EVERYDAY CHEMISTRY

NAME _____ SCHOOL _____

DATE STARTED_____ DATE COMPLETED_____

PREREQUISITE: Laboratory Orientation course, or basic cooking and measuring skills.

HOW TO DO THIS COURSE: Do the steps one at a time, in order. When you finish a step, put your initials and the date on the sign-off line on the right. A split line means to get a pass (and an initial) from another student (or an Academic or Lab Supervisor if it says that). A * means get a checkout. Essays are turned in to the Academic or Lab Supervisor.

PURPOSE: Learn about some basic concepts of chemistry using household chemicals.

ESTIMATED TIME: 10–15 hours.

MATERIALS NEEDED FOR THIS COURSE

Everyday Chemistry (Data Sheet #7463)
Exam: 2433, 8282 (answers)
Other materials:
See Chapter 15 of *Everyday Chemistry*.

NOTE TO STUDENT

Some activities in the chapters are optional and you will have a chance to do some of them at the end of the course. As you do the steps of this course, mark the optional activities you want to do later.

A. CHEMISTRY AND YOU

1. READ: *Everyday Chemistry* (*EC*), Note to Student and Chapter 1 Chemistry and You. _____
2. ESSAY: List five or more things that you know or suspect were formed from other things in some way by chemistry. _____
3. READ: *EC*, Chapter 2 Procedures. _____
4. DRILL: *EC*, "Drill for Pouring a Powder." Get a pass on pouring salt into a bottle. **Supervisor pass**. ____ ____
5. DEMONSTRATE: Show what to wear when heating a test tube and how to hold a test tube over a fire. **Supervisor pass**. ____ ____

B. ABOUT ATOMS

*1. READ: *EC*, Chapter 3 About Atoms, section "Atoms and Molecules." ____ ____

2. DEMONSTRATE: Oxygen and hydrogen are two gases in the air. Show a molecule of oxygen and a molecule of hydrogen. Then show how the atoms can rearrange to make a molecule of water with one oxygen atom left over. _____

*3. READ: *EC*, Chapter 3, section "Compounds." ____ ____

4. DEMONSTRATE USING CLAY: A molecule of alcohol or vinegar. (Show the placement of the atoms.) ____ ____

5. READ: *EC*, section "Spaces between Molecules" to "Activity: Dissolving Sugar in Water." _____

6. PRACTICAL APPLICATION: *EC*, "Activity: Dissolving Sugar in Water." _____

C. CARBON AND CANDLE CHEMISTRY

*1. READ: *EC*, Chapter 4 Carbon and Candle Chemistry, section "Burning Carbon." ____ ____

2. PRACTICAL APPLICATION: *EC*, "Activity: Candle Chemistry #1." _____

3. PRACTICAL APPLICATION: *EC*, "Activity: Candle Chemistry #2." _____

4. PRACTICAL APPLICATION: *EC*, "Activity: Candle Chemistry #3." _____

5. DEMONSTRATE: Draw a burning candle in the middle of a sheet of paper. Then on the left side of the sheet, sketch a wax molecule and a few oxygen molecules from the air and on the right side sketch several carbon dioxide molecules and water molecules that could have come out of the reaction of the wax burning. Draw an arrow from the wax and oxygen molecules to the candle and draw another arrow from the candle to carbon dioxide and water molecules. Finally, add a label to explain what it is happening. _____

6. READ: *EC*, section "Burning Sugar." _____

7. PRACTICAL APPLICATION: *EC*, "Activity: Burning a Sugar Cube." _____

D. REACTIONS WITH OXYGEN

*1. READ: *EC*, Chapter 5 Reactions with Oxygen, section "Oxidation." ____ ____

2. PRACTICAL APPLICATION: *EC*, "Activity: How Fire Uses Up Oxygen." _____

*3. READ: *EC*, section "Making Rust." ____ ____

4. PRACTICAL APPLICATION: *EC*, "Activity: Rusting Steel Wool." _____

5. ESSAY: Explain why in the last activity iron rusted inside a test tube and water rose in the tube. **Supervisor pass.** ____ ____

*6. READ: *EC*, section "Burning Iron." ____ ____

7. PRACTICAL APPLICATION: *EC*, "Activity: Burning Steel Wool." _____

8. READ: *EC*, section "How Bleach Works." _____

9. ESSAY: Explain what oxidation is. Give two examples. **Supervisor pass**. ____ ____

10. READ or REREAD: Note to Student on page 1. _____

11. (Optional) PRACTICAL APPLICATION: *EC*, "Activity: Bleaching Ink." If you decide to do the activity now, just go ahead with it; if you are interested in doing it later (section I, step 2), just check the box to the right. _____

E. CARBON DIOXIDE

*1. READ: *EC*, Chapter 6 Carbon Dioxide, section "Carbon Dioxide from Rocks." ____ ____

2. PRACTICAL APPLICATION: *EC*, "Activity: Carbon Dioxide from Antacid Tablets." _____

*3. READ: *EC*, Section "Carbon Dioxide Expands." ____ ____

4. PRACTICAL APPLICATION: *EC*, "Activity: Carbon Dioxide Cannon." _____

5. READ: *EC*, section "Carbon Dioxide Chokes Out Fire." _____

6. PRACTICAL APPLICATION: *EC*, "Activity: Carbon Dioxide Fire Extinguisher #1." _____

7. PRACTICAL APPLICATION: *EC*, "Activity: Carbon Dioxide Fire Extinguisher #2." _____

8. ESSAY: Why is carbon dioxide useful for putting out fires? **Supervisor pass**. ____ ____

F. CHEMICAL OPPOSITES

*1. READ: *EC*, Chapter 7 Chemical Opposites, section "Acids and Bases." ____ ____

2. DEMONSTRATE: *EC*, "Demonstration: Tasting a Safe Acid and Base." _____

*3. READ: *EC*, section "What Makes Acids and Bases Different?" ____ ____

4. DEMONSTRATE: What makes a compound an acid and what makes a compound a base. ____ ____

*5. READ: *EC*, section "When an Acid and Base React." ____ ____

6. DEMONSTRATE USING CLAY: Neutralization between an acid and base. ____ ____

*7. READ: *EC*, section "A Scale of the Strengths of Acids and Bases," and section "Showing Acids and Bases with a Color Change." ____ ____

8. PRACTICAL APPLICATION: *EC*, "Activity: An Acid-Base Indicator." _____

9. PRACTICAL APPLICATION: *EC*, "Activity: Testing for Acids and Bases." (You might use your leftover cabbage juice indicator in the last section of this course, so save it in a refrigerator until then.) _____

10. (Optional) PRACTICAL APPLICATION: *EC*, "Activity: Using an Indicator to Show Chemical Changes." If you decide to do the activity now, just go ahead with it; if you are interested in doing it later (section I, step 2), just check the box to the right. _____

G. HOW SOAPS WORK

*1. READ: *EC*, Chapter 8 How Soaps Work, section "Soap Chemistry." ____ ____

2. DEMONSTRATE: How soapy water can wash out grease and dirt. ____ ____

3. PRACTICAL APPLICATION: *EC*, "Activity: How Soap Works." _____

*4. READ: *EC*, section "'Hard' Water." ____ ____

5. DEMONSTRATE: Why soapy water doesn't work very well in hard water. ____ ____

6. READ: *EC*, section "Making Hard Water 'Soft.'" _____

7. PRACTICAL APPLICATION: *EC*, "Activity: Showing What Hard Water Does and Making Hard Water Softer." _____

H. GASES WE BREATHE

*1. READ: *EC*, Chapter 9 Gases We Breathe, sections "Oxygen and Carbon Dioxide," and "Changing Sugar into Alcohol and Carbon Dioxide." ____ ____

2. DEMONSTRATE: What yeast cells do to sugar. _____

3. PRACTICAL APPLICATION: *EC*, "Activity: Making Alcohol and Carbon Dioxide with Yeast." _____

*4. READ: *EC*, section "Oxygen from Plants." ____ ____

5. DEMONSTRATE: What green plants do with carbon dioxide and water. _____

6. (Optional) PRACTICAL APPLICATION: *EC*, "Activity: Showing That Green Plants Produce Oxygen Gas." If you decide to do the activity now, just go ahead with it; if you are interested in doing it later (section I, step 2), just check the box to the right. _____

I. FINAL APPLICATION SECTION

1. PRACTICAL APPLICATION: For the rest of the book (Chapters 10–14) you will have a choice of topics to cover and activities to do. As you do this step, check off the activities you might like to do in later steps in this section.

   a) Look over Chapter 10 Crystals, including related activities, and mark any you are interested in doing.

      Activity: Growing Crystals of Sugar
      Activity: Growing Salt Crystals
      Activity: Growing Epsom Salts Crystals on Glass
      Activity: Getting Water Out of Crystals

   b) Look over Chapter 11 Electricity and Light in Chemistry, including related activities, and mark any you are interested in doing.

      Activity: Using Electricity to Split Water Molecules
      Activity: Using Electricity to Produce Hydrogen Gas
      Activity: Breaking Down Molecules with Light

   c) Look over Chapter 12 Milk Chemistry, including the related activity, and mark it if you are interested in doing it.

      Activity: Making Casein

   d) Look over Chapter 13 Colored Flames from Metal Compounds, including the related activity, and mark it if you are interested in doing it.

      Activity: Flame Tests

   e) Look over Chapter 14 Making "Gak" from Glue and Borax Laundry Powder, including related activities, and mark any you are interested in doing.

      Activity: Making Goopy "Gak"
      Activity: Making Bouncy "Gak" _____

2. PRACTICAL APPLICATION: Pick five activities you marked at step I.1 or optional steps earlier in the course and write their names on the five lines below. (You may choose more than five if you like. In that case write the extra ones on another sheet and attach it to this page.) _____

3. PRACTICAL APPLICATION:
   (Name of first activity)_____
   Fully read or re-read the part of the chapter that relates to the activity and then do it. _____

4. PRACTICAL APPLICATION:
   (Name of second activity)_____
   Fully read or re-read the part of the chapter that relates to the activity and then do it. _____

5. PRACTICAL APPLICATION:
   (Name of third activity)_____
   Fully read or re-read the part of the chapter that relates to the activity and then do it. _____

6. PRACTICAL APPLICATION:
   (Name of fourth activity)_____
   Fully read or re-read the part of the chapter that relates to the activity and then do it. _____

7. PRACTICAL APPLICATION:
   (Name of fifth activity)_____
   Fully read or re-read the part of the chapter that relates to the activity and then do it. _____

8. PRACTICAL APPLICATION: In this step you will be changing an activity a little bit in a direction you are interested in. You can choose an activity you have already done and change it, or you can choose an activity you haven't done yet, do it, and then change it.

   In either case, before changing an activity, check with the lab supervisor to make sure your change is safe. **Lab Supervisor** initials: _____

   When you have finished doing the activity, explain in writing how it was done in the book and what happened. Then explain how you changed the activity, what you thought might happen and what did happen.

   Supervisor pass on the write-up. _____ _____

I have completed the steps of this course. I understand what I studied and can use it.

Student _____ Date _____

The student has completed the steps of this course and knows and can apply what was studied.

Academic Supervisor _____ Date _____

This student has passed the exam for this course.

Examiner _____ Date _____