SCIENCE PLANNER: WEEK OF 11.4.19

OBJECTIVES FOR THE WEEK:

Biology : Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project).

Chemistry: Chm.2.1.5 Explain the relationships between pressure, temperature, volume, and quantity of gas both qualitative and quantitative.

DAILY AGENDA – (SUBJECT TO CHANGE) https://evansccca.weebly.com/

DAY	Honors Biology	Honors Chemistry
Mon 11.4	Hand in #1-20 FINISH DRAGON's WORLD!! HAND in Dragon's world questions **Finish #21-39** *HW= Gel Electrophoresis: 3 scenerios!!	Hand in ice Lab and Specific heat problem -PARADIGM LAB: Specific heat of a metal. HW= READ 14.1 and 14.2, answer guided notes. (all under materials in schoology)
Tues 11.5	NOTES: Biotech *HW= get letter signed!! Pg 6 and 7 of notes, revisit take home practice test.	HW check -Finish paradigm Cp lab!!! GAS laws minilab: Charles' Law *HW= Finish LAB! Do first 3 of first 3... SHOW WORK!!
Wed 11.6	GO over HW Benchmark (daily grade) FINISH ALL notes EXTREME GENES! HW= ArcGIS practice, figure out as many things as you can.	GAS LAWS practice- Dalton's law and Ideal gas law. *HW= pg 23 and 24 ALL, show all work and units and pictures!!

Thurs 11.7	**My.ncedcloud.org** **Benchmark:Username= ID#** **PW= CCCAlions2019** ***TEST ID*** *ID: 3181698* Online Passcode *ZA2PU4* **Finish EXTREME Genes** **HW= finish take home test from last week (explain ALL), do corrections on benchmark, study for test!**	**Benchmark:Username= ID#** **PW= CCCAlions2019** ***TEST ID:*** *ID: 2511645* Online Passcode *CA3JU6RE4* **Fix the questions you got wrong** **HW= study for test**
Fri 11.8	**TEST** **HW= make and take a picture of a RARE red pigeon!** https://learn.genetics.utah.edu/content/pigeons/pigeonetics/	**TEST** **HW= complete Rxns,Equilibrium and LeChatellier modules on CK12.** **A short, 24 question multiple choice quiz is at the end. IF you complete it all, you will be exempt from Wednesday's quiz!**

WARM UP ACTIVITIES

MON	**Genetically, what species living today do the scientists think a dragon would be most closely related to?** **What is thermal equilibrium? How do you know thermal equilibrium is reached?**
TUES	**Explain why/why not genetic engineering is ethical in your opinion.** https://www.youtube.com/watch?v=yAud1iynheY

	Why is it important to know the temperature of your tap water BEFORE you put the metal in it?
WED	**Explain why the Human Genome project was so different and so important.** https://www.youtube.com/watch?v=AhsIF-cmoQQ https://www.youtube.com/watch?v=F5LzKupeHtw **A mole of Nitrogen gas at STP occupies a volume of 22.4L. What happens to the volume of this gas at the bottom of the Mariana Trench where the pressure is 15,750 psi and the temperature is 2°C?**
THU	**What questions did you get wrong on the benchmark? Fix them on the back of this sheet.** **What questions did you get wrong on the benchmark? Fix them on the back of this sheet.**
FRI	**What is a ligase and what does it do?** **What mass of nitrogen gas occupies a volume of 11.2L at 0.3 atm and -22°C?**

46. In the human kidney, urea from the blood is filtered through the glomerular membrane into a nephron. The movement of urea across this membrane occurs without an input of energy. Which factor is the MOST likely reason urea absorption does not require energy? A. a pH imbalance B. a pressure difference C. a temperature increase D. a concentration gradient

CHEM PARADIGM LAB: Name: _____
Objective: Determine the specific heat of an unknown metal.

Materials: Lab goggles (required at all times), 2 skewer sticks, four disks of an unknown metal, paperclip, tongs, hot plate, small beaker of boiling water, Styrofoam cup with lid, graduated cylinder to measure the top water, outer Styrofoam cup. Optional materials= string, pipette, coffee straw, paperclips, plastic fork, 2 bamboo skewers.

Procedure: **As a team, write your DETAILED steps here that could be followed by an 8th grader clearly.**

Data: **In this space, collect and label ALL data collected before the experiment, and after the experiment (at equilibrium). USE pictures.**

Analysis: **Use this space to clearly make ALL calculations. It would be a good Idea to make one section of your paper ALL about the heat gained by the tap water and then one section ALL about the heat lost by the metal.**
Your final analysis should be the calculation of the specific heat of the metal.

Conclusion: **Here is where you use your analysis answers to compare it to a chart of ALL the specific heats of different metals. If you get within 10% error, you may answer the bonus question on the board.**

CHEMISTRY WORKSHEET ANSWERS below:

Name ✓

LTON'S LAW OF RTIAL PRESSURES

n's Law says that the sum of the individual pressures of all the gases that make up a e is equal to the total pressure or: $P_t = P_1 + P_2 + P_3 + \dots$ The partial pressure of each equal to the mole fraction of each gas x total pressure.

$$P_t = P_1 + P_2 + P_3 + \dots \quad \text{or} \quad \frac{\text{moles gas}_1}{\text{total moles}} \times P_t = P_1$$

the following problems.

A 250. mL sample of oxygen is collected over water at 25° C and 760.0 torr pressure. What is the pressure of the dry gas alone? (Vapor pressure of water at 25° C = 23.8 torr)

736. torr

A 32.0 mL sample of hydrogen is collected over water at 20° C and 750.0 torr pressure. What is the volume of the dry gas at STP? (Vapor pressure of water at 20° C = 17.5 torr)

28.7 mL

A 54.0 mL sample of oxygen is collected over water at 23° C and 770.0 torr pressure. What is the volume of the dry gas at STP? (Vapor pressure of water at 23° C = 21.1 torr)

49.1 mL

A mixture of 2.00 moles of H_2, 3.00 moles of NH_3, 4.00 moles of CO_2, and 5.00 moles of N_2 exerts a total pressure of 800 torr. What is the partial pressure of each gas?

$H_2 = 114$ torr, $NH_3 = 171$ torr, $CO_2 = 229$ torr, $N_2 = 286$ torr

The partial pressure of F_2 in a mixture of gases where t 300. torr. What is the mole fraction of F_2?

0.395

IDEAL GAS LAW

Name

Use the Ideal Gas Law below to solve the following problems.

$PV = nRT$ where P = pressure in atmospheres
V = volume in liters
n = number of moles of gas
R = Universal Gas Constant .082 L•atm/mol•K
T = Kelvin temperature

1. How many moles of oxygen will occupy a volume of 2.5 liters at 1.2 atm and 25° C? 0.12 moles
2. What volume will 2.0 moles of nitrogen occupy at 720 torr and 20° C? 51 liters
3. What pressure will be exerted by 25 g of CO_2 at a temperature of 25° C and a volume of 500 mL? 28 atm
4. At what temperature will 5.0 g of Cl_2 exert a pressure of 900. torr at a volume of 750 mL? 154 K or −119°C
5. What is the density of NH_3 at 800 torr and 25° C? 0.73 g/L
6. If the density of a gas is 1.2 g/L at 745. torr and 20° C, what is its molecular mass? 29 g/mol
7. How many moles of nitrogen gas will occupy a volume of 347 mL at 6680 torr and 27° C? 0.124 moles
8. What volume will 454 grams (1 lb) of hydrogen occupy at 1.05 atm and 25° C? 5290 L
9. Find the number of grams of CO_2 that exert a pressure of 785 torrs at a volume of 32.6 L and a temperature of 32° C. 59.0 g
10. An elemental gas has a mass of 10.3 g. If the volume is 58.4 L and the pressure is 758 torrs at a temperature of 25° C, what is the gas? helium

BOYLE'S LAW

Name _____

Boyle's Law states that the volume of a gas varies inversely with its pressure if temperature is held constant. (If one goes up, the other goes down.) We use the formula:

$$P_1 \times V_1 = P_2 \times V_2$$

Solve the following problems (assuming constant temperature).

1. A sample of oxygen gas occupies a volume of 250. mL at 740. torr pressure. What volume will it occupy at 800. torr pressure?
   231 mL
2. A sample of carbon dioxide occupies a volume of 3.50 liters at 125 kPa pressure. What pressure would the gas exert if the volume was decreased to 2.00 liters?
   219 kPa
3. A 2.0 liter container of nitrogen had a pressure of 3.2 atm. What volume would be necessary to decrease the pressure to 1.0 atm?
   6.4 liters
4. Ammonia gas occupies a volume of 450. mL at a pressure of 720. mm Hg. What volume will it occupy at standard pressure?
   426 mL
5. A 175 mL sample of neon had its pressure changed from 75 kPa to 150 kPa. What is its new volume?
   88mL
6. A sample of hydrogen at 1.5 atm had its pressure decreased to 0.50 atm producing a new volume of 750 mL. What was its original volume?
   250 mL
7. Chlorine gas occupies a volume of 1.2 liters at 720 torr pressure. What volume will it occupy at 1 atm pressure?
   1.1 liters
8. Fluorine gas exerts a pressure of 900. torr. When the pressure is changed to 1.50 atm, its volume is 250. mL. What was the original volume?
   317 mL

ANSWER KEY

CHARLES' LAW

Name ✓

Charles' Law states that the volume of a gas varies directly with the Kelvin temperature, assuming that pressure is constant. We use the following formulas:

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \text{or} \quad V_1 \times T_2 = V_2 \times T_1$$

$$K = °C + 273$$

Solve the following problems assuming a constant pressure.

1. A sample of nitrogen occupies a volume of 250 mL at 25° C. What volume will it occupy at 95° C?

   310 mL

2. Oxygen gas is at a temperature of 40° C when it occupies a volume of 2.3 liters. To what temperature should it be raised to occupy a volume of 6.5 liters?

   880 K or 610° C

3. Hydrogen gas was cooled from 150° C to 50° C. Its new volume is 75 mL. What was its original volume?

   98 mL

4. Chlorine gas occupies a volume of 25 mL at 300 K. What volume will it occupy at 600 K?

   50. mL

5. A sample of neon gas at 50° C and a volume of 2.5 liters is cooled to 25° C. What is the new volume?

   2.3 L

6. Fluorine gas at 300 K occupies a volume of 500 mL. To what temperature should it be lowered to bring the volume to 300 mL?

   180 K or −93° C

7. Helium occupies a volume of 3.8 liters at −45° C. What volume will it occupy at 45° C?

   5.3 L

8. A sample of argon gas is cooled and its volume went from 380 mL to 250 mL. If its final temperature was −55° C, what was its original temperature?

   331K or 58° C

COMBINED GAS LAW

Name ✓

In practical terms, it is often difficult to hold any of the variables constant. When there is a change in pressure, volume and temperature, the combined gas law is used.

$$\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2} \quad \text{or} \quad P_1V_1T_2 = P_2V_2T_1$$

Complete the following chart.

	P_1	V_1	T_1	P_2	V_2	T_2
1	1.5 atm	3.0 L	20° C	2.5 atm	1.9 L	30° C
2	720 torr	256 mL	25° C	800 torr	250 mL	50° C
3	600 mmHg	2.5 L	22° C	760 mmHg	1.8 L	−4° C
4	1.2 atm	750 mL	0.0° C	2.0 atm	500 mL	25° C
5	95 kPa	4.0 L	22° C	101 kPa	8.0 L	471 K or 198° C
6	650. torr	275 mL	100° C	900. torr	225 mL	150° C
7	850 mmHg	1.5 mL	15° C	540 mmHg	2.5 L	30° C
8	125 kPa	125 mL	544 K 271° C	100 kPa	100 mL	75° C

Name _____

DALTON'S LAW OF PARTIAL PRESSURES

Dalton's Law says that the sum of the individual pressures of all the gases that make up a mixture is equal to the total pressure or : $P_t = P_1 + P_2 + P_3 + \ldots$ The partial pressure of each gas is equal to the mole fraction of each gas x total pressure.

$$P_t = P_1 + P_2 + P_3 + \ldots \quad \text{or} \quad \frac{\text{moles gas}_1}{\text{total moles}} \times P_t = P_1$$

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5. What is the density of NH_3 at 800 torr and 25° C? 0.73 g/L

6. If the density of a gas is 1.2 g/L at 745. torr and 20° C, what is its molecular mass?

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7. How many moles of nitrogen gas will occupy a volume of 347 mL at 6680 torr and 27° C? 0.124 moles

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10. An elemental gas has a mass of 10.3 g. If the volume is 58.4 L and the pressure is 758 torrs at a temperature of 25° C, what is the gas? helium

BIO Benchmark answers		CHEM benchmark answers	
1	B	1	B
2	B	2	D
3	C	3	D
4	C	4	B
5	D	5	C
6	D	6	A
7	D	7	A
8	C	8	A
9	A	9	D
10	D	10	C
11	C	11	A
12	B	12	D
13	B	13	A
14	B	14	C
15	A	15	B
16	D	16	C
17	A	17	C
18	C	18	D
19	C	19	C
20	C	20	D

On Friday's chem test:

Anything from benchmark, anything from calorimetry (Ice lab and Specific heat of a metal lab), anything from the gas laws.