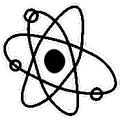
Name: _____ Period: ____ Date: _____

Optional Summer Practice: LHS Honors Chemistry



Packet Info

The practice problems and review information presented in this packet are **COMPLETELY OPTIONAL** and there is **NOTHING** due on the first day of classes. This packet was created for those students who wish to "stay sharp" over the summer months and be just a little bit more prepared when the new school year begins. You may look at, try, or review as much of the information as you wish, as nothing is being collected from this packet. The content presented here was taught in previous middle or high school classes and will be quickly reviewed in the first few weeks of Honors Chemistry. Even though nothing is due from this packet, this shows you some of the information and skills you will need to master in order to do well in Honors Chemistry this year. Since the course itself is challenging and fast-paced, you are strongly encouraged to be as ready as possible when the year begins!

Teachers

If you need help at any point while working on this packet, you may contact the Honors Chemistry teachers using the methods below:

Mr. Little **Email:** MrLittleScience@iCloud.com
Twitter: @MrLittleScience

Mrs. Hoffman **Email:** KHoffman@basdschools.org

Important Additional Info

The practice problems / review topics in this packet are divided up into four separate sections in order to make it easier for you to focus on the individual concepts that you might need to review:

- **Part One: Math Skills Review**- A review of important math skills that are needed to solve certain problems in an Honors Chemistry course
- **Part Two: Metric System and Conversions**- Common conversions that are needed for doing dimensional analysis problems are reviewed
- **Part Three: Elements**- Common elements from the Periodic Table and their symbols that are used throughout the course are reviewed
- **Part Four: Polyatomic Ions**- A review and practice with the important polyatomic ions that will be used in naming and when writing chemical reactions

***Note:** Please be aware that the material found in this packet is a review of topics covered in your middle school / high school science and math courses. Some of the material presented may be challenging or require you to think critically so do your BEST to work through all practice questions and use the given materials or links to help you!

BASD Drop/Add Policy
The following guidelines exist for all other schedule changes requested after August 1st:

1) A schedule change request form must be completed by the student and parent. Forms are available in the Counseling Office or the teacher.

2) Schedule changes will be considered for valid educational reasons only. Schedule changes will not be made to accommodate requests for lateral moves within the same subject area or teacher preference.

3) The counselor and assigned teacher will review the schedule change requests.

4) Quarter courses (half semester courses) will not be dropped after the first 5 days of class.

5) Full semester courses will not be dropped after the first 15 days of class.

6) All students must maintain a full schedule for the entire year.

7) Level changes will not be considered unless the student has a 75% or lower in the course.

Withdrawals from a course will not become part of the student record if the course is dropped within the first 15 days of a semester class and within the first 5 days of a quarter course (half semester course). A "W" (Withdrew) will be recorded after those days but prior to the end of the first quarter. Either a "WP" (Withdraw Passing) or "WF" (Withdraw Failing) will be recorded if the course is dropped after the first marking period, indicating the student's progress at the time of withdrawal.

A course change must be based upon academic considerations and be facilitated by a conference/plan developed by the student, parent, teacher, and counselor/grade level administrator to support student success. This plan will require tutoring, completion of all required work to date, and a sincere demonstration of effort and ability by the student prior to dropping a course or level of course for all classes in English, Social Studies, Math, Science and Foreign Language.

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

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?

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. You should know the following elements / symbols… if you struggle with their memorization, you should make flashcards, use Quizlet, etc. to help:

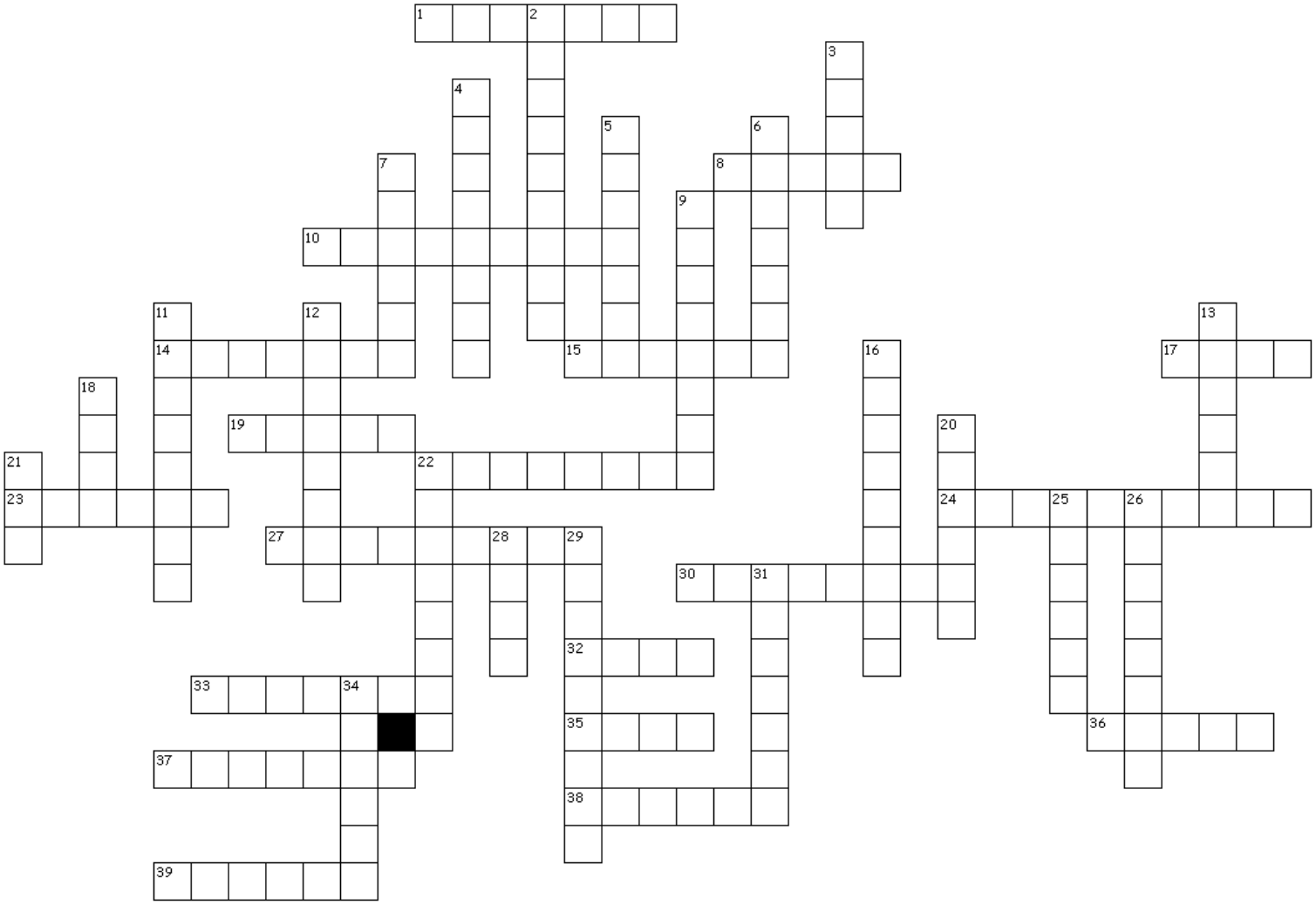
H	Hydrogen
He	Helium
Li	Lithium
Be	Beryllium
B	Boron
C	Carbon
N	Nitrogen
O	Oxygen
F	Fluorine
Ne	Neon
Na	Sodium
Mg	Magnesium
Al	Aluminum
Si	Silicon
P	Phosphorus
S	Sulfur
Cl	Chlorine
Ar	Argon
K	Potassium
Ca	Calcium
Ti	Titanium
Cr	Chromium
Mn	Manganese
Fe	Iron
Co	Cobalt
Ni	Nickel
Cu	Copper
Zn	Zinc
As	Arsenic
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 FOUR: "Why Do Chemists Like Nitrates So Much? Cheaper Than Day Rates." Polyatomic Ions

Polyatomic ions are groups of multiple elements that have a charge (positive or negative). The symbols shown below tell you what elements are in the ion, how many atoms of each, and the overall charge of the ion itself. For example, NH_4^{1+} contains a nitrogen atom, four hydrogen atoms, and the entire group has a charge of +1. As we move through the course, you will be required to memorize and use the polyatomic ions for naming of chemical compounds and writing chemical reactions.

Memory Hints…

If two ions have similar names with the only difference being the number of oxygen atoms in the ion:

- "ite" ending means smaller number of O
- "ate" ending means larger number of O

If there are four ions with similar names and different numbers of oxygen atoms:

- "Hypo" prefix indicates the smallest amount of O
- "Per" prefix indicates the largest amount of O

You should know the following polyatomic ions (with charge) by name if given the formula and by formula if given the name… if you struggle with their memorization, you should make flashcards, use Quizlet, etc. to help:

Ammonium	NH_4^{1+}	Nitrite	NO_2^{1-}
Acetate	$C_2H_3O_2^{1-}$	Hydroxide	OH^{1-}
Perchlorate	ClO_4^{1-}	Oxalate	$C_2O_4^{2-}$
Chlorate	ClO_3^{1-}	Carbonate	CO_3^{2-}
Chlorite	ClO_2^{1-}	Chromate	CrO_4^{2-}
Hypochlorite	ClO^{1-}	Dichromate	$Cr_2O_7^{2-}$
Cyanide	CN^{1-}	Peroxide	O_2^{2-}
Hydrogen carbonate	HCO_3^{1-}	Sulfate	SO_4^{2-}
Iodate	IO_3^{1-}	Sulfite	SO_3^{2-}
Permanganate	MnO_4^{1-}	Phosphate	PO_4^{3-}
Nitrate	NO_3^{1-}	Phosphite	PO_3^{3-}

Here is a video that uses a phrase to help students memorize SOME of the polyatomic ions:
https://www.youtube.com/watch?v=jcKR9U4IxIk