

### Multiple Choice

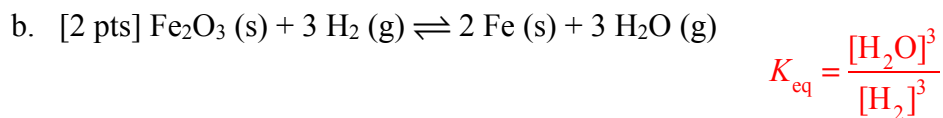
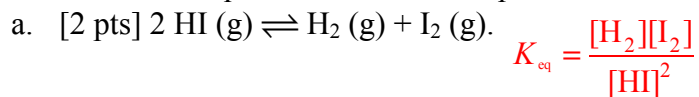
[2 pts each] *Identify the letter of the choice that best completes the statement or answers the question.*

- A 1. For a reaction at equilibrium,...
- A. the forward reaction rate is equal to the reverse reaction rate.
  - B. no reactions take place.
  - C. the forward reaction rate is lower than the reverse reaction rate.
  - D. the forward reaction rate is higher than the reverse reaction rate.
- B 2. For a reaction at equilibrium, the concentrations of the products...
- A. are always less than the concentrations of the reactants.
  - B. do not change.
  - C. are always equal to the concentrations of the reactants.
  - D. are always greater than the concentrations of the reactants.
- A 3. A very high value of  $K_{eq}$  ( $K_{eq} \gg 1$ ) indicates that...
- A. products are favored.
  - B. equilibrium has been reached.
  - C. equilibrium is reached quickly.
  - D. reactants are favored.

### Problems

Use the formulas on the information sheet to perform the following calculations.

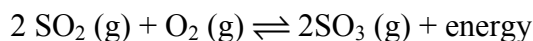
4. Determine the equilibrium constant *expressions* for the following reactions.



5. [2 pts] Given  $[\text{HI}] = 0.396 \text{ M}$ ,  $[\text{H}_2] = 0.052 \text{ M}$ , and  $[\text{I}_2] = 0.052 \text{ M}$ , calculate the value for  $K_{eq}$  for the reaction in part 14a. **Show your work and use the correct sig figs!**

$$K_{eq} = \frac{[\text{H}_2][\text{I}_2]}{[\text{HI}]^2} = \frac{[0.052][0.052]}{[0.396]^2} = .0172 = 1.72 \times 10^{-2}$$

6. [5 pts] Given the balanced reaction and a system in equilibrium,



in what direction (left, right, no change) will the system shift in response to the following stresses?

- a. Added more  $\text{SO}_2$  right
- b. Increasing the pressure right
- c. Heating the mixture left
- d. Adding a catalyst no change

Extra Credit (1 point)

- A 7. The best thing about learning about equilibrium is
- A. that nothing ever changes.
  - B. never having to worry about products!
  - C. it makes chemistry class really easy!
  - D. saying "Le Châtelier".