(Sub, Please make 110 double-sided copies of this (one for each student).)

CHEMISTRY -- EMERGENCY SUB ASSIGNMENT:

DIRECTIONS:

- Choose one (per day) of the projects below to complete. You cannot complete a project that you have already done before on another day.
- For more help / information, see the corresponding chapter in the textbook. Chapters and page numbers are listed.
- It is due to the sub by the end of THIS class period.
- It is for a GRADE.
- Write your name on the FRONT (if it is a poster).
- It is an INDIVIDUAL assignment. (No partner work.)
- You will be assessed on:
    - Accuracy and thoroughness of content (Solid facts and no “fake news”)
    - Organization & layout (you put effort and thought into it)
    - Catchy title
    - Creative
    - Effort
    - Clear, legible writing
    - Colorful
    - For a poster -- At LEAST **3 visuals / images** (yes, you can try to draw!)
        - More visuals is always better!
    - For a writing assignment, it should be AT LEAST five paragraphs and fill a page.

TEXT: Living By Chemistry

PROJECT OPTIONS:

CHAPTER 1: Defining Matter PROJECT -- (p.)

none

CHAPTER 2: Basic Building Materials PROJECT – Element Profile (p. 49)

Element Profile

PROJECT

Research an element. Write a report including

- Your element's name, symbol, and description.
- A list of your element's uses.
- A description of how your element is mined or obtained.

CHAPTER 3: A World of Particles PROJECT – Nuclear Power (p. 81)

Nuclear Power

PROJECT

Research nuclear power. Find out how a nuclear power plant works. Write a report including

- an explanation (with a simple drawing) of how electric power is produced from a nuclear power plant.
- the major benefits and risks of nuclear power.

CHAPTER 4: Moving Electrons PROJECT -- (p.)

none

CHAPTER 5: Building with Matter PROJECT -- (p.)

none

CHAPTER 6: Speaking of Molecules PROJECT – Functional Groups (p. 183)

ınctional Groups

OJECT

Research a functional group. Choose a functional group and find out as much as you can about molecules that contain it. Create a poster that has these details:

- A large drawing of the functional group along with its name

The structural formulas for at least five molecules that possess your functional group, along with their chemical names

A brief description of the properties associated with this group of compounds

CHAPTER 7: Building Molecules PROJECT – Other Smell Classifications (p. 212)

Other Smell Classifications

Research a smell classification not discussed in class, such as musk, woody, spicy, nutty, leather, or tobacco. Create a poster that includes

- A drawing describing the smell classification and sources of the smell
- The structural formulas and ball-and-stick models of at least five molecules in the smell classification that you investigated, along with their chemical names
- A brief description of the properties associated with this group of molecules

CHAPTER 8: Molecules in Action PROJECT – Sense of Smell Study (p. 240)

Sense of Smell Study

Plan and conduct an experiment to compare how the sense of smell differs among different groups of people.

- **Create a goal statement.** Write a sentence or two stating the goal of your study. What do you hope to discover or explore?
- **Choose subjects to study.** Pick two categories of people to study and compare. These categories should be clear and easy to determine (for example, children under the age of 12 versus adults, vegetarians versus meat-eaters, women versus men).
- **Write a proposal.** Write several sentences stating how you propose to accomplish your goal, including how you will conduct your study, how you will randomly choose your sample of participants, and how you will set up the control variables. Clear your proposal with your teacher before conducting your study.
- **Conduct your study.** Keep your data organized in a table or chart. Keep careful notes of everything that you do and what you observe.
- **Write up your results and conclusions.** Write up the results of your study and any conclusions you have come to based on your collected data. Include your data table. If possible, create a graph using your data.

CHAPTER 9: Molecules in the Body PROJECT – Modeling a Receptor Site (p. 251)

odeling a Receptor Site

Build a space-filling model of a smell molecule from a compound in one of the five smell classifications you have studied. Use clay, plaster, sand, or other materials to build a receptor site for this smell molecule. Describe other molecules that might fit into the receptor site you built. Then create a space-filling model of a molecule that will not fit into the receptor site you built.

ur project should include

the receptor site model that you built, labeled with the smell that it detects and a description of molecules that fit into it

a space-filling model of a molecule that fits into the receptor site and one that does not (label which is which)

CHAPTER 10: Physically Changing Matter PROJECT – Different Thermometers (p. 293)

temperature

Charles's law

air mass

Different Thermometers

PROJECT

Different thermometers use different properties of matter to measure temperature. Research how one of these thermometers works. Write a description and include a diagram.

d crystal thermometer

Infrared ear thermometer

Digital resistance thermometer

Cooking thermometer

Galileo density thermometer

CHAPTER 11: Pressing Matter PROJECT – High and Low Pressure (p. 325)

igh and Low Pressure

OJECT

In a newspaper or on the Web, find a weather map of the United States.

1. Find the areas of high and low pressure.
2. Explain where the air is moving up and where the air is moving down.
3. Where do you expect to find stormy weather? Explain your thinking.

CHAPTER 12: Concentrating Matter PROJECT – Global Climate Change (p. 347)

lobal Climate Change

OJECT

Earth's overall climate is currently in a warming phase. Research some of the causes and effects of global warming on Earth.

- What evidence do scientists have that average global temperatures are increasing?

What are some possible causes of global warming?

How might global warming affect the severity and frequency of storms in a region?

What are some possible effects of global warming on different living things and their environments?

CHATER 13: Toxic Changes PROJECT -- Toxins in the Environment (p. 379)

oxins in the Environment

:OJECT Research a potentially toxic substance (your teacher may assign you one). Find out where in your environment you might find this substance and describe its effects on the body. Prepare a short report.

CHAPTER 14: Measuring Toxins PROJECT -- Lethal Dose of a Toxic Substance (p. 406)

Lethal Dose of a Toxic Substance

PROJECT Research a toxic substance (your teacher may assign you one). Find some information about your substance. Your project should include

- the LD_{50} for the substance.
- the lethal dose for a 140 lb person expressed in grams and also in moles.
- two sources for the information you obtained. One source should be a Material Safety Data Sheet (MSDS).

CHAPTER 15: Toxins in Solution PROJECT -- Types of Bonding (p. 427)

ypes of Bonding

ROJECT Research a toxic substance (your teacher may assign you one). Your report should cover these topics.

- Is the bonding in your substance ionic, covalent, or metallic?

If your substance is ionic, determine the cation and the anion. Write and label the ions and their charges. Include a particle view drawing of your substance.

If your substance is covalent, determine if it is polar or nonpolar. Explain your reasoning. Include the structural formula and show the dipole(s).

If your substance is metallic, find out its density. Include a particle view drawing of your substance.

Does your substance conduct electricity? Explain your reasoning.

CHAPTER 16: Acidic Toxins PROJECT -- Dissolving Toxins (p. 455)

issolving Toxins

OJECT Choose a toxic substance (your teacher may assign you one). Find some information about your toxin. Your report should cover these topics.

- Does your substance dissolve in water? If it does not dissolve, would it sink or float?
- Make a particle view drawing of your substance in water, even if it does not dissolve.
- Is your substance acidic, basic, or neutral? If your substance cannot be described in this way, explain why.

CHAPTER 17: Toxic Cleanup PROJECT -- Removing Toxins (p. 476)

Removing Toxins

PROJECT

Choose a toxin (your teacher may assign you one). Find some information about your toxin. Your report should cover these topics.

- According to the Environmental Protection Agency, what is the maximum contaminant level for your toxin in the drinking water supply? How is it reported?
- If your toxin dissolves in water, how would you remove it from water?
- If it does not dissolve in water, how would you remove it from soil?

CHAPTER 18: Observing Energy PROJECT -- Uses of Fire (p. 510)

Uses of Fire

PROJECT

Pick an object that you might purchase, and consider different ways that fire might have been used to make it, harvest it, transport it, and so on. Describe step by step how fire may be involved in getting that object from its natural beginnings to you.

CHAPTER 19: Measuring Energy "Mini" PROJECT – Hydrogen Fuel (p. 526)

PROJECT

In the heats of combustion table, hydrogen has the highest energy per gram of fuel that is combusted. Research to find three reasons why it is challenging to use hydrogen as a fuel for your automobile.

CHAPTER 20: Understanding Energy PROJECT – Uses of Fire (p. 549)

Uses of Fire

ROJECT

Write a report describing where coal comes from and how the energy from coal is converted into electricity in a power plant. Include a diagram of the process in your report.

CHAPTER 21: Controlling Energy PROJECT -- (p. 574)

Alternative Energy

PROJECT

Investigate an energy source that is an alternative to fossil fuels. Create a poster promoting the benefits of the energy source and explaining how it works. Write a short paper on the pros and cons of your energy source.

CHAPTER 22: Radiating Energy PROJECT – Wavelength and Energy (p. 600)

Wavelength and Energy

PROJECT

- How would you answer the question: "Are black and white colors?" Debate the two questions posed below.
  1. A light bulb manufacturer might claim: "Black *is not* a color, but white *is* a color." Is this correct or not? Explain your thinking.
  2. An artist with paints might claim: "Black *is* a color, but white *is not* a color." Is this correct or not? Explain your thinking.
- Research the type of light emitted by three different light sources. Take digital images of white objects and two colored objects illuminated by these three light sources. Write a report explaining what you learned about light sources. Include a description of the experiment you carried out and an explanation of the results.

CHAPTER 23: Chemical Equilibrium PROJECT -- Neurotransmitters (p. 638)

Neurotransmitters

PROJECT

Do Web research on one neurotransmitter. What is the function of the neurotransmitter in the body? What type of receptors are involved and what happens when the neurotransmitter binds to those receptors? Write a report.

Your report should include

- a description of the structure of the neurotransmitter molecule.
- a description of the receptors for the neurotransmitter and where they are found in the body.
- an explanation of what happens when neurotransmitter molecules bind to the receptor.
- a description of how the binding process is reversed.
- a discussion of what happens if the body does not produce enough of the neurotransmitter.

It's Showtime!

It is time for you to show what you have learned both in Unit 6: Showtime and in the entire *Living by Chemistry* course. For this project, you will do research and design your own lab. The goal of this project is to examine the acid-base indicator properties of a naturally occurring pigment.

Research

- Begin by doing literature research to identify a pigment molecule that gives color to a common substance and behaves as an indicator in solution. Choose a substance that is safe to handle and that you can obtain easily, such as flowers, leaves, fruits, berries, vegetables, spices, bark, or roots.
- Find out how it might be possible to safely extract this indicator molecule, so you can prepare a solution. For example, you might crush rose petals in rubbing alcohol or boil beets in water.

Design a Lab Experiment

- Based on your research, write a detailed lab procedure that explains how to prepare a solution of the pigment.
- Next, write a lab procedure for how to test the acid-base properties of the pigment with common substances. You might want to refer to Unit 4: Toxins, Lesson 84, when preparing this procedure.
- Finally, write a lab procedure for testing a small piece of fabric, such as wool, cotton, or nylon, to determine if the pigment will stain the fabric and if the stain is permanent.
- Be sure to include a materials list and any safety considerations.

Teacher and Peer Review

- Bring your proposed lab experiment to class and have your classmates review and critique your project.
- Submit your research and lab experiment to your teacher for review and approval.
- With teacher supervision, conduct your experiment in your school lab.
- Make changes based on feedback and the results of your testing. Once your experiment is a success, your teacher may ask you to lead a small group of students in carrying out the lab, or ask you to do a presentation to show what you learned about pigments, extraction, acid-base properties, and staining fabric.