HW#2 p 352 MC 7, 9
p 354 Problums 27, 32
p 357 Read 78, 79, 80
p 454 MC 1, Concept 22

(9)

p 352 - Multiple Choice

7) Assumption didn't make w/ ideal gas law

a) Gas particles treated as objects w/ zero size
b) Particle do not collide inside container
X (c) Particles collide inelastically w/ walls
d) Particles obey Newton's laws

(2)

9) How did physicists know constant T & m $P \sim \frac{1}{V}$

✓ a) Experiment maintain gas + make P vs V
✓ b) use eqn for ideal gas + relationship for speed + T
(c) Both correct

p 354 – Problems

empty water bottle

27) $V = 1\,L$ $PV = nRT$ $n = \frac{PV}{RT}$

$n = ?$

$P = 1\,atm = 1 \times 10^5\,Pa$

$V = 1 \times 10^{-3}\,m^3$

$R = 8.31\,J/mol\,K$

$T = 293\,K$

$$n = \frac{(1 \times 10^5\,Pa)(1 \times 10^{-3}\,m^3)}{(8.31\,J/mol\,K)(293\,K)}$$

$$= .041\,mol$$

(2)

32) $P = 10^{-15}\,atm$ $PV = NkT$

$V = 1\,cm^3$

$N = \#\,molecules = ?$

$T = 273\,K$

$k = 1.38 \times 10^{-23}\,J/K$

$$\frac{N}{V} = \frac{P}{kT}$$

convert atm → Pa

$$= \frac{(10^{-15}\,atm)(1 \times 10^5\,Pa)}{(1.38 \times 10^{-23}\,J/K)(273\,K)}$$

$$= 2.65 \times 10^{10}\,\frac{molecules}{m^3}$$

convert $m^3 \rightarrow cm^3$

$$= 2.65 \times 10^{4}\,\frac{molecules}{cm^3}$$

p 357 - Reading

78) Volume Gamow bag

$1\,m^3 = 1000\,L$ ~~4~~ $.476\,m^3 \left(\frac{1000\,L}{1\,m^3}\right)$

$476\,L \sim 500\,L$ (d)

(3)

79) temp on 6450 m elevation

$T_K = T_C + 273$

$-20°C + 273 = 253K$

80) n. of gram. moles

elevation 4400 m

$n = \frac{PV}{RT}$

$n = \frac{(.58 \times 10^5\,N/m^2)(.476\,m^3)}{(8.31\,J/mol\,K)(253K)}$

$n = 13.1$ mol

p454 – Multiple Choice

1) Ideal gas separated by divider in 2 identical half size containers
Correct?

X a) Temp 1/2 previous
✓ (b) mass 1/2 original
X c) density 1/2 original
✓ (d) Thermal energy 1/2 original

(2)

– Concept

22) Two reasons blowing across hot soup lowers temp

- When you blow over the top of a bowl of hot soup, you increase evaporation + its cooling effect by removing the warm vapor that tends to condense and reduce the net evaporation

- As you blow, you also increase the rate of convective cooling, replacing the hot air near the surface of the soup w/ cooler air