of TESTS.*
- *significant figures on long answer part of TESTS*
- *Sentence (paragraph) answers part of TESTS*
- **Reports activities & LABS (all but analysis)**
- Public presentations of ideas part of PROJECTS
- Written reflections on individual work, group work, or content of a project.
- MIND WORK MUSINGS and verbal reflections
- Discussions with teacher.
- Top two levels of Bloom's taxonomy
- Evaluating systems and structures (literal & figurative)
- creating brand new products
- **lab skills the % error portion on LABS**
- **Experiment Procedure design activities & questions on how the lab design could be improved part of LABS**
- Design process activities & PROJECTS
- Marks for research
- Most components of a PROJECT
- The LEARNIEs

2 terms each worth 40%, a final comprehensive exam worth 20%


Periodic Table of the Elements
1 1IA 11A
2 IIA 2A
3 IIIB 3B
4 IVB 4B
5 VB 5B
6 VIB 6B
7 VIIB 7B
8 9 VIII 8 10
11 IB 1B
12 IIB 2B
13 IIIA 3A
14 IVA 4A
15 VA 5A
16 VIA 6A
17 VIIA 7A
18 VIIIA 8A
1 H Hydrogen 1.0079
2 He Helium 4.00260
3 Li Lithium 6.941
4 Be Beryllium 9.01218
5 B Boron 10.811
6 C Carbon 12.011
7 N Nitrogen 14.00674
8 O Oxygen 15.9994
9 F Fluorine 18.998403
10 Ne Neon 20.1797
11 Na Sodium 22.989768
12 Mg Magnesium 24.305
13 Al Aluminum 26.981539
14 Si Silicon 28.0855
15 P Phosphorus 30.973762
16 S Sulfur 32.066
17 Cl Chlorine 35.4527
18 Ar Argon 39.948
19 K Potassium 39.0983
20 Ca Calcium 40.078
21 Sc Scandium 44.95591
22 Ti Titanium 47.88
23 V Vanadium 50.9415
24 Cr Chromium 51.9961
25 Mn Manganese 54.938
26 Fe Iron 55.847
27 Co Cobalt 58.9332
28 Ni Nickel 58.6934
29 Cu Copper 63.546
30 Zn Zinc 65.39
31 Ga Gallium 69.732
32 Ge Germanium 72.64
33 As Arsenic 74.92159
34 Se Selenium 78.96
35 Br Bromine 79.904
36 Kr Krypton 83.80
37 Rb Rubidium 85.4678
38 Sr Strontium 87.62
39 Y Yttrium 88.90585
40 Zr Zirconium 91.224
41 Nb Niobium 92.90638
42 Mo Molybdenum 95.94
43 Tc Technetium 98.9072
44 Ru Ruthenium 101.07
45 Rh Rhodium 102.9055
46 Pd Palladium 106.42
47 Ag Silver 107.8682
48 Cd Cadmium 112.411
49 In Indium 114.818
50 Sn Tin 118.71
51 Sb Antimony 121.760
52 Te Tellurium 127.6
53 I Iodine 126.90447
54 Xe Xenon 131.29
55 Cs Cesium 132.90543
56 Ba Barium 137.327
57-71
72 Hf Hafnium 178.49
73 Ta Tantalum 180.9479
74 W Tungsten 183.85
75 Re Rhenium 186.207
76 Os Osmium 190.23
77 Ir Iridium 192.22
78 Pt Platinum 195.08
79 Au Gold 196.9665
80 Hg Mercury 200.59
81 Tl Thallium 204.3833
82 Pb Lead 207.2
83 Bi Bismuth 208.98037
84 Po Polonium [208.9824]
85 At Astatine 209.9871
86 Rn Radon 222.0176
87 Fr Francium 223.0197
88 Ra Radium 226.0254
89-103
104 Rf Rutherfordium [261]
105 Db Dubnium [262]
106 Sg Seaborgium [266]
107 Bh Bohrium [264]
108 Hs Hassium [269]
109 Mt Meitnerium [268]
110 Ds Darmstadtium [269]
111 Rg Roentgenium [272]
112 Cn Copernicium [277]
113 Uut Ununtrium unknown
114 Uuq Ununquadium [289]
115 Uup Ununpentium unknown
116 Uuh Ununhexium [298]
117 Uus Ununseptium unknown
118 Uuo Ununoctium unknown
Lanthanide Series
57 La Lanthanum 138.9055
58 Ce Cerium 140.115
59 Pr Praseodymium 140.90765
60 Nd Neodymium 144.24
61 Pm Promethium 144.9127
62 Sm Samarium 150.36
63 Eu Europium 151.9655
64 Gd Gadolinium 157.25
65 Tb Terbium 158.92534
66 Dy Dysprosium 162.50
67 Ho Holmium 164.93032
68 Er Erbium 167.26
69 Tm Thulium 168.93421
70 Yb Ytterbium 173.04
71 Lu Lutetium 174.967
Actinide Series
89 Ac Actinium 227.0278
90 Th Thorium 232.0381
91 Pa Protactinium 231.03588
92 U Uranium 238.0289
93 Np Neptunium 237.0482
94 Pu Plutonium 244.0642
95 Am Americium 243.0614
96 Cm Curium 247.0703
97 Bk Berkelium 247.0703
98 Cf Californium 251.0796
99 Es Einsteinium [254]
100 Fm Fermium 257.0951
101 Md Mendelevium 258.1
102 No Nobelium 259.1009
103 Lr Lawrencium [262]
Alkali Metal
Alkaline Earth
Transition Metal
Basic Metal
Semimetals
Nonmetals
Halogens
Noble Gas
Lanthanides
Actinides

LAB Write up Format

The lab write-up needs to be nicely word processed, the data tables, charts, although the graphs & and formula analysis may be done neatly by hand. If you can not get access to a computer to do so please see the teacher as soon as possible and make alternative arrangements.

IMPORTANT CLARIFICATION:

Authored work must demonstrate authentic understanding of the Author or Co-author(s).

The data collection of labs can be done in groups, but *EVERYTHING ELSE NEEDS TO BE AUTHENTICALLY INDIVIDUAL*.
You may collaborate and get tips from each other on solving the analysis issues, but each student must be able to demonstrate that they can solve them by themselves. Never ever share electronic copies of your lab work with other authors! The originality of your work should never be in question. If you use someone else's material you must cite your source clearly.

FOLDER: The lab needs to be submitted in a slim folder with the following info on the cover of the folder:
Student's full name, course title with section letter

TITLE PAGE: When the folder is opened the first thing that should be seen is a neat title page. The following **6** pieces of information need to be on the title page**:**
Title, Course title with section letter, Author's name(s), Group members, Teacher, & Date submitted
Every lab should have the following sections in order.

PURPOSE: Restate the purpose as it was presented in the lab instructions

HYPOTHESIS: [uniquely done by the author(s)]
Answer the hypothesis, providing a justification for why you believe that outcome will occur. Feel free to elaborate and demonstrate to the reader that some considerable thought went into your hypothesis.

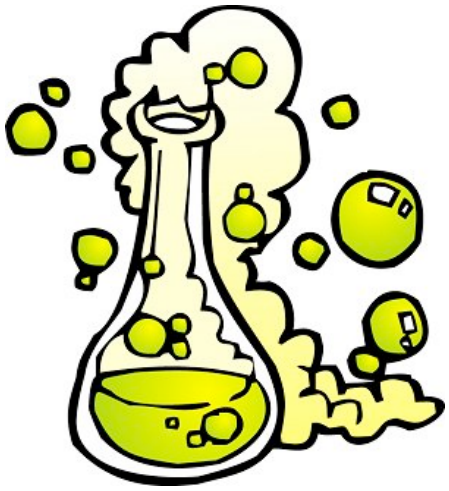
DATA SECTION: [collected as a group, uniquely presented by the author(s)]

QUALITATIVE OBSERVATIONS:
This is where you record all sentence observations of things that you noticed that may be relevant to the outcome or conclusion of the lab.

QUANTITATIVE OBSERVATIONS:
This is where you have all your measured observations neatly organized in a systematic chart. The chart must include headings, units, and levels of precision. Be careful to record all measurements as honestly in significant figures as possible.

ANALYSIS SECTION: [uniquely done by the author(s)]
This is where the graphs are put. Make sure you have a title, well labeled axis with units, and a line/curve of best fit through the data points.

This is where the data is manipulated through formulas and calculations to determine other important quantities. One sample calculation for each type needs to be shown in full. The answers for these values need to neatly organized in a systematic chart. The chart must include headings, units, and levels of precision. Be careful to record all calculations as honestly in significant figures as possible.



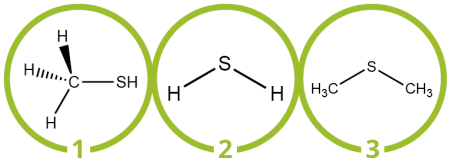
CONCLUSION: **[uniquely done by the author(s)]**
Briefly state your conclusion.

DISCUSSION: [uniquely done by the author(s)]
Answer all your discussion sections in full sentences.

THE CHEMISTRY OF BODY ODOURS

BODY ODOURS ARE COMMONLY THE RESULT OF BACTERIAL ACTIVITY - FOR EXAMPLE, BACTERIA LIVING ON OUR SKIN BREAK DOWN THE SECRETIONS OF SWEAT INTO ODOUROUS COMPOUNDS. THIS GRAPHIC SHOWS THE MAIN COMPOUNDS RESPONSIBLE FOR PARTICULAR ODOURS.

HALITOSIS

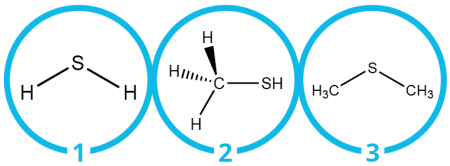


NAME	SMELLS LIKE
1. METHANETHIOL	sulfur, garlic
2. HYDROGEN SULFIDE	sulfur, rotting eggs
3. DIMETHYL SULFIDE	cabbage, sulfur, sweet

UNDERARM ODOUR

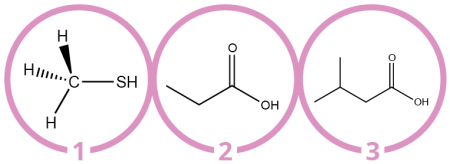
NAME	SMELLS LIKE
1. (E)-3-METHYL-2-HEXENOIC ACID	goat
2. (S)-3-METHYL-3-SULFANYLHEXAN-1-OL	onion
3. 3-HYDROXY-3-METHYLHEXANOIC ACID	cumin

FLATULENCE



NAME	SMELLS LIKE
1. HYDROGEN SULFIDE	sulfur, rotting eggs
2. METHANETHIOL	sulfur, garlic
3. DIMETHYL SULFIDE	cabbage, sulfur, sweet

FOOT ODOUR



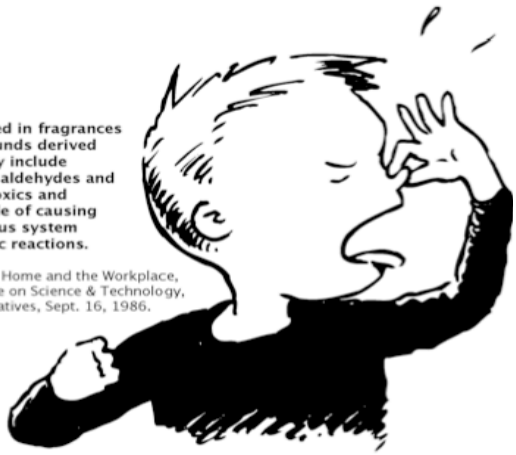
NAME	SMELLS LIKE
1. METHANETHIOL	sulfur, garlic

YOUR PERFUME STINKS!

But before you rush to cover yourself in Perfume, deodorant, antiperspirant, or cologne, Read the warning to the right….

95% of chemicals used in fragrances are synthetic compounds derived from petroleum. They include benzene derivatives, aldehydes and many other known toxics and sensitizers -- capable of causing cancer, central nervous system disorders and allergic reactions.

Source: Neurotoxins: At Home and the Workplace, Report by the Committee on Science & Technology, U.S. House of Representatives, Sept. 16, 1986. (Report 99-827)



For a great website to illustrate the connection between a subject area (Chemistry) and career opportunities check out this fantastic infographic for 15600 Williams College Alums: http://web.williams.edu/Mathematics/devadoss/careerpath.html

"This work with Hayley Brooks, Scott Sanderson, and Kaison Tanabe, using the CIRCOS software at its core, has motivated the formation of CereusData. The left side of the circle is broken into 15 parts, each representing a grouping of all majors available at Williams. For example, "Cultural Studies" includes such majors as Anthropology, Sociology, and Asian Studies. The right side of the circle is similarly broken into 15 parts, each representing a grouping of possible careers chosen by Williams alums. Choose one of the three tabs below to explore further."