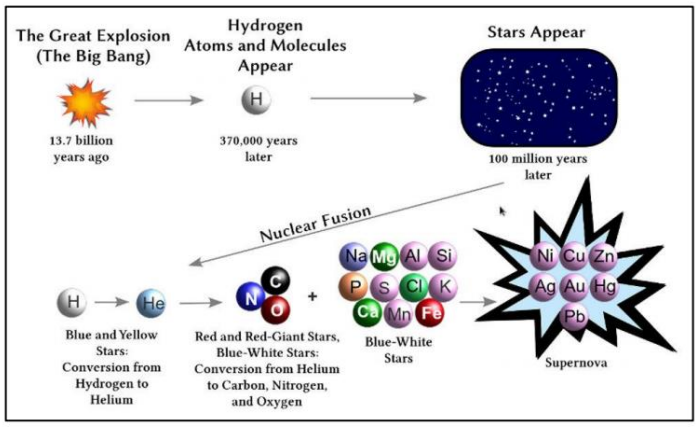
Week 7 Packet – Honors Chem

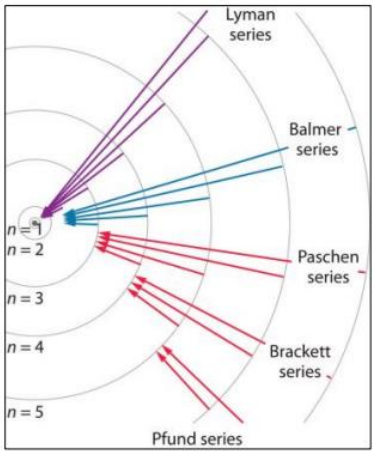
This is *<u>hopefully</u>* all the handouts we will use this week in Honors Chem. Due to the challenging logistics of this year, please offer grace if I miss a handout or if things change during the week. **<u>Please note</u>** – You do not *<u>have</u>* to print. I am just providing the option to make things easier for those who want to print. All of these pages are on the class website, always! www.mychemistryclass.net

***I will put the glue ins for the notes on the front and/or back of the packet cover page like this – since you don't need the cover page for anything you can always just cut these out and glue them in. Trying to save some paper for those of you who are printing! ☺**

N-14



N-14



Dougherty Valley HS Chemistry
Electrons – Extra Practice

Worksheet #6*

Name: **Period:** **Seat#:**

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

1) Write the electron configuration for each atom.
a) Na b) Pb c) Sr d) U e) N f) Ag g) Ti h) Ce i) Cl j)Hg

2) If each orbital can hold a maximum of two electrons, how many electrons can each of the following sets hold?
a) 2s b) 5p c) 4f d) 3d e) 4d

3) What is the shape of an s orbital?

4) How many s orbitals can there be in an energy level?

5) How many electrons can occupy an s orbital?

6) What is the shape of a p orbital?

7) How many p orbitals can there be in an energy level?

8) Which is the lowest energy level that can have a s orbital?

9) Which is the lowest energy level that can have a p orbital?

10) Is it possible for two electrons in the same atom to have exactly the same set of quantum numbers? Which rule tells you yes or no?

11) How many d orbitals can there be in an energy level?

12) How many d electrons can there be in an energy level?

13) Which is the lowest energy level having d orbitals?

14) How many f electrons can there be in an energy level?

15) Which is the lowest energy level having f orbitals?

16) How many f orbitals can there be in an energy level?

17) How many unpaired electrons are in each of the following atoms?
a) K b) C c) P d) Ag e) Xe

18) Why do the fourth and fifth rows of elements contain 18 elements, rather than 8 as do the second and third series?

19) Which atoms are represented by the following electron configurations?

a. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^2$
b. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^4$
c. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^5$
d. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6$
e. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{14} 5d^{10} 6p^6\ 7s^1$
f. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2 4\ d^{10}\ 5p^6\ 6s^2\ 4f^{14} 5d^{10} 6p^6\ 7s^2\ 5f^{14}\ 6d^8$
g. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{10}$
h. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{14} 5d^{10}\ 6p^4$
i. $1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^5$

20) What is wrong with the following configurations?

a. $1s^2 2s^2 2p^6 3s^2 3p^0$
b. $1s^2 2s^2 2p^5 3s^2$
c. $1s^2 2s^2 3s^2 3p^6$

21) What is atomic absorption?

22) What is atomic emission?

23) Describe how you can identify an element based on a line spectra

24) Describe how the elements were formed in the universe

25) How do we use absorption spectra to identify the chemical makeup of stars?

Dougherty Valley HS Chemistry
Electrons – Extra Practice

Full, Nobel, and Ion Configuration Practice

#	Element	Full Configuration	Nobel Gas Configuration
26	Sodium		
27	Iron		
28	Bromine		
29	Barium		
30	Tin		
31	Cobalt		
32	Silver		
33	Tellurium		
34	Radium		
35	Argon		

Configuration of Ions

#	Element	# e- lost or gained	Total # e- left after loss or gain	Element written with charge	Full Configuration after loss or gain
36	Ca				
37	F				
38	Se				
39	N				
40	I				

Dougherty Valley HS Chemistry
Electrons – Extra Practice

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41) Give two examples of:

a. An atom with a half-filled orbital set (subshell)
b. An atom with a completely filled outer shell (valence shell, or outer energy level)
c. An atom with its outer electrons occupying a half-filled subshell (orbital set) and a filled subshell (orbital set)

42) How many unpaired electrons are there in the ground state of each of the following atoms? (Hint: Orbital Diagram)

a. Ge
b. Se
c. V
d. Fe
e. Si
f. Mo
g. Ag

43) How many unpaired electrons are in the ground state of each of the following particles?

a. Cl^-
b. O^{2-}
c. Al^{3+}
d. Ca^{2+}
e. Na^+
f. P^{3-}
g. Xe

44) Arrange the following species into groups that have matching electron configurations (that is called “iso-electronic” when their configurations match)

F^-	Rb^+	Ti^{4+}	He
Sc^{3+}	O^{2-}	Ar	Se^{2-}
Be^{2+}	Na^+	B^{3+}	Y^{3+}

Dougherty Valley HS Chemistry
Flame Tests – Atomic Emission

Worksheet #7

Name: **Period:** **Seat#:**

Required Sections: (Refer to R-5 for guidelines and requirements. Make note of any specific changes given by your teacher in class)

Prelab: *All written in your lab notebook* - Materials, Reagent Table, Procedures, Data Table (should be pre-written in your lab notebook but do not rip out carbon copy pages of data table when turning in prelab)

Post-lab: - Post Lab Two Pager, Discussion Questions

Background

Have you ever seen a fireworks display? Where do all of the colors come from?

In this activity, you will investigate the colors of flame produced by solutions of metal salts.

A flame test is a procedure used to test qualitatively for the presence of certain metals in chemical compounds. When the compound to be studied is excited by heating it in a flame, the metal ions will begin to emit light. Based on the emission spectrum of the element, the compound will turn the flame a characteristic color. This technique of using certain chemical compounds to color flames is widely used in pyrotechnics to produce the range of colors seen in a firework display.

Certain metal ions will turn the flame very distinctive colors; these colors in turn can help identify the presence of a particular metal in a compound. However, some colors are produced by several different metals, making it hard to determine the exact ion or concentration of the ion in the compound. Some colors are very weak and are easily overpowered by stronger colors.

In this activity, solutions of ionic salts are sprayed into a Bunsen burner apparatus. You will be able to see the different colored flames produced. By comparing the color given off by an unknown with the known metal salts, the identity of the metal salt can be determined.

Materials

Bunsen Burner, matches or striker, various metal containing compounds (0.1 M concentration)

- Calcium Chloride
- Copper Chloride
- Barium Chloride
- Potassium Chloride
- Sodium Chloride
- Lithium Chloride
- Copper Sulfate
- Potassium Sulfate
- Sodium Sulfate
- Calcium Sulfate
- Strontium Nitrate

Procedure:

1) Light the Bunsen burner and open the air vent to obtain a non-luminous flame with two blue cones.
- Be sure to avoid a yellow flame.

2) Spray the first sample into the bottom of the apparatus.
- You can spray a few times until you get an intense color, but please do not be wasteful!
- Spray at a 45-degree angle upwards. Do NOT spray towards anyone!

3) Record the color and intensity (bright/faint) of the flame in the data table.

4) Repeat steps 2 & 3 with the other salt solutions. Be sure to record the colors as precisely as possible.

Data Table - *sample table. Yours needs a descriptive title, include all necessary rows for data collection, and to be drawn big enough and neat enough to write in!*

Chemical Formula of Metal Salt	Metal Atom Found in the Salt Compound	Flame Color and Intensity

Sample Table

Discussion questions on back!

Dougherty Valley HS Chemistry
Flame Tests – Atomic Emission

Discussion Questions: *- To be done AFTER the lab is done. Remember – do not copy the questions, but make sure to paraphrase them well enough that it will remind me what the question was about!*

1) What subatomic particles are found in the chemicals that were responsible for the production of colored light?
2) What does it mean when the electrons are "excited"?
3) How were the electrons "excited" in this part of the experiment – how did we physically do it?
4) Why do different chemicals emit different colors of light?
5) What is the relationship between energy, frequency, and wavelength? (Look it up! Research your answer!)
6) List the colors observed in this lab in order from the highest energy to the lowest energy. (You don't need to know the actual wavelengths to do this, we are just ranking them from high to low).
7) List the colors observed in this lab in order from the highest frequency to the lowest frequency. (You don't need to know the actual wavelengths to do this, we are just ranking them from high to low).
8) List the colors observed in this lab in order from the highest wavelength to the shortest wavelength. (You don't need to know the actual wavelengths to do this, we are just ranking them from high to low).
9) Based on the results of your experiment, what metal was found in the unknown(s)? Explain how you know this.
10) Explain why we did not see distinct lines (like on an emission spectrum) when the metal salts were burned. In other words, what ***didn't*** we do that would have taken the colored light we saw and turned it into a line spectra.
11) Do you think we can use the flame test to determine the identity of unknowns in a mixture? Why or why not?
12) Colorful light emissions are applicable to everyday life. Where else have you observed colorful light emissions?

Dougherty Valley HS Chemistry
Post Lab Two Pager

Worksheet #8

Name: **Period:** **Seat#:**

Lab Title	**Topic**
Purpose/Question/Problem/Goal/Hypothesis	
Key Vocab Terms	**Key Equations**
Key Concept Explained	
Important or Unique Lab Equipment, Set Up, or Named Lab Techniques	**Sig Figs Related to Lab Equipment**
Your Experimental Results	
Accepted Value/Results	**Percent Error Calculation**

Dougherty Valley HS Chemistry
Post Lab Two Pager

Sample Calculations for Each Type of Calculation Done	
Possible Lab Errors	**Mathematical Impact of Lab Errors on Results**
Example Test Question on this Topic	**Solved Example Test Question on this Topic**

Things to Turn In

- **Prelab –** Done in lab notebook, carbon papers turned in *before* the lab.
- **Post Lab** – Turned in after the lab. Due dates will be told to you in class.
  - **Page 1 – Post Lab Two Pager** – Done on this template.
  - **Page 2 – Data Tables** – Done in lab notebook, carbon papers turned in.
  - **Page 3 – Calculation Section –** Done in lab notebook, carbon papers turned in.
  - **Page 4 – Post Lab Questions** – Questions on lab sheet, answers done in lab notebook, carbon papers turned in.
  - **Page 5 – Formal Post Lab Section** - If asked for. Will be given specific instructions at the time.
- **Post Lab Quiz –** Will be done and turned in during class.