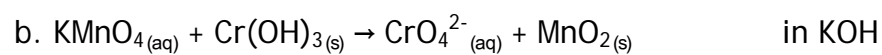
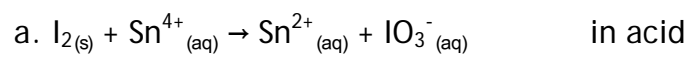
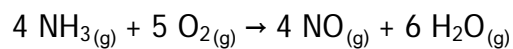


1. **Balance** the following oxidation reduction equations and, where possible, **write the complete chemical equation**. Include phase labels in your final answers. No partial credit for these. The equations are either balanced or they are not.



2. Zinc metal reacts with excess Perchloric acid in a single replacement reaction. The gas produced is collected over water in a setup similar to that used in the textbook. The temperature is 22.5°C and the external pressure is 746.8 mmHg. The level of the solution inside the tube is 15.7 cm above the level outside the tube. The total volume of gas collected is 36.72 mL. Other useful information is that the density of the solution is 1.05 g/mL and the density of mercury is 13.58 g/mL. The vapor pressure of water at 22°C is 19.8 mmHg and at 23°C it is 21.1 mmHg. Calculate the number of *grams of Zinc metal* used.

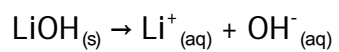
3. Use the data in the table provided to calculate the amount of energy, in kJ, produced or consumed when 100.00 grams of each of the reactants below is converted into products.



4. A gas has a root-mean-square speed of 473 m/s at 40.0°C.
a. Calculate the *molar mass of the gas in g/mol*.

b. Calculate the *rate of effusion relative to Helium gas*.

5. In a calorimetric experiment, 6.48 g of lithium hydroxide, LiOH, was dissolved in water. The temperature of the water rose from 25.00°C to 36.66°C. What is ΔH for the solution process?



The heat capacity of the calorimeter and its contents is 547 J/°C.

6. 26.87 L of Nitrogen gas at 683.4 mmHg and 35.9°C reacts with 75.93 L of Hydrogen gas at 702.9 mmHg and 55.1°C to produce ammonia gas. Calculate the *volume, in L, ammonia gas produced at STP*.

7. Calculate the following:

a. A flexible container is filled with Argon so that the volume of the container is 13.4 L at a pressure of 1.033 atm and 243.7 K. The volume is changed to 8.43 L and the temperature is changed to 157.2°C. What is the new *pressure in mmHg*?

b. 10.0 moles each of Neon and Krypton are placed into a 25.00 L container at 5.6°C. What is the *partial pressure* of each gas and the *total pressure* in the container? Express your answer in kPa.