10.1 Because a straw works by atmospheric pressure pushing a liquid from a region of higher pressure (the cup) to a region of lower pressure (your mouth), the decreased atmospheric pressure on Mar's would make drinking with a straw more difficult.

10.5 From Charle's law we know that temperature and volume are directly related. As such, if pressure remains constant, an increase in temperature causes an increase in volume, as represented in plot (a)

10.6 a) 12 b) 9 c) When these gases are allowed to freely mix, the atoms will be evenly distributed throughout the apparatus. As such. 4 blue and 3 red particles will occupy each container.

10.7 a) Red < Yellow < Blue

b) The total number of particles is 10 (2 red, 3 yellow, 5 blue).

$P_{red} = X \cdot P_t$ $P_{ylw} = X \cdot P_t$ $P_{blue} = X \cdot P_t$

$P_{red} = 2/10 \cdot 1.40atm$ $P_{ylw} = 3/10 \cdot 1.40atm$ $P_{blue} = 5/10 \cdot 1.40atm$

$P_{red} = 0.28$ atm $P_{ylw} = 0.42$ atm $P_{blue} = 0.70$ atm

10.13

Statement (c) is false. When gases mix, they don't dissolve. Instead, all the component gases in the mixture expand to fill the container, create a mixture that exists in all proportions regardless of the solubility of their liquids.

10.15 a $$P = \frac{\text{Force}}{\text{Area}} = \frac{130\ \text{lb}}{0.50\text{in}^2} = 260\text{psi}$$

10.23 (0.995 atm equals 75.6 cm Hg)

i) The gas pressure is less than atmosphere, 75.6cm - 52cm = 23.6cm

ii) Pressure is greater than atmosphere, 75.6cm + 67 cm = 142.6cm

iii) The pressure of the gas is the height, 10.3cm

10.49 Answer C is the best explanation for why a helium balloon rises in air. In accounts for helium's lower density based on lower molecular mass.

10.50 Answer B is correct as explained in the extension of the answer

10.53

$$PV = nRT$$

$$(0.976\text{atm})(0.354\text{L}) = n(0.08206)(372\text{K})$$

$$n = 0.0113 \text{ mol}$$

$$M = \frac{\text{mass}}{\text{mole}} = \frac{1.012 \text{ g}}{0.0113 \text{ mol}} = 89.6 \text{ g mol}^{-1}$$

10.59 $P_t = P_{gas} + P_{water}$

$738 \text{ torr} = x + 22.38 \text{ torr}$

$x = 716 \text{ torr}$

$$PV = nRT$$

$$(0.942\text{atm})(0.159\text{L}) = n(0.08206)(297\text{K})$$

$$n = 0.00615 \text{ mol } H_2$$

$$0.00615 \text{ mol } H_2 \left| \frac{1 \text{ mol Zn}}{1 \text{ mol } H_2} \right| \frac{65.4 \text{ g Zn}}{1 \text{ mol Zn}} = 0.402 \text{ g Zn}$$

10.61

a) When the valve is opened, the N_2 gas will occupy the entire 5.0 liter volume.

$$P_1V_1 = P_2V_2$$
$$1.0 \text{ atm} \cdot 2.0\text{L} = x \cdot 5.0\text{L}$$
$$x = 0.40 \text{ atm}$$

b) When the valve is opened, the O_2 gas will occupy the entire 5.0 liter volume.

$$P_1V_1 = P_2V_2$$
$$2.0 \text{ atm} \cdot 3.0\text{L} = x \cdot 5.0\text{L}$$
$$x = 1.20 \text{ atm}$$

c) $P_t = P_a + P_b$

$P_t = 0.40 \text{ atm} + 1.20 \text{ atm}$

$P_t = 1.60 \text{ atm}$

10.65 Avogadro's Principle states that equal volumes of a gas a equal temperatures and pressures will contain equal moles of particles. As such, at equal temperatures and pressures, mass ratios and moles ratios will be proportional, allowing us to use volumes in the place of moles to calculate a mole fraction.

$$X = \frac{Mol_{CO2}}{Mol_t} = \frac{Vol_{CO2}}{Vol_t} = \frac{407\ L}{10^6\ L} = 0.000407$$

10.67

$$\frac{5.50\ g\ CO_2 \mid 1\ mole\ CO_2}{\mid 44.0\ g\ CO_2} = 0.125\ mol\ CO_2$$

$$PV = nRT$$
$$x(10.0L) = (0.125\ mol)(0.08206)(297K)$$
$$P = 0.305\ atm$$

$$P_t = P_a + P_b$$
$$P_t = 0.305\ atm + 0.928\ atm$$
$$P_t = 1.233\ atm$$

10.71

$P_{oxygen} = X \cdot P_{total}$

$0.21 \text{ atm} = X \cdot 8.38 \text{ atm}$

$X = 0.025$