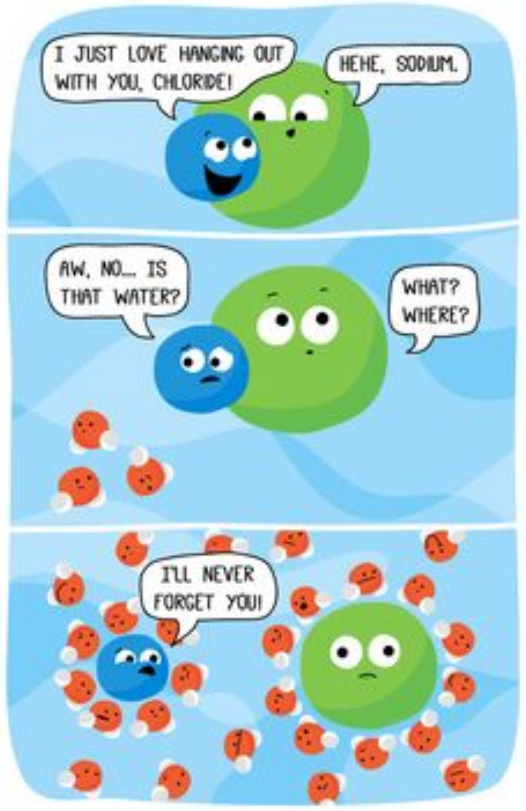
Honors Chemistry
Mrs. Voicu

Summer Work Packet



Name: _____

Welcome to Chemistry Honors!

Chemistry Honors is a challenging course that is designed for students with strong skills in both math and science. Mastering chemistry requires a consistent, dedicated effort throughout the course as the material is cumulative. Students will apply critical thinking skills and concepts learned in class to real world problems. To get us started in September, I have created this summer assignment that may appear to be more math than chemistry. The use of these and additional math concepts will be strongly embedded in the chemistry honors curriculum.

Chemistry Honors Summer Assignment Expectations

The exercises in the chemistry honors summer assignment will be due for grading on the second meeting of class. **You MUST show your work!** You will be able to ask questions about the material during our first class and get clarification, if necessary.

There will be a graded quiz on the 2nd day of class based on summer packet.

Flipped Learning

Guiding Questions (you should be able to answer these after completing the unit):

1. What is flipped learning?
2. How can this benefit me in honors chemistry?
3. How do I access flipped lessons?

Flipped Learning

Flipped learning is an instructional approach in which direct teaching moves from the classroom learning space to the individual learning space, and the resulting classroom space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage in the subject matter.

Flipped learning can provide greater opportunity for in-class problem solving in chemistry honors. Most students find that problem solving is the best way for learning the content in chemistry honors.

Flipped and remote lessons, delivered as YouTube videos, can be accessed via a link included in a Google Classroom homework assignment or as a QR code (sample shown below) that can be read by any camera-equipped computer, tablet, or smartphone. These lessons, when assigned as homework, will be graded as homework. You will be expected to view the videos and answer questions, and may also have graded in-class quizzes. For example, scan the enclosed QR code to access a sample video for Crash Course Chemistry with Hank Green.

Google Classroom code:

PART ONE: "This Isn't Math Class!?"
Math Skills Review

Chemistry is a math-based science class. Using scientific notation and solving equations are just some of the basic math skills that are used throughout Honors Chemistry to solve problems. Although you will use a calculator to do most of the basic math for you, it cannot always do everything. The information in this section reviews how to do scientific notation without a calculator and how to solve an equation for a variable. Keep in mind that in Chemistry, you will be required to show all work (with units) for any math problems we complete.

- **Scientific Notation**

Scientific notation is used often in chemistry to represent really small or really large numbers. Using scientific notation, you can represent a number written out in standard form using a product of two numbers: a coefficient and 10 raised to a power. The coefficient must be a number greater than or equal to one and less than ten (basically, you need one non-zero digit then the decimal point). The power (exponent) represents the number of places the decimal point had to be shifted to get the coefficient. A **POSITIVE** exponent indicates that the decimal point was shifted to the **LEFT**, while a **NEGATIVE** exponent indicates that the decimal was shifted to the **RIGHT**. The exponent may be a positive or negative whole number. To write a number in standard form from scientific notation, the steps are reversed.

Examples: Write the following in scientific notation.

8,900,000,000 = 8.9×10^{9} (positive 9 because decimal moved to the LEFT to get the 8.9)
0.001 = 1×10^{-3} (negative 3 because decimal moved to the RIGHT to get the 1)
5,678 m = 5.678×10^{3} m
0.0000876 min = 8.76×10^{-5} min

Examples: Write the following in standard form.

6.7×10^{4} = 67,000 (positive 4 indicates decimal must move to the RIGHT… opposite of before)
8.9×10^{-2} = 0.089 (negative 2 indicates decimal must move to the LEFT… opposite of before)
1.2×10^{5} cm = 120,000 cm
3.4×10^{-5} g = 0.000034 g

If you need more review, visit the following: https://www.youtube.com/watch?v=Wf-HlVqZPHY

PRACTICE:

Standard Notation	Scientific Notation
1,235,000 mL	
	2.2×10^{-7} s
0.0000750 m	
340,000,000,000 g	
	9.1×10^{10}

- **Solving Equations for a Variable**

When solving chemistry problems, you will often be required to rearrange an equation to solve for an unknown. Three important concepts to remember when solving for a variable include use the opposite "function" to move something from one side to the other, what you do to one side, you must do to the other side of the equation, and get the variable alone and by itself.

Example: Solve for the variable in the following equation.

$2a = 5(27 - 3a)$

1) Expand the right side by multiplying each term.

$5 \times 27 = 135$
$5 \times 3a = 15a$

Rewritten Equation: $2a = 135 - 15a$

2) Group like terms together. The main idea here is to get all the *a* terms on one side and the terms without *a* on the other side by using the opposite function to move terms from one side of the equation to the other side of the equation. Remember that whatever you do to one side you must do to the other side of the equation. In this case, to "move" the $15a$ to the side with $2a$ you must add $15a$ to both sides of the equation. This "cancels" the $15a$ on the right side.

$2a = 135 - 15a$
$+15a \quad +15a$

Rewritten Equation: $17a = 135$

3) Isolate the unknown. Divide both sides by the *a*'s coefficient (opposite of multiplying 17 x *a*).

$$\frac{17a}{17} = \frac{135}{17}$$

4) Solve.

$a = 7.94$ (135 divided by 17)

If you need more review, visit the following: https://www.youtube.com/watch?v=l3XzepN03KQ and https://www.youtube.com/watch?v=Qyd_v3DGzTM

PRACTICE:

Solve the following equations for X.

1) $30X = (60)(40)$

2) $15X + 2 = 10X + 4$

3) $15X - 2 = 10X - 4$

Derived Units:

- Derived units have two or more SI base units combined
- Examples of derived units are:
  - Area = m^2
  - Volume = m^3
  - Density = $\frac{mass}{volume} = \frac{kg}{m^3}$
  - Centigrade temperature (based on the Kelvin temperature scale)

Magnitude Prefixes:

Magnitude prefixes can be added before an SI base unit to create a unit larger or smaller than the base unit. For example, a kilogram is one thousand times larger (10^3) than a gram. Conversely, a milligram is one thousand times smaller (10^{-3}) than a gram. You will need to memorize all the SI prefix multipliers (name, abbreviation, and value) in Table 2.2. We will not be using the two crossed out prefixes: hecto and deca. A mnemonic useful for remembering the order of the magnitude prefixes is written below Table 2.2.

TABLE 2.2 SI Prefix Multipliers

Prefix	Symbol	Meaning	Multiplier	
tera-	T	trillion	1,000,000,000,000	(10^{12})
giga-	G	billion	1,000,000,000	(10^9)
mega-	M	million	1,000,000	(10^6)
kilo-	k	thousand	1,000	(10^3)
~~hecto-~~	~~h~~	~~hundred~~	~~100~~	~~10^2~~
~~deca-~~	~~da~~	~~ten~~	~~10~~	~~10^1~~
deci-	d	tenth	0.1	(10^{-1})
centi-	c	hundredth	0.01	(10^{-2})
milli-	m	thousandth	0.001	(10^{-3})
micro-	μ	millionth	0.000001	(10^{-6})
nano-	n	billionth	0.000000001	(10^{-9})
pico-	p	trillionth	0.000000000001	(10^{-12})
femto-	f	quadrillionth	0.000000000000001	(10^{-15})

A mnemonic for remembering the order of the magnitude prefixes is:

The great many knights did cross moats, mainly near Paris, France.

Tera Giga mega kilo deci centi milli micro nano pico femto

Now study and test yourself! Study suggestions: write the prefixes on notecards, make a Quizlet, record your voice saying the prefixes and their value. **Note: The multipliers are not conversion factors. They tell us the size of the multiplier relative to the base unit. You need to determine a conversion factor by determining how many of the smaller units are equal to the larger or base unit.** For example, compare grams and micrograms. There are 10^6 micrograms in 1 gram, so a conversion factor for grams to micrograms would be 1 g = 10^6 µg.

PART TWO: "What's 1/5 of a Foot? A Toe."
Metric System and Conversions

In this section, the metric system and common conversions will be reviewed. Scientists conduct experiments where data is collected and shared all over the globe. Although the United States has their own standards for measurement, the scientific world uses the International System of Units (SI) or what is commonly known as the metric system. Data collection and its accuracy are crucial in chemistry lab. Scientists use the same system of measurement so that data can be easily shared and compared with other data. The metric system provides that unity. Some of the conversions presented here are power of 10 conversions, which allow the moving of the decimal point to quickly convert between units. Not all conversions that we use in Honors Chemistry are power of 10.

You will be expected to know and use the following conversions this year… if you struggle with the memorization of these conversions, you should make flashcards, use Quizlet, etc. to help:

1 in = 2.54 cm	1 m = 1000 mm	1 mL = 1 cm^3
1 ft = 12 in	1000 m = 1 km	1000 mL = 1 L
1 yd = 3 ft	1 g = 10 dg	1 min = 60 s
1 mi = 5280 ft	1 g = 100 cg	1 hr = 60 min
1 m = 10 dm	1 g = 1000 mg	1 day = 24 hr
1 m = 100 cm	1000 g = 1 kg	365 days = 1 yr

Example: Use the conversions and dimensional analysis to determine the number of meters in 5.6 mm.

Starting unit (in this case mm) always goes on the bottom of the conversion in order to "cancel" them out.

$$5.6\ \cancel{mm} \times \frac{1\ m}{1000\ \cancel{mm}} = 0.0056\ m$$

To solve: multiply across the top, multiply across the bottom, then divide the two numbers you get.

If you need more review of dimensional analysis, visit: https://www.youtube.com/watch?v=DsTg1CeWchc

PRACTICE:

1) How many meters are there in 245 cm?
2) Determine the number of millimeters in 3.5 m.
3) If Johnny runs a lap in 1.27 minutes, how many seconds does it take him?
4) Suzy drove her car 50.34 miles in one day. How many feet did she drive?
5) The bug jumped a distance of 48 cm. Determine the inches in this jump.
6) A website says the distance to the gas station is 12.98 km. How many cm away is this?
7) If your birthday is 54 days away, how many seconds do you have to wait to open gifts?
8) The scale says the mass of the beaker is 7,980 mg. How many kilograms is this mass?

- The Kelvin temperature scale is an absolute scale; there are no negative values. A temperature change (ΔT) of 1 K equals a temperature change of 1 ^{0}C.
- Temperature Conversions:
    - K = °C + 273 (Some books use 273.15, but we will round down)
    - °C = K - 273
    - We will **not** be converting temperature from ^{0}C to ^{0}F and ^{0}F to ^{0}C.

Exercise 8: Convert the Kelvin temperatures to degrees centigrade and the degrees centigrade temperatures to Kelvin.

1. 310 K = _____ ^{0}C (“normal” internal body temperature)
2. -78 ^{0}C = _____ K (sublimation point of carbon dioxide)
3. 801 ^{0}C = _____ K (melting point of sodium chloride)
4. 373 K = _____ ^{0}C (boiling point of water)

Qualitative vs. Quantitative Data:

Quantitative data is numerical (quantity). This type of data results from measurements. Some examples of quantitative data would be:

- The mass of the aluminum cylinder was 14.23 g.
- The length of the pencil was 9.18 cm.

Qualitative data is non-numerical (qualities). Some examples of qualitative data would be:

- The sulfur sample was yellow in color.
- The reaction produced a large amount of crystals.

Exercise 9: Determine if the following statements are qualitative or quantitative.

1. _____ The cup had a mass of 454 grams.
2. _____ Copper (II) sulfate pentahydrate is a granular blue solid.
3. _____ The graduated cylinder contained 55 mL of water.
4. _____ The beaker is larger than the vial.

Chapter 2.3 – Significant Figures and Precision

Guiding Questions:

1. How do accuracy and precision differ?
2. How do we report measurements so that the number of digits reflects the degree of precision of our instrument?
3. How do we determine the significant digits in a measured number?

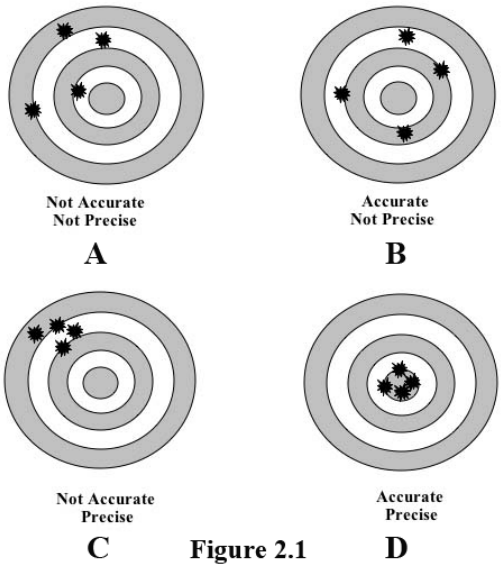


Figure 2.1

Accuracy and Precision:

Accuracy describes how close a measurement is to the actual value for that measurement. Precision tells us how closely our measurements are grouped to one another. There are no absolute value limits for precision and accuracy, but values within about 0.5% of one another are usually considered precise. Accuracy would include values within about 1-2% of the target value. A good visual representation of accuracy and precision are the results of shooting at a target. (Figure 2.1) The goal of shooting at a target is to get all of your shots in the absolute center. Panel A shows that the shots were not grouped together (not precise) and not near the center (not accurate). Panel B shows that the shots were not grouped together (not precise) but they average out to the desired result (accurate). In panel C, the shots are grouped together (precise) but are not located at the center (not accurate). Finally, in panel D we see that the shots are grouped together (precise) and at the center of the target (accurate).

Exercise 10: Analyze the data in Table 2.4 to determine if the data in trials 1-3 are precise and/or accurate. Write your conclusions on the lines below

Table 2.4: Measurement Trials for the Density of an Aluminum Rod

Literature Value for the density of Aluminum = 2.712 g/mL[4]

Trial #	Density Measurement 1 (g/mL)	Density Measurement 2 (g/mL)	Density Measurement 3 (g/mL)	Density Measurement 4 (g/mL)
1	1.511	1.499	1.505	1.501
2	3.002	2.415	2.600	2.820
3	2.709	2.719	2.720	2.708

Conclusion Trial 1: _____

Conclusion Trial 2: _____

Conclusion Trial 3: _____

[4] http://www.engineeringtoolbox.com/metal-alloys-densities-d_50.html

Measuring Significant Figures:

When we report a scientific measurement, we report all of the known digits plus a guess for the last digit's value. This is termed significant figures, or sig figs. This allows us to obtain a value that reflects the full precision of our measuring device. On the thermometer below (Figure 2.2) we would read the value to the nearest tenth of a degree (0.1 ^{0}C). The thermometer in Figure 2.2 would be read as 87.5 ^{0}C. This number has three significant figures. The first two numbers, 87, are known. The last number, 0.5, is our estimate of the final measurement value.

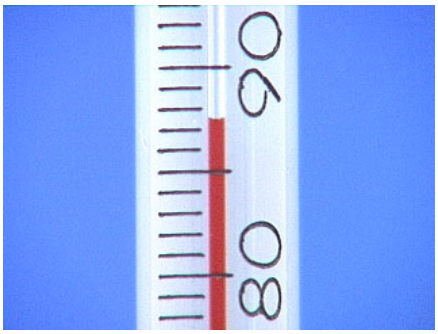


Figure 2.2

Counting Significant Figures:

All digits in a number that have a value of 1-9 are significant. Zeros in a number can have significance or be merely placeholders so the digits have the correct value. To determine the number of significant figures in a number, we use the following rules:

1. All non-zero digits are significant.
   2.45 g (3 sig. figs.)
   1,518 m (4 sig. figs.)
2. Interior or "sandwich zeros are significant.
   1.**000**8 g (5 sig. figs.)
   2**0**2 kg (3 sig. figs.)
3. Trailing zeros to the right of a non-zero number that falls after a decimal point are significant.
   19.**00** s (4 sig. figs.)
   125.**000**7 g (7 sig. figs.)
4. Trailing zeros that fall before a decimal point are significant, provided there is a non-zero number to the left of the zeros.
   5**0**.00 mm (4 sig. figs.)
   17**00**.24 g (6 sig. figs.)
5. Leading zeros (zeros to the left of a decimal point before a non-zero number) are not significant and are merely placeholders.
   0.0005 m (1 sig. fig.)
6. Note: All of the digits in the coefficient of a number written in scientific notation are significant. The exponent is not counted as significant.
   5.002×10^{-4} kg (4 sig. figs.)
   9×10^{6} atoms (1 sig. fig.)

7. Exact numbers (12 apples) and defined quantities (conversion factors) are considered to have “infinite sig. figs.” and do not limit the resulting sig. figs. in a calculation.

A Second Way to Determine Significance:

The “Atlantic-Pacific Rule for Significance” (Figure 2.3) can also be used to determine the number of significant figures in a number. Once you find a non-zero digit all the remaining digits in the indicated direction are significant, including zeros.

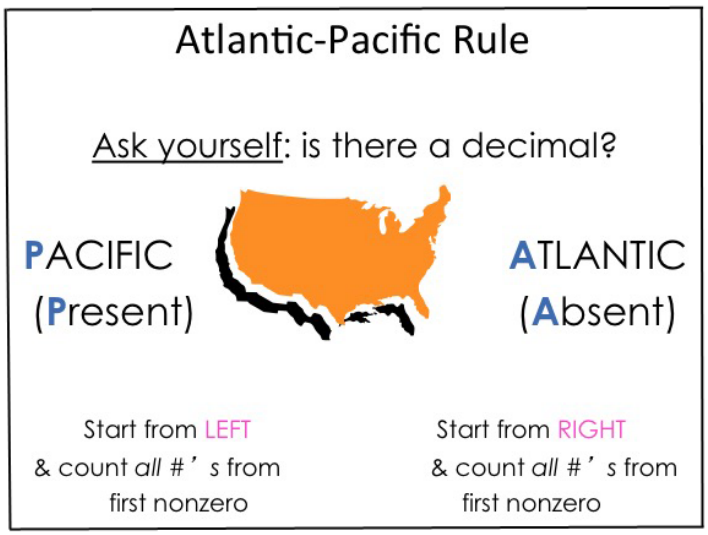


Figure 2.3

Screencast “Atlantic-Pacific Rule of Significance” https://youtu.be/RnDj7ohzcss

Exercise 11: Determine the number of significant figures for each of the following numbers.

1. 3.405 _____ significant figures
2. 8.1×10^{-3} _____ significant figures
3. 0.0004588 _____ significant figures
4. 900,000 _____ significant figures
5. 80,001 _____ significant figures
6. 6.02×10^{23} _____ significant figures
7. 6 dozen _____ significant figures

Rules for Using Sig Figs Correctly with Mathematical Operations:

Addition/Subtraction

In addition or subtraction, the result has the same number of decimal places as the quantity with the fewest decimal places.

Example:

5.7**4** cm
0.8**2**3 cm
+ 2.6**5**1 cm
9.2**1**4 = 9.21 cm (we must round to the hundredths place)

Multiplication/Division

In multiplication and division, the result carries the same number of significant figures as the factor with the fewest significant figures.

Example:

5.02 in x 89.665 in x 0.100 in = 45.01183 = 45.0 in^3 (3 sig figs)

5.892 g / 6.1 mL = 0.9659016393 = 0.97 g/mL (2 sig figs)

Exercise 12: Perform each calculation and report the result with correct units and sig. figs.

1. 87.6 s + 9.888 s + 2.3 s + 10.77 s =
2. 43.7 mm – 2.341 mm =
3. 6.99 kg – 5.772 kg =

Exercise 13: Perform each calculation and report the result with correct units and sig. figs.

1. 4.5 cm x 0.03060 cm x 0.391 cm =
2. 5.55 m / 8.97 s =
3. (7.890×10^7) km / (6.7×10^4) hr =

Additional resources for help with significant figures:

1. **Highly recommended:** Tyler Dewitt's chemistry videos
    a. "Why Are Significant Figures Important?" (This is one of 10 videos in the playlist.)
    https://youtu.be/VAuslY-Uuf4

Practice Quiz Chapter 2.2 and 2.5 (This practice quiz is slightly longer than the graded quiz)

Show your work, where applicable.

1) Which number is correctly expressed in scientific notation?
   a) 87,005 miles
   b) 456×10^2 miles
   c) 90.0×10^3 miles
   d) 6.7×10^4 miles

2) Write the number 986,500,000 s, in scientific notation: _____

3) Write the number 6.70×10^{-5} s, in expanded notation: _____

4) Write the number 0.0000000546 s, in scientific notation: _____

5) Write the number 1.5×10^6 s, in expanded notation: _____

6) Complete the following problems and express the results in scientific notation. All numbers must have the correct units!
   a) $(9.5 \times 10^5 \text{ m}) + (6.7 \times 10^4 \text{ m}) =$ _____
   b) $(9.5 \times 10^5 \text{ m}) - (6.7 \times 10^4 \text{ m}) =$ _____
   c) $(9.5 \times 10^5 \text{ m}) \times (6.7 \times 10^4 \text{ m}) =$ _____
   d) $(9.5 \times 10^5 \text{ m}) / (6.7 \times 10^4 \text{ s}) =$ _____

7) What is the SI unit of mass?
   a) pound
   b) gram
   c) kilogram
   d) ton

8) What is the abbreviation for the SI unit of length?
   a) mm
   b) m
   c) km
   d) ft

PART THREE: "Tell Me a Joke About Potassium. K"
Elements

In any Chemistry course, the Periodic Table of Elements is your best friend. While at first it might seem confusing because of all the letters and numbers on it, you will learn how to use this information throughout Honors Chemistry. There are 118 elements on the Periodic Table. The good news is that you will never need to memorize all of the information on the table, as it is given to you to use in most cases. Knowing certain elements and their chemical symbol, however, will make Chemistry much easier for you. Each element has a one or two letter chemical symbol that relates to its name. The first letter in the symbol is always capitalized, and the second letter (if present) is always lowercase. You will notice that not all of the symbols seem to correspond to their name. For example, the chemical symbol of carbon is C, while potassium has a chemical symbol of K. This occurs because some chemical symbols are derived from their Latin name. That makes some of these elements a little bit more challenging.

For your success in Honors Chemistry, it is vital that you know some of the common elements and their corresponding chemical symbols. Spelling of the names should be close, but the symbols must be written correctly and in the proper case format.

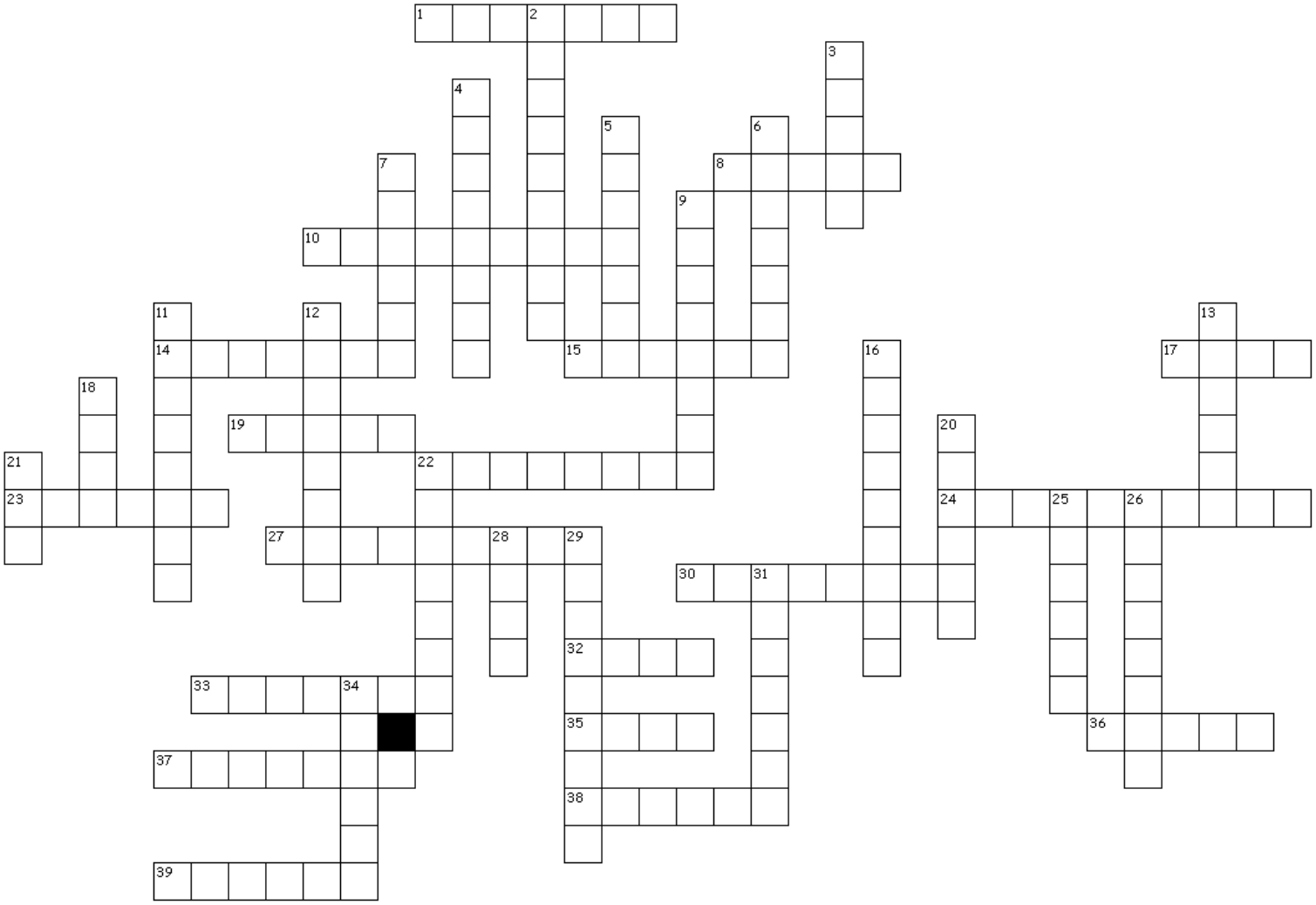
H	Hydrogen
He	Helium
Li	Lithium
Be	Beryllium
B	Boron
C	Carbon
N	Nitrogen
O	Oxygen
F	Fluorine
Ne	Neon
Na	Sodium
Mg	Magnesium
Al	Aluminum
Si	Silicon
P	Phosphorus
S	Sulfur
Cl	Chlorine
Ar	Argon
K	Potassium
Ca	Calcium
Ti	Titanium
Cr	Chromium
Mn	Manganese
Fe	Iron
Co	Cobalt
Ni	Nickel
Cu	Copper
Zn	Zinc
As	Arsenic
Br	Bromine
Kr	Krypton
Sr	Strontium
Ag	Silver
Cd	Cadmium
Sn	Tin
Sb	Antimony
I	Iodine
Xe	Xenon
Cs	Cesium
Ba	Barium
W	Tungsten
Pt	Platinum
Au	Gold
Hg	Mercury
Pb	Lead
Bi	Bismuth
Rn	Radon
U	Uranium

After reviewing the elements and their symbols, you can try the crossword puzzle on the next page to help with your practicing and memorization.

PRACTICE:

Use your knowledge of the chemical symbols for the various elements to help you complete the following puzzle.

Element Symbols Crossword Puzzle



Across

1. Kr
8. Rn
10. Sr
14. Li
15. He
17. Zn
19. B
22. Cr
23. I
24. P
27. Be
30. F
32. Au
33. Si
35. Ne
36. Xe
37. Hg
38. Na
39. O

Down

2. K
3. Ar
4. Ti
5. Br
6. Ca
7. Ba
9. Al
11. Pt
12. N
13. Ag
16. Mg
18. Pb
20. Cu
21. Sn
22. Cl
25. S
26. H
28. Fe
29. Mn
31. U
34. C

Part IV PHYSICAL AND CHEMICAL PROPERTIES AND CHANGES

PHYSICAL PROPERTY	CHEMICAL PROPERTY
1. observed with senses 2. determined without destroying matter	1. indicates how a substance reacts with something else 2. matter will be changed into a new substance after the reaction

Identify the following as a chemical (C) or physical property (P):

_____1. blue color
_____2. density
_____3. flammability (burns)
_____4. solubility (dissolves)
_____5. reacts with acid
_____6. supports combustion
_____7. sour taste
_____8. melting point
_____ 9. reacts with water
_____10. hardness
_____11. boiling point
_____12. luster
_____13. odor
_____14. reacts with air

PHYSICAL CHANGE	CHEMICAL CHANGE
1. a change in size, shape, or state 2. no new substance is formed	1. a change in the physical and chemical properties 2. a new substance is formed

Identify the following as physical *(P)* or chemical *(C)* changes.

_____1. NaCl (Table Salt) dissolves in water.
_____2. Ag (Silver) tarnishes.
_____3. An apple is cut.
_____4. Heat changes H_2O to steam.
_____5. Baking soda reacts to vinger.
_____6. Fe (Iron) rusts.
_____7. Alcohol evaporates .
_____8. Ice melts.
_____9. Milk sours.
_____10. Sugar dissolves in water.
_____11. Wood rots.
_____12. Pancakes cook.
_____13. Grass grows.
_____14. A tire is inflated.
_____15. Food is digested.
_____16. Paper towel absorbs water.

Physical and Chemical Changes

Part A

Can you recognize the chemical and physical changes that happen all around us? If you change the way something looks, but haven't made a new substance, a **physical change** (P) has occurred. If the substance has been changes into another substance, a **chemical change** (C) has occurred.

1.		An ice cube is placed in the sun. Later there is a puddle of water. Later still the puddle is gone.
2.		Two chemical are mixed together and a gas is produce.
3.		A bicycle changes color as it rusts.
4.		A solid is crushed to a powder.
5.		Two substances are mixed and light is produced.
6.		A piece of ice melts and reacts with sodium.
7.		Mixing salt and pepper.
8.		Chocolate syrup is dissolved in milk.
9.		A marshmallow is toasted over a campfire.
10.		A marshmallow is cut in half.

Part B
Read each scenario. Decide whether a physical or chemical change has occurred and give evidence for your decision. The first one has been done for you to use as an example.

	Scenario	Physical or Chemical Change?	Evidence…
1.	Umm! A student removes a loaf of bread hot from the oven. The student cuts a slice off the loaf and spreads butter on it.		
2.	Your friend decides to toast a piece of bread, but leaves it in the toaster too long. The bread is black and the kitchen if full of smoke.		
3.	You forgot to dry the bread knife when you washed it and reddish brown spots appeared on it.		
4.	You blow dry your wet hair.		
5.	In baking biscuits and other quick breads, the baking powder reacts to release carbon dioxide bubbles. The carbon dioxide bubbles cause the dough to rise.		
6.	You take out your best silver spoons and notice that they are very dull and have some black spots.		
7.	A straight piece of wire is coiled to form a spring.		
8.	Food color is dropped into water to give it color.		
9.	Chewing food to break it down into smaller particles represents a _____ change, but the changing of starch into sugars by enzymes in the digestive system represents a _____change.		
10.	In a fireworks show, the fireworks explode giving off heat and light.		

Part C: True (T) or False (F)

1.		Changing the size and shapes of pieces of wood would be a chemical change.
2.		In a physical change, the makeup of matter is changed.
3.		Evaporation occurs when liquid water changes into a gas.
4.		Evaporation is a physical change.
5.		Burning wood is a physical change.
6.		Combining hydrogen and oxygen to make water is a physical change.
7.		Breaking up concrete is a physical change.
8.		Sand being washed out to sea from the beach is a chemical change.
9.		When ice cream melts, a chemical change occurs.
10.		Acid rain damaging a marble statue is a physical change.

Part V: States of Matter

https://www.youtube.com/watch?v=bMbmQzV-Ezsj

Investigate each state of matter using the link above. Once your investigation is complete, answer the following questions regarding the properties of each state,

1. In the table below, list the properties of each state of matter, an example of each & sketch a diagram of their particles.

	Solid	**Liquid**	**Gas**
Example			
Particle Diagram			
Properties			

There is a fourth state of matter known as plasma. Use the following resource below. Investigate plasmas and their properties then answer the question listed below.

https://www.youtube.com/watch?v=VkeSI_B5Ljc

2. a. Give one example of a natural plasma and one example of a man-made plasma.

b. Plasmas have similar characteristics to what state of matter?

c. Identify what major property of plasmas that is different from the state listed in part b.

Now that you have an understanding of matter and its different states, you will be reviewing state changes. Using prior knowledge and credible sources, label each arrow in the diagram below with the correct name of the process that is occurring. Note: There are six arrows therefore you should have six labels.