Dougherty Valley HS Chemistry
Gas Laws – Extra Practice Up Through Gas Stoich

Worksheet #12*

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.

- **Show work for ANY math problem.**
- **Include ALL units.**
- **Some answers provided at the end of the question. The answers are underlined.**

1) What volume of oxygen gas at STP is needed to completely react with 10.0g of C_6H_6? *21.5 L*
$2C_6H_{6(l)} + 15O_{2(g)} \rightarrow 12CO_{2(g)} + 6H_2O_{(g)}$

2) What volume of PH_3 gas at 27.0°C and 753 mmHg is produced when 21.2 g of hydrogen gas react with excess phosphorus? *174 L*
$P_{4(s)} + 6H_{2(g)} \rightarrow 4PH_{3(g)}$

3) What volume of NH_3 is produced when 2.50 g of Mg_3N_2 reacts with excess water at STP? *1.11 L*
$Mg_3N_{2(s)} + 3H_2O_{(l)} \rightarrow 3MgO_{(s)} + 2NH_{3(g)}$

4) If 0.500 g of sodium reacts with excess water, what volume of hydrogen gas will be produced at 25.0°C and 765 mmHg? *0.26 L*
___ $Na_{(s)}$ + ___ $H_2O_{(l)} \rightarrow$ ___ $NaOH_{(aq)}$ + ___ $H_{2(g)}$

5) If 12.5 L of fluorine at STP reacts with excess aluminum chloride, what mass of aluminum fluoride will be produced? *31.2 g*
___ $AlCl_{3(aq)}$ + ___ $F_{2(g)} \rightarrow$ ___ $AlF_{3(aq)}$ + ___ $Cl_{2(g)}$

6) How many grams of H_2O do you need to produce 1 L of o_2 gas at STP? (use the decomposition equation of water to hydrogen and oxygen)? *1.6g*

7) Quicklime (CaO) is produced by the thermal decomposition of calcium carbonate ($CaCO_3$), Calculate the volume of CO_2 at STP produced from the decomposition of 152 g $CaCO_3$
$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

8) How many grams of Al do you need to make a 0.500 L of hydrogen gas using the following equation? You may assume STP conditions.
$2Al_{(s)} + 2OH^-_{(aq)} + 6H_2O_{(l)} \rightarrow 3H_{2(g)} + 2Al(OH)_{4\,(aq)}$

9) What volume of chlorine gas at 27.0 °C and 0.987atm is needed to completely react with 500.0 ml of nitrogen gas at 27.0°C and 770 mmHg.
____ $N_{2(g)}$ + ____ $Cl_{2(g)} \rightarrow$ ____ NCl_3

10) Convert the following temperatures to K
a. 104 °C *377 K* b. -3 °C *270 K*

11) Convert the following temperatures to C
a. 67 K *-206* C b. 1671 K *1398 C*

12) A sample of nitrogen gas has a volume of 478 cm^3 and a pressure of 104.1 kPa. What volume would the gas occupy at 88.2 kPa if the temperature remains constant? *564 cm^3*

13) 9.98 dm^3 of hydrogen gas is collected at 38.8 C. Find the volume the gas will occupy at -39.9 C if the pressure remains constant. *6.71 dm^3*

14) A sample of gas has a vol. of 215 cm^3 at 23.5 C and 84.6 kPa. What vol. will the gas occupy at STP? *165 cm^3*

~~15)~~ ~~At a certain temperature, molecules of methane gas, CH4 have an average velocity of 0.098 m/s. What is the average velocity of carbon dioxide molecules at this same temp? *0.059 m/s*~~

16) 495 cm^3 of oxygen gas and 877 cm^3 of nitrogen gas, both at 25.0 °C and 114.7 kPa, are injected into an evacuated 536 cm^3 flask. Find the total pressure in the flask, assuming the temp remains constant. *294 kPa*

17) A sample of gas is transferred from a 75 mL vessel to a 500.0 mL vessel. If the initial pressure of the gas is 145 atm and if the temp is held constant, what is the pressure of the gas sample in the 500.0 mL vessel? *21.8 atm*

18) A sample of gas occupies a volume of 450.0 mL at 740 mm Hg and 16°C. Determine the volume of this sample at 760 mm Hg and 37°C. *470 mL*

~~19)~~ ~~One mole of H_2S gas escapes from a container by effusion in 77 seconds. How long would it take one mole of NH_3 gas to escape from the same container? *54 sec*~~

20) Convert a pressure of 0.0248 mm Hg to the equivalent pressure in pascals (Pa). *3.31 Pa*

21) Air in a closed cylinder is heated from 25°C to 36°C. If the initial pressure is 3.80 atm, what is the final pressure? *3.94 atm*

22) A bubble of helium gas has a volume of 0.650 mL near the bottom of a large aquarium where the pressure is 1.54 atm and the temperature is 12°C. Determine the bubble's volume upon rising near the top where the pressure is 1.01 atm and 16°C. *1.00 mL*

23) At what temperature Celsius will 19.4 g of molecular oxygen, O2, exert a pressure of 1820 mm Hg in a 5.12 L cylinder? *-27 C*

24) A sample of N_2, is collected in a100 mL container at a pressure of 688 mm Hg and a temp of 565 °C. How many grams of nitrogen gas are present in this sample? *0.0368 g*

25) What is the pressure in mm Hg , of a gas mixture that contains 1g of H_2, and 8.0 g of Ar in a 3.0 L container at 27°C. *4332 mmHg*

26) To what temperature must 32.0 ft3 of a gas at 2°C be heated for it to occupy 1.00 x 10^2 ft^3 at the same pressure? *586 C*

27) What is pressure in atm of 2.48 moles of gas in a 250.0 mL container at 58°C? *270 atm*

28) Determine the molar mass of a gas that has a density of 2.18 g/L at 66°C and 720 mmHg. *(Hint: the number of moles of a substance is its mass/molecular mass and density is mass/volume.)* *64 g/mol*

29) Gases Crossword!

ACROSS

2 "Volumi uguali di gas diversi posti nelle stesse condizioni di pressione e di temperatura contengono lo stesso numero di molecole."

4 Number of grams in 3 moles of hydrogen gas.

5 0 mm Hg.

8 Number of covalent bonds in a molecule of hydrogen.

10 Pressure unit.

12 Thermoscopes were once used to measure this.

13 0°C, 1 atm.

16 "I have already called attention to certain philosophical experiments that are in progress ... relating to vacuum, designed not just to make a vacuum but to make an instrument which will exhibit changes in the atmosphere, which is sometimes heavier and denser and at other times lighter and thinner."

18 Number of atoms in a molecule of cyclopropane.

19 It's measured in teaspoons, bushels, quarts and hogsheads

DOWN

1 Weather forecasting tool.

3 On August 27, 1783 at the Champs de Mars in Paris he filled a balloon with gas that had been made by pouring 225 kg of sulfuric acid over half a ton of scrap iron. After a flight that lasted about 45 minutes, his balloon descended into a field close to the little village of Gonesse, where the local farmers attacked it with pickaxes and spades.

4 Self-contained underwater breathing apparatus.

6 Carbon monoxide can attach itself strongly to the oxygen-binding sites on this protein, making it unable to act as an oxygen-transporting molecule in blood.

7 It changes with altitude.

9 Has 5 valence electrons.

11 Liquid used by Boyle.

14 Disease treated with iron lung.

15 Gas with atoms that have completely filled outermost electron shells.

17 224 liters of helium contain this many moles of atoms at STP

The first three people from each period to come check their crossword puzzle and have it correct will get prizes! ☺