Accompanying Questions
Topic 11: Gases

Objective:

This is to provide guiding questions to help you comprehend the material we have covered in this section of the class. These questions or very similar questions have been answered within the video lecture and/or live class.

Instructions and Notes:

- Most of these questions/concepts are taken or derived from the chapters in the Chemistry: Atoms First 2e Online Textbook (OpenStax)
- Book sections covered: 8.1, 8.2

Submission:

Students do not submit this and it is not graded.

Helpful Tips:

- These questions or very similar questions may appear on the exams so I strongly recommend that you complete them.
- Download the lectures and rewatch the lectures.
- Pause the lectures and rewind them through concepts you don't fully understand.
- Go to tutoring in the ASTC or MESA, ask your classmates in our Discord room, watch YouTube Videos, come to office hours, etc.

In-Lecture Questions

Lecture 1 of 3

1. Why do we feel water pressure under the water but not air pressure in our everyday lives?
2. What is pressure? What is the equation for pressure? What is F?
3. What is the equation for force? What does "m" and "a" stand for?
4. Why would a human on ice skates create more pressure than an elephant?
5. How can atoms exert pressure even though they are so small?
6. About how much pressure are we experiencing at sea level in lbs/in^2 and atm?
7. Write down four (4) conversion rates for pressure.
8. What are the three (3) steps for conversions?
9. A typical barometric pressure in Kansas City is 740 torr. What is this pressure in atmospheres, in millimeters of mercury, in kilopascals, and in bar?

Lecture 2 of 3

10. How is pressure related to temperature? What is the equation that we use to calculate pressure and temperature relationships? (The one with the equals sign)
11. All temperatures for gas problems should be converted to what?

12. A sample of nitrogen, N_2, occupies 45.0 mL at 27 °C and 600 torr. What pressure will it have if cooled to –73 °C while the volume remains constant?
13. How is volume related to temperature? What is the equation that we use to calculate volume and temperature relationships?
14. A sample of oxygen, O_2, occupies 32.2 mL at 30 °C and 452 torr. What volume will it occupy at –70 °C and the same pressure?
15. What is the volume of a sample of ethane at 467 K and 1.1 atm if it occupies 405 mL at 298 K and 1.1 atm?
16. How is volume related to pressure? What is the equation that we use to calculate volume pressure relationships?
17. The sample of gas in Figure 8.13 has a volume of 30.0 mL at a pressure of 6.5 psi. Determine the volume of the gas at a pressure of 11.0 psi, using: (a) the P-V graph in Figure 8.13 (b) the 1/P vs. V graph in Figure 8.13 (c) the Boyle's law equation (d) Comment on the likely accuracy of each method.
18. How is moles related to volume? What is the equation that we use to calculate moles and volume relationships?
19. A 12.8 L volume of gas contains 0.000498 moles of oxygen gas. At constant temperature and pressure, what volume does 0.0000136 moles the gas fill?

Lecture 3 of 3

20. What equation can do all the same calculations in the "Gas Laws" subtopic? Write the equation.
21. For the Combined Gas Law, what do you do with the variables if they stay constant or are not mentioned in the problem?
22. A sample of ammonia is found to occupy 0.250 L under laboratory conditions of 27 °C and 0.850 atm. Find the volume of this sample at 0 °C and 1.00 atm.
23. Use the Combined Gas Law to answer this question: The sample of gas in Figure 8.13 has a volume of 30.0 mL at a pressure of 6.5 psi. Determine the volume of the gas at a pressure of 11.0 psi. Look back at question #17, which equation was easier to use and/or remember?
24. Use the Combined Gas Law to answer this question: A 12.8 L volume of gas contains 0.000498 moles of oxygen gas. At constant temperature and pressure, what volume does 0.0000136 moles the gas fill? Look back at question #19, which equation was easier to use and/or remember?
25. Write out the Ideal Gas Law and define/describe all of the variables/constants.
26. Write out the gas constant (R) including units.
27. What units do all of the variables need to be in to use the Ideal Gas Law.
28. Methane, CH_4, is being considered for use as an alternative automotive fuel to replace gasoline. One gallon of gasoline could be replaced by 655 g of CH_4. What is the volume of this much methane at 25 °C and 745 torr?
29. Calculate the pressure in bar of 2520 moles of hydrogen gas stored at 27 °C in the 180-L storage tank of a modern hydrogen-powered car.