IDEAL GAS LAW

Name Key

Use the Ideal Gas Law below to solve the following problems.

PV = nRT where P = pressure in atmospheres
V = volume in liters
n = number of moles of gas
R = Universal Gas Constant
0.0821 L•atm/mol•K
T = Kelvin temperature

1. How many moles of oxygen will occupy a volume of 2.5 liters at 1.2 atm and 25° C?
.12 mols PV = nRT (1.2)(2.5) = n(.0821)(298) = .123 mols

2. What volume will 2.0 moles of nitrogen occupy at 720 torr and 20° C?
51 L PV = nRT (.95)(V) = (2)(.0821)(293) 760 .95 torr

3. What pressure will be exerted by 25 g of CO_2 at a temperature of 25° C and a volume of 500 mL? 28 atm .5L PV = nRT P(.5) = (.57)(.0821)(298) 25g CO2 | 1mol / 44g = .57 mols

4. At what temperature will 5.00 g of Cl_2 exert a pressure of 900. torr at a volume of 750 mL? PV = nRT (1.18)(.750) = (.071)(.0821)T 760 5.00g Cl2 | 1mol / 70g = .071

5. What is the density of NH_3 at 800 torr and 25° C? .739 g/L n = .043 mols x 17g / 1mol = PV = nRT (1.05)(1L) = ? (.0821) 760 298

6. If the density of a gas is 1.2 g/L at 745. torr and 20° C, what is its molecular mass?
29 g/mol n = .041 mols 1.2g / .041 mols = .98 atm 760 +273 293 K PV = nRT (.98)(1L) = ? (.0821) (293)

7. How many moles of nitrogen gas will occupy a volume of 347 mL at 6680 torr and 27° C? .124 mols PV = nRT (8.79)(.347) = n(.0821)(300) 1000 .347 L 760 8.79 atm +273 300K

8. What volume will 454 grams (1 lb) of hydrogen occupy at 1.05 atm and 25° C?
5290 L PV=nRT 454g | 1mol H_2 / 2g = 227 mols (1.05)(?) = (227)(.0821)(298) +273 298

9. Find the number of grams of CO_2 that exert a pressure of 785 torrs at a volume of 32.5 L and a temperature of 32° C. 59g n = 1.34 mols | 44g / 1 mol CO_2 +273 305 760 = 1.03 atm PV = nRT (1.03)(32.5) = n(.0821)(305)

10. An elemental gas has a mass of 10.3 g. If the volume is 58.4 L and the pressure is 758 torrs at a temperature of 2.5° C, what is the gas? 4.08 g/mol Helium 760 = .997 atm +273 275.5 PV = nRT (.997)(58.4) = ? (.0821) (275.5) 2.6 mols 10.3 / 2.6 = 4

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