

1. A small bubble rises from the bottom of a lake, where the temperature and pressure are 4°C and 3.0 atm, to the water's surface, where the temperature is 25°C and pressure is 0.95 atm. Calculate the final volume of the bubble if its initial volume was 2.1 mL.

$$P_1 V_1 T_2 = P_2 V_2 T_1$$

$$V_2 = \frac{P_1 V_1 T_2}{P_2 T_1}$$

$P_1 = 3.0 \text{ atm}$ $P_2 = 0.95 \text{ atm}$
 $V_1 = 2.1 \text{ mL}$ $V_2 = ?$
 $T_1 = 4 + 273 = 277 \text{ K}$ $T_2 = 298 \text{ K}$

$$V_2 = \frac{(3.0 \text{ atm})(2.1 \text{ mL})(298 \text{ K})}{(0.95 \text{ atm})(277 \text{ K})}$$

$$V_2 = 7.13 \text{ mL} \Rightarrow \boxed{7.1 \text{ mL}}$$

2. Calculate the density, in g/L, of CO₂ gas at 27°C and 0.50 atm pressure.

$P = 0.50 \text{ atm}$
 $V = ?$
 $n = \text{use 1 mole (44.01 g)}$
 $R = 0.0821 \text{ L} \cdot \text{atm} / \text{mol} \cdot \text{K}$
 $T = 27 + 273 = 300 \text{ K}$

$$PV = nRT$$

$$V = \frac{(1 \text{ mol})(0.0821 \text{ L} \cdot \text{atm})(300 \text{ K})}{(0.50 \text{ atm})} = 49.26 \text{ L}$$

$$D = \frac{44.01 \text{ g}}{49.26 \text{ L}} = \boxed{0.89 \text{ g/L}}$$

3. Calculate the volume occupied by 35.2 g of methane gas (CH₄) at 25°C and 1.0 atm. R = 0.0821 L·atm/K·mol.

$n = \frac{35.2 \text{ g}}{16.042 \text{ g/mol}} = 2.194 \text{ mol}$
 $P = 1.0 \text{ atm}$
 $V = ?$
 $T = 298 \text{ K}$

$$PV = nRT$$

$$V = \frac{nRT}{P}$$

$$V = \frac{2.194 \text{ mol} \cdot 0.0821 \text{ L} \cdot \text{atm} \cdot 298 \text{ K}}{1.0 \text{ atm}}$$

$$V = 53.7 = \boxed{54 \text{ L}}$$

4. If 30.0 L of oxygen are cooled from 200°C to 1°C at constant pressure, what is the new volume of oxygen?

~~$$P_1 V_1 T_2 = P_2 V_2 T_1$$~~

$$(30.0 \text{ L})(274 \text{ K}) = V_2 (473 \text{ K})$$

$$V_2 = 17.4 \text{ L}$$

5. Determine the molar mass of Freon-11 gas if a sample weighing 0.597 g occupies 100 cm³ at 95°C, and 1,000 mmHg.

molar mass = g/mol Have
 $P = 1000 \text{ torr}$
 $V = 100 \text{ cm}^3 = 0.100 \text{ L}$
 $n = ?$
 $R = \frac{62.4 \text{ L} \cdot \text{torr}}{\text{mol} \cdot \text{K}}$
 $T = 368 \text{ K}$

$$PV = nRT$$

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

$$n = \frac{(1000 \text{ torr})(0.100 \text{ L})}{62.4 \text{ L} \cdot \text{torr} (368 \text{ K})}$$

$$n = 0.00435 \text{ mol}$$

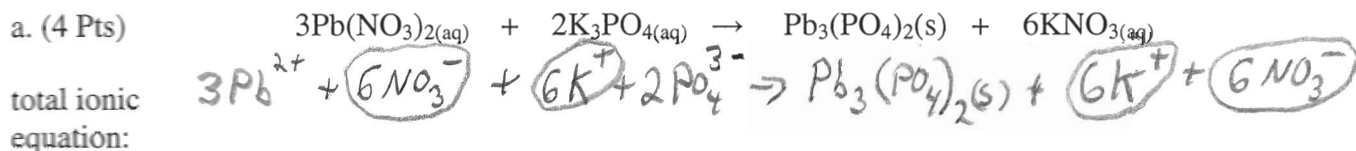
then: $\frac{0.597 \text{ g}}{0.00435 \text{ mol}} = \boxed{137 \text{ g/mol}}$

1. (5 Pts) Circle all of the weak acids in the table below:

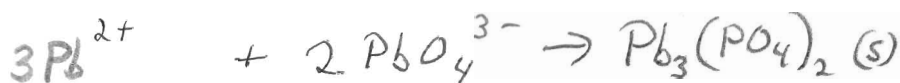
HNO ₃ (aq)	<u>HCH₃COO</u> (aq)	<u>HNO₂</u> (aq)	HCl(aq)	HClO ₄ (aq)
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2. Provide the total ionic equation and the net ionic equation for each of the following: (be careful with weak acids)

a. (4 Pts)



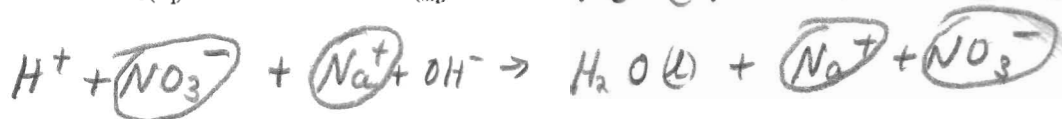
net ionic equation:



b. (5 Pts)



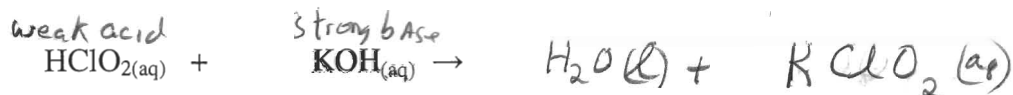
total ionic equation:



net ionic equation:



c. (5 Pts)



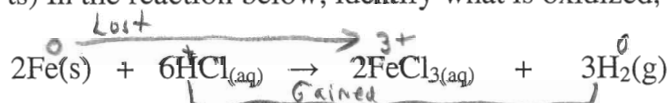
total ionic equation:



net ionic equation:



3. (4 Pts) In the reaction below, identify what is oxidized, what is reduced



Fe is oxidized H⁺ is reduced

HCl is the oxidizing agent Fe is the reducing agent

4. (2 Pts) Determine the charge of carbon in Na₂C₂O₄.

$$\frac{2(+1)}{\text{Na}} + \frac{2x}{\text{C}} + \frac{4(-2)}{\text{O}} = 0 \quad x = \textcircled{3+}$$

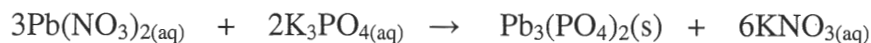
CHM151 Quiz 4b 25 Pts Spring 2008 Name: Key

1. (5 Pts) Circle all of the weak acids in the table below:

<u>HNO₂(aq)</u>	<u>HCH₃COO(aq)</u>	HNO ₃ (aq)	HCl(aq)	HClO ₄ (aq)
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2. Provide the total ionic equation and the net ionic equation for each of the following: (be careful with weak acids)

a. (4 Pts)



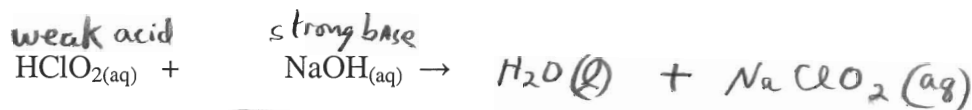
total ionic equation:



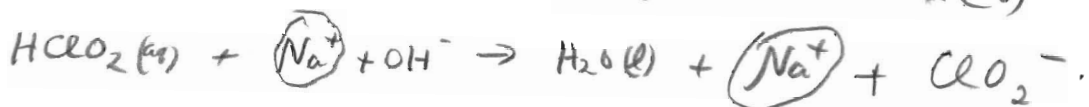
net ionic equation:



b. (5 Pts)



total ionic equation:



net ionic equation:



c. (5 Pts)



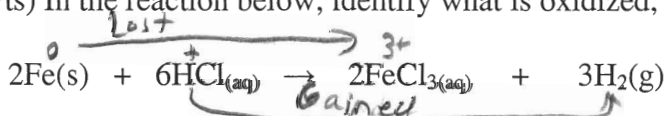
total ionic equation:



net ionic equation:



3. (4 Pts) In the reaction below, identify what is oxidized, what is reduced



H⁺ is reduced Fe is oxidized

Fe is the reducing agent HCl is the oxidizing agent

4. (2 Pts) Determine the charge of Mn in KMnO₄

$$\frac{+1}{\text{K}} + \frac{x}{\text{Mn}} + \frac{4(-2)}{\text{O}} = \frac{0}{\text{overall}}$$

$$\textcircled{x = 7+}$$