

Worksheet 3

January 18, 2022

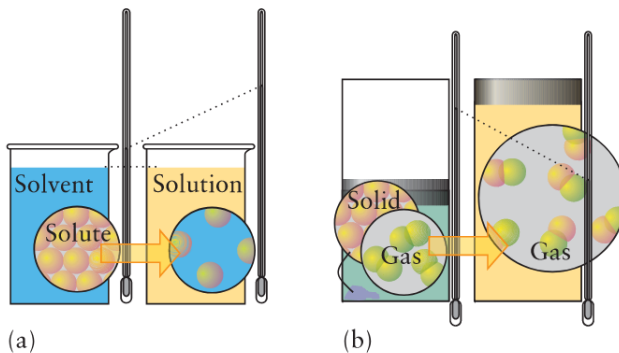
Weekly homework assignments are posted approximately one week prior to the due date. Collaborations are encouraged and students must report all collaborators in writing on each assignment. All external sources (websites, books) must be properly cited. Additional problems are listed at the end of each assignment. This week's assignment is due *Tuesday, Jan 25th at 10:00am*.

Real Gases

1. (2 pts) The pressure of a sample of hydrogen fluoride is lower than expected and, as the temperature is increased, rises more quickly than the ideal gas law predicts. Suggest an explanation in words and/or illustrations.

First Law of Thermodynamics

2. (2 pts) Below there are pictures showing a molecular view of a system undergoing a change. In each case, predict the signs of q and w for each process. Explain what is happening to the system.



Enthalpy ΔH

3. (4 pts) Carbon disulfide can be prepared from coke (an impure form of carbon) and elemental sulfur



- (a) How much heat is absorbed in the reaction of 1.25mol S_8 ?
- (b) Calculate the heat absorbed in the reaction of 197g of carbon with an excess of sulfur.
- (c) If the heat absorbed in the reaction was 415kJ, how much of CS_2 was produced?

4. (4 pts) Calculate the heat generated by a reaction mixture of 13.4L of SO_2 at 1.00atm and 273K and 15.0g of oxygen in the reaction



5. (4 pts) An experimental automobile burns hydrogen for fuel. At the beginning of a test drive, the rigid 30.0-L tank was filled with hydrogen at 16.0atm and 298K. At the end of the drive, the temperature of the tank was still 298K, but its pressure was 4.0atm.

- (a) How many moles of H_2 were burned during the drive?
- (b) How much heat, in kilojoules, was given off by the combustion of that amount of hydrogen?