Chemistry 11

GAS LAWS IPAD PROJECT

1. Properties and Variables of gases
2. Kinetic Molecular Theory and its relationship to gases
3. Pressure and Volume relationships
4. Volume and Temperature Relationships
5. Pressure and Temperature Relationships
6. Combined Gas Law
7. Universal Gas Constant and Ideal gas law

Research/Learn: You will find a list of your learning objectives and information you need to cover for each section in the handout on your section of the material. I am here solely in the role of guidance. You need to learn as much as you can about the material you are assigned and organize it into a logical sequence. You need to find the information from at least 4 sources, one of which will be a textbook, which may be your primary source, and one of which must be a website. You will need to locate the website and the two other sources.

Presentation: You and your group need to organize, design, prepare, and present your material that you researched and learned by some means of presentation. I'd prefer you use KEYNOTE, but you aren't restricted to that presentation software. You may choose another form of presentation, as long as it is appropriate to the material and is pre-approved. I do expect it to be thorough and coherent. If there is a concept that you aren't comfortable with then you can't teach it to someone else. Come to me and let me try to clear it up for you. If you can't do any of the calculations you can't teach any of the calculations. The presentation format can be of your choosing, but should be an appropriate length and level of challenge. I expect examples, definitions, pictures, and charts if necessary to present the material. We are your students; you are the teachers…so teach us. (Don't forget that there may be some labs or demonstrations that you might find to help in your presentation, discuss with me if they are realistic)

Notes: You need to provide me with a set of notes that goes along with your presentation. I will make copies of them and return them to you. You will pass them out for students to fill in as you present the material. The type of handout is up to you, but something needs to be available for your students. How interactive you make the notes is up to you, but I don't expect it to be a completed set. Your students need to be involved in the presentation in some way.

Worksheet: You need to assess the learning of your students. To do that you will need to type up a worksheet for me to photocopy for your classmates. This worksheet should correlate directly to your lesson and can be in any format you choose (except word searches or mazes). It needs to be a relevant length (one page front) for the average student to do, and should be appropriately challenging. You as a group will also have to grade the worksheet, so you need to generate an answer key.

GOOD LUCK! AND HAVE FUN!

PROJECT OUTLINE:

1st Week (sometime in June) → work collaboratively on your project.

Day 1 -> project is assigned, designate roles for group members and begin your research

GROUPS OF 3 or 4 (total of 7 groups)

Roles must include, but are not limited to:

1. Facilitator
2. Recorder
3. Information gatherer
4. Presentation developer

Day 2->develop your worksheet

Day 3->develop your notes/presentation

Day 4 ->develop your notes/presentation

2nd Week (Sometime in June) → Presentations begin

Day 5-> Groups 1,2, 3+4 present. HOMEWORK: worksheets for groups 1-4(Jan 16)

Day 6-> Groups 5,6+7 present. HOMEWORK: worksheets for groups 4-7 (Jan 18)

Day 7-> All groups to assess their worksheets in class and hand to Mrs. Weiss by end of class. (Jan 19)

GROUP 1: PROPERTIES AND VARIABLES OF GASES

- There are several characteristics that are true of all gases, describe and explain them at length with the following to help you:
  - Gases have very low densities compared to liquids and solids, yet they do have a mass! How might you demonstrate that a collection of gases has mass? Why should it be obvious that gases have mass?
  - Gases are compressible. Explain this in layperson terminology.
  - Gases spread out to fill their containers. Can you prove this to the class?
  - Gases diffuse by nature. What does this mean and how do we know it?
  - Gases exert pressure. How?
- Gases are measured with 4 different variables: pressure, volume, temperature, and amount.
  - What is "amount" in terms of a gas and what variable is used?
  - How is volume of a gas measured, in what units, and what variable is used?
  - How is temperature always expressed (hint: Kelvin), how do we convert to Kelvin, and what variable is used?
  - The units of pressure I want you to introduce the class are atm, kPa, and mmHg. What is meant by standard pressure, and what are the standard pressures used for each unit above?
- What is atmospheric pressure in a nutshell? And what are the Standard conditions to measure gases?

GROUP 2: THE KINETIC MOLECULAR THEORY AND ITS RELATIONSHIP TO GAS PROPERTIES

The Kinetic Molecular Theory is the current model of choice to explain the characteristics of gases and why they behave the way they do. Kinetic of course means motion, and Molecular has to do with molecules, so we can assume the motion of gas molecules is involved. Your job is to find as much information as you can on the Kinetic Molecular Theory and how it is used to explain the behavior of gases, and to talk with each other and me until you understand it. Topics that should be addressed and explored are (not in any particular order):

- What is the Kinetic Molecular Theory and using the following as your guides you should, at the very least, be able to explain in detail the KMT to your peers?

1. What does this theory assume?
2. How does the KMT differ between solids, liquids, and gases?
3. How does the KMT explain phase changes?
4. How does the KMT explain the characteristic of gases that they spread out to fill their containers?
5. How does the KMT explain the pressure exerted by gases?
6. How does the KMT explain how gases diffuse?
7. Why does a gas exert a greater pressure when its particles are moving faster (think about force)?
8. How does the KMT explain how temperature affects the motion of gas molecules and what that does to pressure, and volume?

GROUP 3: VOLUME AND PRESSURE RELATIONSHIPS OF GASES

Studies of the behavior of gases played a major role in the development of physical sciences in the 17th and 18th centuries. Your job is to find as much information as you can on volume and temperature relationships and then to talk with each other until you understand it. Topics that should be addressed and explored are (not in any particular order):

Who studied the relationship between volume of a gas and its pressure?

If the credited scientist has a published experiment that defined his work, describe the experiment and its findings.

What variable must be held constant for this law to be accurate?

What happens to volume of a gas as pressure increases, etc?

What does a graph of pressure versus volume look like?

What is the mathematical connection between volume and pressure?

What is happens when you have a change in pressure or volume?

Demonstrate some example calculations using volume and pressure relationships.

How do we use volume and pressure connections today?

You have a fairly big piece of the pie so it's important to be thorough and clear. I will help you with whatever you might need. If you choose to do a lab, just let me know and we'll check to see if it is feasible. You'll look for labs that deal with volume and pressure of gases; I have a couple in mind if you want to look at them. Your worksheet should concentrate on the calculations for the two labs, and why they are important to be able to do. If you don't understand how to do the calculations, then you need to talk to me; if you can't do them then you can't teach them.

GROUP 4: VOLUME AND TEMPERATURE RELATIONSHIPS OF GASES

Studies of the behavior of gases played a major role in the development of physical sciences in the 7^{th} and 8^{th} centuries. Your job is to find as much information as you can on volume and temperature relationships and then to talk with each other until you understand it. Topics that should be addressed and explored are (not in any particular order):

- Who studied the relationship between volume of a gas and its temperature?
- If the credited scientist has a published experiment that defined his work, describe the experiment and its findings.
- What variable must be held constant for this law to be accurate?
- What happens to volume of a gas as temperature increases, etc?
- What does a graph of temperature versus volume look like?
- What is the mathematical connection between volume and temperature?
- What is happens when you have a change in temperature or volume?
- Demonstrate some example calculations using volume and temperature relationships.
- How do we use volume and temperature connections today?

GROUP 5: PRESSURE AND TEMPERATURE RELATIONSHIPS OF GASES

- Who studied the relationship between pressure of a gas and its temperature?
- If the credited scientist has a published experiment that defined his work, describe the experiment and its findings.
- What variable must be held constant for this law to be accurate?
- What happens to pressure of a gas as temperature increases or vice versa, etc?
- What does a graph of temperature versus pressure look like?
- What is the mathematical connection between pressure and temperature?
- What is happens when you have a change in temperature or pressure?
- Demonstrate some example calculations using pressure and temperature relationships.
- How do we use pressure and temperature connections today?

GROUP 6: COMBINED GAS LAW

- What is the expression that represents the combined gas law?
- How do we write the expression as a change in the conditions the gases are under?
- How can we manipulate the combined gas law to obtain our pressure-volume relationship?
- How can we manipulate the combined gas law to obtain volume-temperature relationship?
- How can we manipulate the combined gas law to obtain pressure-temperature relationship?
- What kinds of calculations are done with the combined gas law?
- Demonstrate several example calculations of the combined gas law.
- Describe briefly the relationship between volume and amount.
- How does increasing the amount of a gas affect volume and vice versa?

  Who gets credit for this relationship?

GROUP 7: IDEAL GAS LAW AND UNIVERSAL GAS CONSTANT

The ideal gas law is the most often used calculations in chemistry. It takes into account pressure, volume, temperature, and amount of gas and gives us a powerful mathematical relationship between them. You need to spend some time on the Universal Gas Constant and how to derive the different versions of it. You need to explore and talk with each other until you understand it. Topics that should be addressed and explored are (not in any particular order):

- What is the ideal or universal gas constant?
- What variables are involved as units in the universal (ideal) gas constant?
- How is this constant derived?
- There are several versions of the universal gas constant, derive the different versions for the three different standard pressure units (atm, mmHg, and kPa).
- State the ideal gas law.
- Using the ideal gas law, calculate the molar mass or density of a gas.
- Demonstrate several example calculations where you use the ideal gas law to solve for a variety of variables.
- Why is it called the IDEAL gas law?

Topic of presentation: Group # ( )_____

Your Name: _____

EVALUATION OF GROUP PARTICIPATION

Circle the number in the rating chart that best fits how you feel. 5 is good 1 is bad.

1) How would you rate your group's effort to cooperate with each other?

1 2 3 4 5

2) How would you rate your group's effort to do their best work?

1 2 3 4 5

3) How would you rate your group's effort to participate as much as possible?

1 2 3 4 5

4) If you were to give a grade to each of your group members for their effort on this project, what would it be out of 5 possible points?

group member : _____ grade: _____/5

group member : _____ grade: _____/5

group member : _____ grade: _____/5

5) If you were to give yourself a grade for your effort on this project, what would it be out of 5 possible points?

grade: _____/5

Gas Laws Project Rubric

Name: _____ Teacher: Weiss

Date of Presentation: _____ Title of Work: _____

	Criteria				Points
	1	2	3	4	
Organization (4 pts)	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because students jump around.	Students present information in logical sequence which audience can follow.	Students present information in logical, interesting sequence which audience can follow.	____
Content Knowledge (4 pts)	Students do not have grasp of information; students don't have enough knowledge to teach the material.	Students are uncomfortable with information but what they do understand they can explain.	Students are at ease with content, but fail to elaborate.	Students demonstrate full knowledge (more than required) with explanations and elaboration.	____
Visuals (4 pts)	Students used no visuals.	Students occasionally used visuals that rarely support text and presentation.	Visuals related to text and presentation.	Students used visuals to reinforce screen text and presentation.	____
Mechanics (4 pts)	Presentation had four or more spelling errors and/or grammatical errors.	Presentation had three misspellings and/or grammatical errors.	Presentation has no more than two misspellings and/or grammatical errors.	Presentation has no misspellings or grammatical errors.	____
Delivery (4 pts)	Students mumble, incorrectly pronounce terms, and speak too quietly for students in the back of class to hear.	Students incorrectly pronounce terms. Audience members have difficulty hearing presentation.	Students' voices are clear. Students pronounce most words correctly.	Students used clear voices and correct, precise pronunciations of terms.	____
Group Participation (25 pts)	Students don't work well together and one or two people do all the work.	Students work well together, but one or two people do all of the work.	Students work well together, but don't share the work evenly.	Students work well together and participate as a solid team	From student evaluations
Worksheet (4 pts)	Worksheet is too easy and isn't a good reflection of material covered.	Worksheet is easy and lacks depth of material coverage.	Worksheet is appropriately challenging but lacks depth.	Worksheet is challenging and is appropriate to the material.	____
				Total---->	____ /49

Teacher Comments: