South Pasadena • Chemistry

Name _____
Period ___ Date ___/___/___

12 • The Gas Laws

THE IDEAL GAS LAW

PV = nRT where
P = pressure in atmosphere
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 2.50 liters at 1.20 atm and 25 °C?

_____

2. What volume will 2.00 moles of nitrogen occupy at 720. torr and 20.°C?

_____

3. What pressure will be exerted by 25.0 g of CO_2 at temperature of 25 °C and a volume of 500. mL?

_____

4. At what temperature will 5.00 g of Cl_2 exert a pressure of 900. torr at a volume of 750. mL?

_____

5. What is the density of NH_3 at 800. torr and 25 °C? _____

6. If the density of a gas is 1.2 g/L at 745 torr and 20.°C, what is its molar mass?

_____

7. How many moles of nitrogen gas will occupy a volume of 347 mL at 6680 torr and 27 °C?

_____

8. What volume will 454 grams (1 lb) of hydrogen occupy at 1.05 atm and 25 °C?

_____

9. Find the number of grams of CO_2 that exert a pressure of 785 torr at a volume of 32.5 L and a temperature of 32 °C. _____

10. An elemental gas has a mass of 10.3 g. If the volume is 58.4 L and the pressure is 758 torr at a temperature of 2.5 °C, what is the gas? _____

DATE:

TOPIC:

1) $PV=nRT$ $(1.20\,atm)(2.50\,L)=n(.0821)(298\,K)$

$.123\,mol=n$

2) $PV=nRT$ $\frac{720\,torr}{760\,torr}\left|\frac{1\,atm}{}\right.=.947\,atm$

$(.947\,atm)V=(2.00\,mol)(.0821)(293\,K)$

$V=50.8\,L$

3) $PV=nRT$ $\frac{25.0\,g\,CO_2}{44.01\,g}\left|\frac{1\,mol\,CO_2}{}\right.=.568\,mol\,CO_2$

$P(.500\,L)=(.568\,mol)(.0821)(298\,K)$

$P=27.8\,atm$

4) $PV=nRT$ $\frac{5.00\,g\,Cl_2}{70.90\,g}\left|\frac{1\,mol}{}\right.=.0705\,mol$

$(1.18\,atm)(.750\,L)=(.0705\,mol)(.0821)(T)$

$153\,K=T$ $\frac{900\,torr}{760\,torr}\left|\frac{1\,atm}{}\right.=1.18\,atm$

5) later 6) later

7) $PV=nRT$ $\frac{6680\,torr}{760\,torr}\left|\frac{1\,atm}{}\right.=8.79\,atm$

$(8.79\,atm)(.347\,L)=n(.0821)(300.\,K)$

$.124\,mol=n$

8) $PV=nRT$ $\frac{454\,g}{2.02\,g\,H_2}\left|\frac{1\,mol}{}\right.=225\,mol\,H_2$

$(1.05\,atm)V=(225\,mol)(.0821)(298\,K)$

$V=5240\,L$

9) $PV=nRT$ $\frac{785\,torr}{760\,torr}\left|\frac{1\,atm}{}\right.=1.03\,atm$

$(1.03\,atm)(32.5\,L)=n(.0821)(305\,K)$

$1.34\,mol=n$ $\frac{1.34\,mol\,CO_2}{1\,mol\,CO_2}\left|\frac{44.01\,g}{}\right.=59.0\,g\,CO_2$

#10 $PV = nRT$

$\frac{758\,torr}{760\,torr} \mid \frac{1\,atm}{} = .997\,atm$

$(.997\,atm)(58.4\,L) = n(.0821)(275.5\,K)$

$2.57\,mol = n$

$\frac{10.3\,g}{2.57\,mol} = \boxed{4.00\,g/mol\ (He)}$