Summer Work Packet

Honors Chemistry 412

Course Title: Honors Chemistry 412

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Estimated Time For Completion (Approximate): 4-6 hrs.

Objectives: Prepare for the first unit and key concepts of Honors Chemistry.

- Students will read and take notes on Chapters 1 and 2 of the textbook, Chemistry: Matter and Change. You should log in to the Ebook using the following information:

  Website: https://connected.mcgraw-hill.com/connected/login.do
  Username: myscience4
  Password: 2017sciencesc

- Students will complete the study guides for chapters 1 and 2 found in this packet. This assignment will be collected for credit on the first day of school, and we will be going over solutions in preparation for the quiz on chapters 1 and 2.

- Students will make flash cards for memorization of polyatomic ions and metric units. You will see a list of what needs to be on the flash cards in this packet. For elements and ions, put the symbol on one side and the name on the other. Have only one element or ion per card. These will be turned in with your summer packet for a grade. You will be tested on them throughout the first semester.
  - Use 3x5 index cards, not cut strips of paper, to produce your flash cards.

Method(s) of Assessment:

- Formal grade for summer work packet (notes, study guides, flashcards)
- Formal grade for chapters 1 and 2 exam (to be given at the end of the first week of school)

Impact on 1st Quarter Grade:

- Two formal assignments

Due Date:

- First day of school!

Name: _____ Honors Chemistry Summer Assignment

Metric Unit Flashcards

Directions: Write the unit name and quantity on one side and the symbol on the other.

Example Flashcard:

Kilo	1 kilo = 1000 base unit = 10^3

Table of Prefixes

Prefix	Abbrev.	Meaning
Tera-	T	10^{12}
Giga-	G	10^{9}
Mega-	M	10^{6}
kilo-	k	10^{3}
hecto-	h	10^{2}
deca-	da	10^{1}
Base Units	- meter, liter, gram, or second	
deci-	d	10^{-1}
centi-	c	10^{-2}
milli-	m	10^{-3}
micro-	µ	10^{-6}
nano-	n	10^{-9}
pico-	p	10^{-12}

Name: _____ Honors Chemistry Summer Assignment

Polyatomic Ion Flashcards

Directions: Write the polyatomic ion symbol on one side and the name on the other.

Example Flashcard:

Cyanide	CN^{1-}

1- Charge		2- Charge		3- Charge		1+ Charge	
Formula	Name	Formula	Name	Formula	Name	Formula	Name
$H_2PO_4^{1-}$	Dihydrogen phosphate	HPO_4^{2-}	Hydrogen phosphate	PO_4^{3-}	Phosphate	NH_4^{+}	Ammonium
$C_2H_3O_2^{1-}$	Acetate	$C_2O_4^{2-}$	Oxalate	PO_3^{3-}	Phosphite		
BrO_3^{1-}	Bromate	O_2^{2-}	Peroxide	AsO_4^{3-}	Arsenate		
HSO_3^{1-}	Hydrogen sulfite	SO_3^{2-}	Sulfite				
HSO_4^{1-}	Hydrogen sulfate	SO_4^{2-}	Sulfate				
HCO_3^{1-}	Hydrogen carbonate	CO_3^{2-}	Carbonate				
NO_2^{1-}	Nitrite	CrO_4^{2-}	Chromate				
NO_3^{1-}	Nitrate	$Cr_2O_7^{2-}$	Dichromate				
CN^{1-}	Cyanide	SiO_3^{2-}	Silicate				
OH^{1-}	Hydroxide						
MnO_4^{1-}	Permanganate						
ClO^{1-}	Hypochlorite						
ClO_2^{1-}	Chlorite						
ClO_3^{1-}	Chlorate						
ClO_4^{1-}	Perchlorate						

Introduction to Chemistry

Section 1.1 A Story of Two Substances

In your textbook, read about the ozone layer.

Use each of the terms below just once to complete the passage.

atmosphere	oxygen gas	ozone	ozone hole
stratosphere	troposphere	ultraviolet radiation	

Earth's **(1)** _____ is made up of several layers. The air we breathe makes up the lowest level. This layer is called the **(2)** _____. The next layer up is called the **(3)** _____. This level contains a protective **(4)** _____ layer.

Ozone forms when **(5)** _____ is struck by ultraviolet radiation in the upper part of the stratosphere. The ozone forms a layer around Earth, which absorbs **(6)** _____. Without ozone, you are more likely to get a sunburn or possibly skin cancer. The thinning of the ozone layer, called the **(7)** _____, is worrisome because without ozone all organisms on Earth are subject to harm from too much radiation.

In your textbook, read about chlorofluorocarbons.

For each statement below, write *true* or *false*.

_____ **8.** CFC is another name for a chlorofluorocarbon.

_____ **9.** CFCs are made up of carbon, fluorine, and cesium.

_____ **10.** All CFCs are synthetic chemicals.

_____ **11.** CFCs usually react readily with other chemicals.

_____ **12.** CFCs were developed as replacements for toxic refrigerants.

Section 1.2 Chemistry and Matter

In your textbook, read about chemistry and matter.

Define each term.

1. chemistry

_____

2. matter

_____

3. mass

_____

Write each term below under the correct heading. Use each term only once.

air	magnetic field	car	feeling	heat	human body
light	radio	radio wave	flashlight	textbook	thought

Made of Matter	Not Made of Matter
4. _____	**10.** _____
5. _____	**11.** _____
6. _____	**12.** _____
7. _____	**13.** _____
8. _____	**14.** _____
9. _____	**15.** _____

For each statement below, write *true* or *false*.

_____ **16.** The mass of an object can vary with the object's location.

_____ **17.** A mass measurement includes the effect of Earth's gravitational pull on the object being measured.

_____ **18.** Scientists measure the amount of matter in terms of mass.

_____ **19.** Subtle differences in weight exist at different locations on Earth.

_____ **20.** Your mass on the Moon would be smaller than your mass on Earth.

Section 1.2 *continued*

Identify each branch of chemistry described.

21. The study of the matter and processes of living things

_____

22. The study of carbon-containing chemicals

_____

23. The study of the components and composition of substances

_____

24. The study of matter that does not contain organic chemicals

_____

25. The study of the behavior and changes of matter and the related energy changes

_____

For each branch of chemistry in Column A, write the letter of the item in Column B that pertains to that branch.

Column A	Column B
_____ **26.** Organic chemistry	**a.** the behavior and changes of matter and the related energy changes
_____ **27.** Physical chemistry	**b.** in general, matter that does not contain carbon
_____ **28.** Biochemistry	**c.** most carbon-containing chemicals
_____ **29.** Analytical chemistry	**d.** matter and processes of living organisms
_____ **30.** Inorganic chemistry	**e.** components and compositions of substances

Answer the following questions.

31. Compare the macroscopic world with the submicroscopic world.

_____

_____

_____

32. Why are chemists interested in the submicroscopic description of matter?

_____

_____

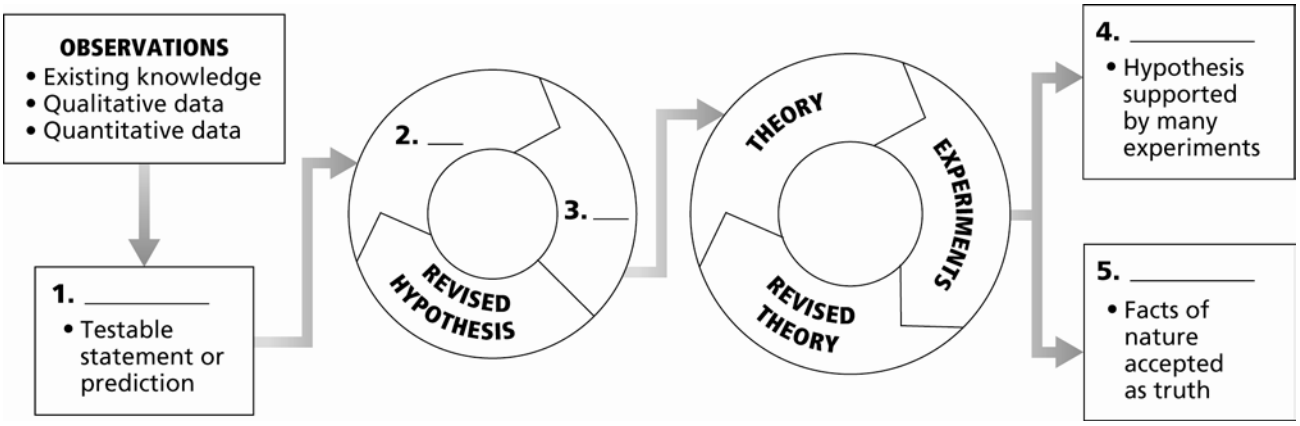
_____

Section 1.3 Scientific Methods

In your textbook, read about a systematic approach that scientists use.

Use the words below to complete the concept map. Write your answers in the spaces below the concept map.

conclusions	experiments	hypothesis	scientific law	theory



1. _____

2. _____

3. _____

4. _____

5. _____

For each item in Column A, write the letter of the matching item in Column B.

Column A	Column B
_____ **6.** Refers to physical characteristics such as color, odor, or shape	**a.** observation
_____ **7.** Refers to mass, volume, and temperature measurements	**b.** qualitative data
_____ **8.** A variable controlled by the experimenter	**c.** quantitative data
_____ **9.** The act of gathering information	**d.** independent variable
_____ **10.** Changes in value based on the value of the controlled variable	**e.** dependent variable

Section 1.3 *continued*

Circle the letter of the choice that best completes the statement.

11. A constant is a factor that
- **a.** changes during an experiment.
- **b.** changes from one lab group to another.
- **c.** is affected by the dependent variable.
- **d.** is not allowed to change during an experiment.

12. A control is a
- **a.** variable that changes during an experiment.
- **b.** standard for comparison.
- **c.** type of dependent variable.
- **d.** type of experiment.

13. A hypothesis is a(n)
- **a.** set of controlled observations.
- **b.** explanation supported by many experiments.
- **c.** tentative explanation of observations.
- **d.** law describing a relationship in nature.

14. A theory is a(n)
- **a.** set of controlled observations.
- **b.** explanation supported by many experiments.
- **c.** tentative explanation of observations.
- **d.** law describing a relationship in nature.

15. A model is a(n)
- **a.** visual, verbal, and/or mathematical explanation of how things occur.
- **b.** explanation that is supported by many experiments.
- **c.** description of a relationship in nature.
- **d.** tentative explanation about what has been observed.

In the space at the left, write the word or phrase in parentheses that correctly completes the statement.

_____ **16.** Molina and Rowland used a (model, scientific method) to learn about CFCs in the atmosphere.

_____ **17.** Their hypothesis was that CFCs break down in the stratosphere due to interactions with (ultraviolet light, oxygen).

_____ **18.** Molina and Rowland thought that these interactions produced a chemical that could break down (chlorine, ozone).

_____ **19.** To test their (data, hypothesis), Molina and Rowland examined interactions that occur in the stratosphere.

_____ **20.** Based on their data, Molina and Rowland developed a (hypothesis, model) that explained how CFCs destroy ozone.

_____ **21.** Molina and Rowland concluded that (chlorine, radiation) formed by the breakdown of CFCs in the stratosphere reacts with ozone and destroys it.

Section 1.4 Scientific Research

In your textbook, read about types of scientific investigations.

For each description below, write *A* for applied research or *P* for pure research.

_____ **1.** Is undertaken to solve a specific problem

_____ **2.** Seeks to gain knowledge for the sake of knowledge itself

_____ **3.** Is used to find CFC replacements

_____ **4.** Was conducted by Molina and Rowland

In your textbook, read about students in the laboratory and the benefits of chemistry.

Answer the following questions.

5. When should you read the label on a chemical container?

_____

_____

6. What do scientists usually do when a scientific problem first arises?

_____

_____

7. What kinds of clothing should not be worn in the lab?

_____

8. What is technology?

_____

_____

9. Which type of research would you be more interested in working in—pure research or applied research? Why?

_____

_____

_____

_____

Analyzing Data

Section 2.1 Units and Measurement

In your textbook, read about SI units.

Complete the following table.

SI Base Units		
Quantity	**Base unit**	**Unit abbreviation**
1.		s
2. Mass		
3.	kelvin	
4. Length		

In your textbook, read about base units and derived units.

For each SI unit in Column A, write the letter of the matching item from Column B.

Column A

_____ **5.** second

_____ **6.** meter

_____ **7.** kilogram

_____ **8.** cubic meter

Column B

a. A platinum-iridium cylinder that is stored at constant temperature and humidity

b. The microwave frequency given off by a cesium-133 atom

c. A cube whose sides all measure exactly one meter

d. The distance that light travels through a vacuum in 1/299, 792, 458 second

9. Use **Table 2.2** in your textbook to arrange the following prefixes in order from largest to smallest.

centi- giga- kilo- mega- milli- nano- pico-

_____

10. List the symbols and factors that the following prefixes represent.

a. centi- _____

b. kilo- _____

c. milli- _____

Section 2.1 *continued*

Answer the following questions.

11. Which temperature scale will you use for your experiments in this class? Is this an SI unit?

_____

12. How many grams are in a kilogram?

_____

13. How many liters are in a megaliter?

_____

14. How many centimeters are in a meter?

_____

15. What is the difference between a base unit and a derived unit?

_____

_____

16. What is density?

_____

17. Explain in terms of density why a grocery bag containing all canned goods is harder to lift than a grocery bag containing all paper goods.

_____

_____

_____

18. How can you obtain an object's volume if you know its density and its mass?

_____

_____

_____

19. What is the three-part process for problem solving?

_____

20. How are degrees Celsius converted to kelvins?

_____

Section 2.2 Scientific Notation and Dimensional Analysis

In your textbook, read about scientific notation.

1. Circle the figures that are written in scientific notation.

1.61×10^2	$1.61 \times 10 \times 10$
1.61×100	161 km
$1.627\ 62 \times 10^{-27}$ kg	$9.109\ 39 \times 10^{-31}$ kg
2.8×10^{-8}	1,380,000

2. Change the following data into scientific notation.

a. 5,000,000 km _____

b. 8,394,000,000 s _____

c. 0.000421 g _____

d. 0.03 cm _____

In your textbook, read about dimensional analysis.

Answer the following questions.

3. What is a conversion factor?

_____

_____

4. What is dimensional analysis?

_____

Complete the following dimensional analysis problems.

5. Convert 50 kilograms into grams.

50 _____ × 1000 _____ /1 _____ = 50,000 _____

6. Convert 5 meters into centimeters.

5 _____ × 100 _____ /1 _____ = 500 _____

7. Convert 5 liters into kiloliters.

5 _____ × 1 _____ /1000 _____ = 0.0005 _____

8. Convert 5 centimeters into meters.

5 _____ × 1 _____ /100 _____ = 0.05 _____

9. Convert 55 kilometers per hour into meters per second. Use the conversion factor 1 km = 1000 m.

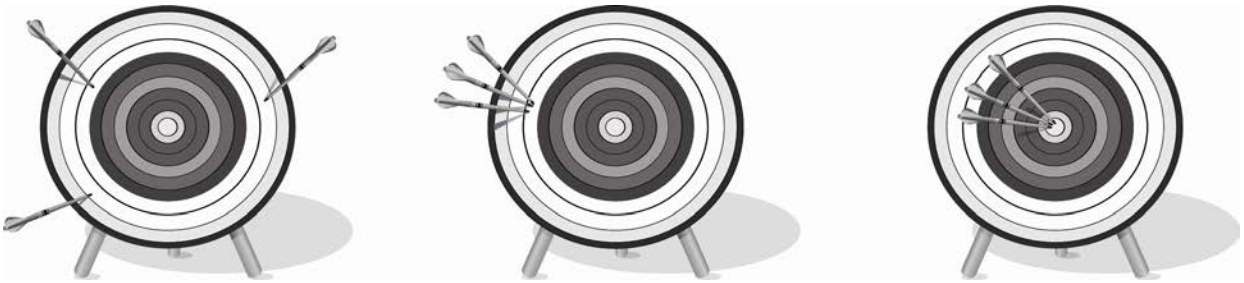
55 _____ /_____ × 1000 _____ /1 _____ × 1 _____ /60 _____

× 1 _____ /60 _____ = 15 _____

Section 2.3 Uncertainty in Data

In your textbook, read about accuracy and precision.

1. Use the terms *precise* and *accurate* to describe the following figures. You may use both terms for some figures. If a term does not apply to a figure, leave the space blank.



a. _____ **b.** _____ **c.** _____

_____ _____ _____

Circle the letter of the choice that best completes the statement or answers the question.

2. The difference between an accepted value and an experimental value is called a(n)
- **a.** error.
- **b.** percent error.
- **c.** measured value.
- **d.** precise measurement.

3. The ratio of an error to an accepted value is called a(n)
- **a.** accuracy-to-precision value.
- **b.** accuracy.
- **c.** percent error.
- **d.** precision.

4. When you calculate percent error, you can ignore the
- **a.** accepted values.
- **b.** measured values.
- **c.** experimental values.
- **d.** plus and minus signs.

5. If two measurements are very close to each other, then they are
- **a.** accurate.
- **b.** precise.
- **c.** both accurate and precise.
- **d.** accepted values.

6. Which of the following is most likely to produce data that are not precise?
- **a.** a balance that is not set to zero
- **b.** not reading a graduated cylinder at eye level
- **c.** altering the procedure during an experiment
- **d.** making the same error with each trial

Section 2.3 *continued*

In your textbook, read about significant figures.

Use each of the terms below just once to complete the statements.

counting numbers	estimated	non-zero	zeros
scientific notation	significant figures	placeholders	

7. The digits that are reported in an answer are called _____.

8. The numeral 9.66 has three significant figures, two known figures and one _____ figure.

9. _____ numbers are always significant.

10. All final _____ to the right of the decimal place are significant.

11. Zeros that act as _____ are not significant.

12. _____ have an infinite number of significant figures.

13. When you convert to _____, you remove the placeholder zeros.

In your textbook, read about rounding off numbers.

14. Round the following to four significant figures.

a. 12.555 km _____ **b.** 1.0009 _____ **c.** 99.999 _____ **d.** 23.342999 _____

15. Round 12.783456 to the requested number of significant figures.

a. 2 significant figures _____ **c.** 6 significant figures _____

b. 5 significant figures _____ **d.** 7 significant figures _____

16. Round 120.752416 to the requested number of significant figures.

a. 3 significant figures _____ **c.** 5 significant figures _____

b. 4 significant figures _____ **d.** 7 significant figures _____

17. Complete the following calculations. Round off the answers to the correct number of significant figures.

a. 51.2 kg + 64.44 kg _____

b. 6.435 cm – 2.18 cm _____

c. 16 m × 2.82 m × 0.05 m _____

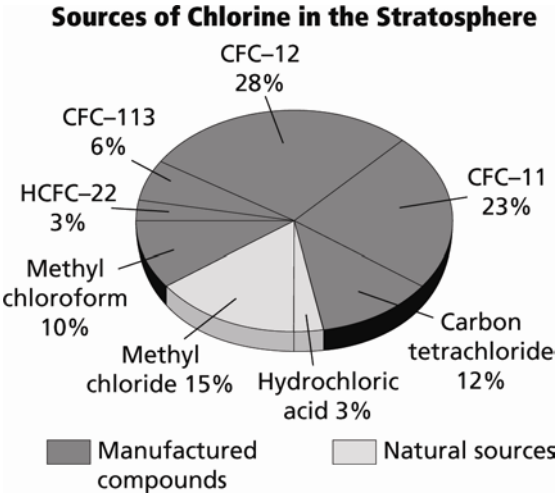
d. 3.46 m/1.82 s _____

Section 2.4 Representing Data

In your textbook, read about graphing.

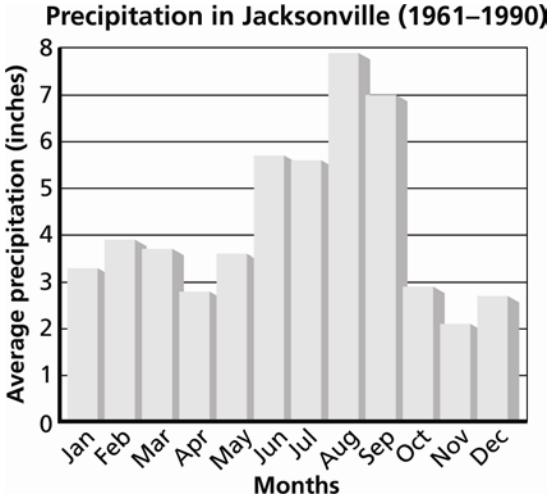
Label each kind of graph shown.

1.



_____

2.



_____

Answer the following questions about the graphs.

3. What percent of the sources of chlorine in the stratosphere are CFCs? _____

4. During which month of the year does Jacksonville usually get the most precipitation? The least?

_____

In your textbook, read about line graphs.

Sequence the following steps. Write *1* beside the first step in plotting a line graph. Write *2* beside the second step, and so on.

_____ **5.** Give the graph a title.

_____ **6.** Choose the ranges for the axes.

_____ **7.** Identify the independent and dependent variables.

_____ **8.** Plot the data points.

_____ **9.** Determine the range of the data that needs to be plotted for each axis.

_____ **10.** Draw the "best fit" line for the data.

_____ **11.** Number and label each axis.