

**Vasquez High School -- Chemistry -- S'14 Exam #3 -- Chapter 13 -- 100 points**

Write TRUE if the statement is true OR write the word(s) that substitute for the underlined word(s) that would make it true. Writing false only earns partial credit. Three points each.

- \_\_\_\_\_ 1) Consider a sample of oxygen collected over water. To get the pressure of just the oxygen, we would subtract the vapor pressure of the water. This is an example of Dalton's Law.
- \_\_\_\_\_ 2) The egg getting sucked into the flask was a clear demonstration of Boyle's Law.
- \_\_\_\_\_ 3) Standard temperature and pressure is 0 K and 1 atm.
- \_\_\_\_\_ 4) When doing gas stoichiometry, we are not normally asked for how many grams of gas are produced, but how many liters of gas are produced.
- \_\_\_\_\_ 5) The combined gas law with pressures remaining constant reduces to Charles' Law.

Short Answer/Fill-in. Be neat and complete. Three points each.

- 6) Consider the ideal gas law  $PV = nRT$ . What must the units of R be? \_\_\_\_\_
- 7) The molar volume of chlorine gas is \_\_\_\_\_.
- 8) Boyle's Law states that if the pressure of a gas is doubled, then the volume of it must be \_\_\_\_\_.
- 9) The formula for the kinetic energy of a particle indicates that if the energy of the particle is increased by a factor of four, then the speed of the particle \_\_\_\_\_ by a factor of \_\_\_\_\_.
- 10) Part of the kinetic theory states that the size of the particles is small compared to \_\_\_\_\_.
- \_\_\_\_\_.

Longer Answer. Be clear and neat and be sure to read what you wrote before turning it in. Five points each.

- 11) Describe how you can use the kinetic theory of gases to show how an increase in the temperature of a gas increases the pressure of that gas.

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- 12) Describe two reasons why the ideal gas law, as given in #6 above is not quite adequate. (2 points extra for stating Van der Waals' equation correctly).

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Calculation/Diagram Section. Write the formulas. Show your work. Write the units if needed. Seven points.

- 13) A sample of gas having a volume of 18.3 L has a pressure of 1.25 atm at 15 °C. How many moles of gas are present?
- 14) Consider the four gases, F<sub>2</sub>, Cl<sub>2</sub>, CO<sub>2</sub>, and NH<sub>3</sub>. Rank them from fastest to slowest, AND determine the ratio of the average speed of the fastest gas to the average speed of the slowest one.
- 15) A balloon containing 528 L of air has a pressure of 720 torr. If the volume is kept constant and the volume is reduced to 392 L, what will the new pressure be, in torr?
- 16) A sample of xenon hexafluoroplatinate gas, XePtF<sub>6</sub>, has a pressure of 860 mmHg at a temperature of 53 °C. Its vessel has a volume of 41.5 L. If we compress the gas to a volume of 29.2 L while reducing the temperature to 309 K, what will the new pressure be in mmHg?
- 17) Consider the gases F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, and I<sub>2</sub>. If all four gases had a partial pressure of 290 torr at 30.0 °C all contained within the same vessel, which one would have the greatest number of molecules present in the vessel?

18) A 42.5 g sample of oxygen gas is added to a 75.0 g sample of carbon dioxide gas in a 30.0 L container at 37 °C. Calculate the partial pressure of each gas and the total pressure of the mixture.

19) Draw both a working barometer and a working manometer with ALL appropriate labels.

20) Draw both the graphs of Boyle's Law and of Charles' Law with all axes labelled.



21) Recall the demonstration of the newspaper covering the meter stick. For four points, state how many pounds of air were on top of the newspaper if it measured 22" x 28".