

+WS 5.9 review sheet page 2

7. In the "wet dry ice lab", we placed a sample of dry ice (which is actually solid CO₂, not water) in a plastic pipet and placed a metal Clamp around the stem, then squeezed down on this with a pair of pliers. This helped keep the pressure in the pipet as the dry ice sublimed, thus building up the pressure and taking the sample to the triple point, that unique temp. and pressure on the phase diagram where all three phases (Solid, liquid and gas) can exist together and where all three processes (melting, boiling and subliming) can occur at the same time.

8. Bobby wanted to boil some acetone (a liquid which is somewhat more volatile than water, meaning it evaporates more quickly). Remembering what he learned in Spanish chemistry class, that a liquid will always boil when its vapor pressure matches atmospheric pressure, Bobby decides there are two ways he can boil the liquid: he can increase the temp to 75 °C, at which point its vapor pressure would equal the standard 14.7 psi, or he could decrease the pressure to around 4.8 psi, at which point the liquid would boil.

temp (°C)	v.p. of acetone (psi)
25	4.8
50	7.4
75	14.7
100	27.9

room temp
room pressure

9. Suzi does the "Boyle's Law lab" and collects the data at right. Use any two data lines to determine what value she gets for atmospheric pressure.

(any 2 data lines will work)

$$(42.1 + x)(2.9) = (31.5 + x)(3.6)$$

$$122.09 + 2.9x = 113.4 + 3.6x$$

$$8.69 = 0.7x$$

$$12.4 = x$$

Ans: 12.4 psi

gauge press. (psi)	vol. (mL)
42.1	2.9
31.5	3.6
22.7	4.5
17.9	5.2

10. 13.5 g of CO₂, 13.5 g of Ne and 13.5 g of CH₄ are all placed together in a tank at 762 mmHg. What is the partial pressure of the CO₂, the Ne, and the CH₄?

$$13.5 \text{ g CO}_2 \times \frac{1 \text{ mol}}{44.0 \text{ g}} = 0.307 \text{ mol CO}_2$$

$$13.5 \text{ g Ne} \times \frac{1 \text{ mol}}{20.2 \text{ g}} = 0.668 \text{ mol Ne}$$

$$13.5 \text{ g CH}_4 \times \frac{1 \text{ mol}}{16.0 \text{ g}} = 0.844 \text{ mol CH}_4$$

ADD → 1.819 mol total

$$p_{\text{CO}_2} = \left(\frac{0.307}{1.819}\right)(762) = 129 \text{ mmHg}$$

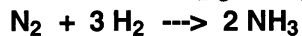
$$p_{\text{Ne}} = \left(\frac{0.668}{1.819}\right)(762) = 280 \text{ mmHg}$$

$$p_{\text{CH}_4} = \left(\frac{0.844}{1.819}\right)(762) = 354 \text{ mmHg}$$

Ans: 129 mmHg Ans: 280 mmHg Ans: 354 mmHg

11. Which gas in the tank above is moving the fastest?? CH₄ (it's the lightest)

12. What volume of H₂ gas at STP would be needed to produce 2.30 moles of NH₃?



$$2.30 \text{ mol NH}_3 \times \frac{3 \text{ mol H}_2}{2 \text{ mol NH}_3} = 3.45 \text{ mol H}_2$$

$$3.45 \text{ mol H}_2 \times \frac{22.4 \text{ L}}{1 \text{ mol}} =$$

Ans: 77.3 L

Ans (IRO+3): 4.8 12.6 14.7 15.7 75 77.3 129 216 280 354 atmospheric boil boil boiling chemistry clamp CH₄ CO₂ decrease dry force gas gas ice increase liquid liquid melting more O₂ phase pipet pliers point pressure pressure pressure pressure pressure quickly solid sublimed subliming temp. temp. triple vapor vapor Units (IRO): atm psi mmHg mmHg mmHg