Advanced Chemistry
Summer Assignment 2024-2025

Contact Info:

- **Mrs. Curtis & Mrs. Snow & Mr. Bosnic**
- ****Google Classroom: Join by clicking this link or go to Google Classroom and use join code: dtxwnx4(you MUST join this for this course, please join immediately... aka right now! ☺)**
- **kimberly.curtis@nisd.net , erin.snow@nisd.net , anthony.bosnic@nisd.net**

Dear Advanced Chemistry Student: Welcome to the exciting and challenging world of Advanced Chemistry! The objective of this assignment is to allow you to prepare for and strengthen your skills for the upcoming school year. The information presented here represents a starting point for Advanced Chemistry students. It is based on what was taught to you in middle school with two extensions: conversions and atomic theory.

Advanced Chemistry is designed to prepare students for not only AP Chemistry but any AP course. It expands to topics beyond the scope of general high school chemistry and is taught at a quicker and more rigorous pace. Please know that we make ourselves available for tutoring before and after school, as well as will be providing an ample amount of help videos and notes on our Google Classroom page we have shared above. We can get you where you need to be, but you need to be willing to put in the effort. You must be fully committed to the course. You will need to invest time outside of class working on chemistry. Advanced Chemistry is a rewarding course, and will prepare you well for future AP classes.

Due to the above, we need you to initial each of the following and have you and your parents sign in the indicated spots. This is so we know that you are aware of the rigor of Advanced Chem and what is expected of you in order to succeed in the course. Signatures are due the 2nd class of school.

Student Initials:

_____ I understand that I will have homework almost every class day.

_____ I understand that this is not busy work, but *essential* practice to learning the material. It may also be lecture notes I need to complete in order to be ready to practice concepts for the next class period.

_____ I understand that I will need to spend time OUTSIDE OF CLASS studying for quizzes and unit tests to do well.

_____ I understand that chemistry is a subject that builds on itself all year (unlike biology) so that in order to excel at the next unit, I must know how to do the current unit.

_____ I understand that Advanced Chemistry covers many topics that regular chemistry does not cover in order to prepare students for AP. This means our schedule is tight and the pace is fast.

_____ _____ _____

Student Signature Parent Signature Date

You are expected to complete this assignment to be turned in on the 2nd day of class. We will have a test on the material at an announced time in the first couple weeks of school.

We are looking forward to a great year in Advanced Chemistry!

Summer Assignment due the 2nd class of School

Lesson 1: Matter and Change
Lesson 2: Conversions
Lesson 3: Density
Lesson 4: Atomic Theory
Lesson 5: "What's in an Atom?"

Lesson 1: Matter and Change

Watch the following short videos to review material you should have al;ready learned in middle school:
Physical vs. Chemical Changes
Pure Substances and Mixtures
Solids, Liquids and Gases at the Particle Level - stop video at 3:20

Matter and Change Practice

*PART A: In the data table, record the color and state of matter. Based on these properties and any other observations, determine the composition classification (**element**, **compound**, **homogeneous mixture** (aka **solution**) and **heterogeneous mixture**) of each substance.*

Data Table

Name of Substance	Symbol or Formula	Color	Check One			Check One			
			Solid	Liquid	Gas	Element	Compound	Homogen, Mixure	Hetero. Mixture
1. Air 	NA								
2. Water 	H_2O								
3. Gold 	Au								
4. Copper (II) sulfate solution 	$CuSO_4$ in water								
5. Italian Salad dressing 	NA								

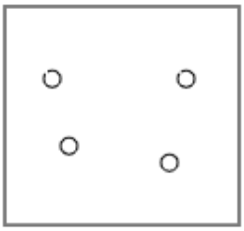
6. Table Sugar (sucrose) 	$C_{11}H_{22}O_{11}$									
7. Chlorine gas 	Cl_2									
8. Stainless steel 	Alloy of Fe and C									

Part B:

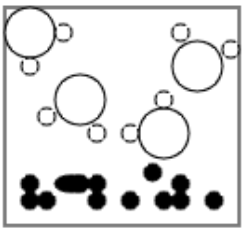
Each diagram shows a sample of substances as viewed at the atomic level. Characterize the contents of the container in terms of each of the following categories

1. Homogenous mixture, heterogeneous mixture, or pure substance
2. Element(s), Compound(s), or both
3. Solid, Liquid, gas or combination of phases (specify which are present)

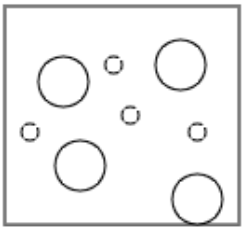
A.



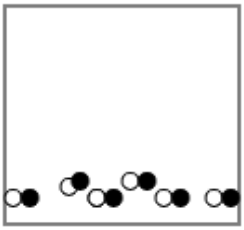
1. _____
2. _____
3. _____

B. 

1. _____
2. _____
3. _____

C. 

1. _____
2. _____
3. _____

D. 

1. _____
2. _____
3. _____

Lesson 2: Conversions (Dimensional Analysis)

Watch the "Converting Units with Conversion Factors" video on Google Classroom or click on link. Solve the following problems using the conversion factors below. You MUST use the method the video explains.

GO to next page…

Length
SI unit : meter (m)
1 km = 0.62137 mi
1 mi = 5280 ft
= 1.6093 km
1 m = 1.0936 yd
1 in = 2.54 cm (exactly)
1 cm = 0.3937 in
1 Å = 10^{-10} m

Mass
SI unit : kilogram (kg)
1 kg = 2.2046 lb
1 lb = 0.454 kg
= 16 oz
1 amu = 1.6605402 x 10^{-24} g

Temperature
SI unit : kelvin (K)
0 K = -273.15°C
= -459.67°F
K = °C + 273.15
$°C = \left(\frac{5}{9} \times °F\right) - 32°$
$°F = \left(\frac{9}{5} \times °C\right) + 32°$

Energy (derived)
SI unit : Joule (J)
1 J = 1 kg-m^2 / s^2
1 J = 0.239 cal
= 1 C x 1 V
1 cal = 4.184 J
1 eV = 1.602 x 10^{-19} J

Pressure (derived)
SI unit : Pascal (Pa)
1 Pa = 1 N/m^2
= 1 kg/m-s^2
1 atm = 101.325 kPa
= 760 torr
= 14.70 lb/in^2
1 bar = 100 kPa

Volume (derived)
SI unit : cubic meter (m^3)
1 L = 10^{-3} m^3
= 1dm^3
= 10^3 cm^3
= 1.0567 qt
1 gal = 4 qt
= 3.7854 L
1 cm^3 = 1 mL
1 in^3 = 16.4 cm^3

1. In Europe, the energy contained in foods is measured in Joules (rather than calories). How many calories would be contained in a food that has 180,000 J per serving?
   Conversion Factor I need to use:_____

Work:

2. You go to the doctor and they measure your weight to be 42.8 kg. How many pounds do you weigh?
   Conversion Factor I need to use:_____

Work:

3. Challenge problem: You run track...your event is the 2 mile race. For fun you want to see how many millimeters you run each race….Figure it out!
   Conversion Factors I need to use:

Work:

Lesson 3: Density

Please view the video on Density on Google Classroom or by clicking on the link. Define: Mass, Volume, Density and solve the practice problems.

Mass:
Volume:
Density:

Problems:

1. Samples A, B, & C have masses of 80 g, 12 g, and 33 g, and volumes of 20 mL, 4 cm^3, and 11 mL, respectively. Which of the samples have the same density?

2. An object with a mass of 3.5g raises the level of water in a graduated cylinder from 25.1 mL to 32.1 mL. What is the density of the object?

3. Examine the density values for several common liquids in the table below. Sketch the results of an experiment that layered each of the liquids in a 1000 mL graduated cylinder.

Substance	**Density** (gm/cu.cm)
Water	1.00
Cooking oil	0.92
Sea Water	1.025
Carbon tetrachloride	1.58
Benzene	0.87
Glycerin	1.26
Methanol	0.79

4. What is the mass of a 26.8 mL sample of methanol? Use chart above for density.

Lesson 4: Atomic Theory

Using the resources provided on Google Classroom or links here (History of Atom and Models of the Atom Timeline), create a SIMPLE timeline on a piece of paper that includes the scientists listed below. For each "point" please provide: Name, Date (year), model created or improved (in terms of what they contributed to the idea of an "atom"), and a picture that would help you remember what their model of the atom (or addition to the model) is.

Scientists to include:

1) ***Dalton***
2) ***Rutherford***
3) ***Democritus***
4) ***Chadwick***
5) ***Schrodinger***
6) ***Thomson***
7) ***Bohr***

Lesson 5: What is in an Atom?

After watching the "Nuclide Symbols" video on Google Classroom or by clicking the link, define the following terms and complete the table below. A Periodic table is attached for your reference.

Atomic # -
Mass # -
Isotope -

Element	Isotope	Atomic Notation ${}^{A}_{Z}X$	Number of protons (Atomic Number, Z)	Number of nucleons (Mass Number, A)	Number of neutrons	Number of electrons
lithium	lithium-7	${}^{7}_{3}\mathrm{Li}$				
	lithium-6					
			8	16		
				17	9	
				235		92
uranium				238		

PERIODIC TABLE OF THE ELEMENTS

1 **H** 1.008																	2 **He** 4.00
3 **Li** 6.94	4 **Be** 9.01											5 **B** 10.81	6 **C** 12.01	7 **N** 14.01	8 **O** 16.00	9 **F** 19.00	10 **Ne** 20.18
11 **Na** 22.99	12 **Mg** 24.30											13 **Al** 26.98	14 **Si** 28.09	15 **P** 30.97	16 **S** 32.06	17 **Cl** 35.45	18 **Ar** 39.95
19 **K** 39.10	20 **Ca** 40.08	21 **Sc** 44.96	22 **Ti** 47.90	23 **V** 50.94	24 **Cr** 52.00	25 **Mn** 54.94	26 **Fe** 55.85	27 **Co** 58.93	28 **Ni** 58.69	29 **Cu** 63.55	30 **Zn** 65.39	31 **Ga** 69.72	32 **Ge** 72.59	33 **As** 74.92	34 **Se** 78.96	35 **Br** 79.90	36 **Kr** 83.80
37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.91	40 **Zr** 91.22	41 **Nb** 92.91	42 **Mo** 95.94	43 **Tc** (98)	44 **Ru** 101.1	45 **Rh** 102.91	46 **Pd** 106.42	47 **Ag** 107.87	48 **Cd** 112.41	49 **In** 114.82	50 **Sn** 118.71	51 **Sb** 121.75	52 **Te** 127.60	53 **I** 126.91	54 **Xe** 131.29
55 **Cs** 132.91	56 **Ba** 137.33	57 ***La** 138.91	72 **Hf** 178.49	73 **Ta** 180.95	74 **W** 183.85	75 **Re** 186.21	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.08	79 **Au** 196.97	80 **Hg** 200.59	81 **Tl** 204.38	82 **Pb** 207.2	83 **Bi** 208.98	84 **Po** (209)	85 **At** (210)	86 **Rn** (222)
87 **Fr** (223)	88 **Ra** 226.02	89 **†Ac** 227.03	104 **Rf** (261)	105 **Db** (262)	106 **Sg** (266)	107 **Bh** (264)	108 **Hs** (277)	109 **Mt** (268)	110 **Ds** (271)	111 **Rg** (272)							

*Lanthanide Series	58 **Ce** 140.12	59 **Pr** 140.91	60 **Nd** 144.24	61 **Pm** (145)	62 **Sm** 150.4	63 **Eu** 151.97	64 **Gd** 157.25	65 **Tb** 158.93	66 **Dy** 162.50	67 **Ho** 164.93	68 **Er** 167.26	69 **Tm** 168.93	70 **Yb** 173.04	71 **Lu** 174.97
†Actinide Series	90 **Th** 232.04	91 **Pa** 231.04	92 **U** 238.03	93 **Np** (237)	94 **Pu** (244)	95 **Am** (243)	96 **Cm** (247)	97 **Bk** (247)	98 **Cf** (251)	99 **Es** (252)	100 **Fm** (257)	101 **Md** (258)	102 **No** (259)	103 **Lr** (262)