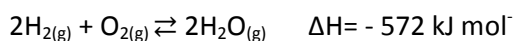


Friday Worksheet

Name:

Chemical equilibrium worksheet 3

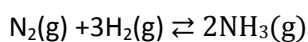
- 1) Hydrogen and oxygen gases are placed in a sealed vessel and allowed to react according to the equation below.



The reaction is allowed to reach equilibrium at which point one of the following changes takes place.

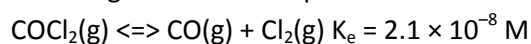
- a) Discuss how each change will impact on the equilibrium position and offer an explanation
- A catalyst is added.
 - The volume of the vessel is doubled.
 - Temperature of the vessel is increased.
 - Helium is added to double the pressure of the vessel.
 - Solid iron is added which reacts with the oxygen gas.
- b) What are the ideal conditions for maximum yield.
- c) How are the conditions for maximum yield at odds with the rate at which the reaction reaches equilibrium?
Compromises have to be made between yield and rate. What are they?

- 2) Nitrogen gas reacts with hydrogen gas to form ammonia according to the following equation.



The equilibrium constant for the above reaction at a given temperature is $8.32 \times 10^{-3} \text{ M}^{-2}$. Hydrogen and nitrogen gases were mixed together in a sealed 4 litre vessel and allowed to react. At equilibrium the concentration of ammonia is 0.234 mol/litre and the concentration of nitrogen is 0.843 mol/litre. What is the amount of hydrogen present, in grams, in the reaction vessel at this temperature?

- 3) In an experiment, 2.00 mol of pure phosgene, COCl_2 , is placed in a 2.00 L flask where the following reaction takes place.



- a) It can be assumed that, at equilibrium, the amount of unreacted COCl_2 is approximately equal to 2.0 mol. On the basis of the data provided, explain why this assumption is justified.
- b) What is the mass of Cl_2 gas present in the reaction vessel at this temperature?