

## Answers to HW Grade 12: Chemical Equilibrium

1. It is dynamic because both the forward and reverse reactions continue to occur. For example, in a cluster of crystals of solute in contact with a saturated solution, the small crystals get smaller as the large crystals grow.
2. d
4. c
5. d
7. a) False  
b) False  
c) False  
d) True  
e) False  
f) True
8. The catalyst causes the reaction to reach equilibrium faster but it has no effect on the concentrations because it will speed up the forward and reverse reaction equally. A catalyst does not affect the value of  $K$ .
9. c
- 12 See back of book
13. a) adding HCl      b) adding  $O_2$       c) lowering the temp      d) increase the total pressure  
e) removing water      f) removing chlorine
14. a) Yes, there is a smaller number of moles of gas on the right.  
b) No, there are the same number of moles of gases on both side of the equation, so a pressure change will have no effect.  
c) Yes, there is a smaller number of moles of gas on the right.
15. a) The volume has no effect because there are the same number of moles of gas on both side of the equation.  
b) A larger volume will cause the reaction to go to the right to make more moles of gas.
16. a) exothermic      b) endothermic

17. See back of book.

31.  $K = 2.3 \times 10^3$

32.  $K = 5.4 \times 10^2$

41. See back of book.

42. Reaction shifts to right. Drawing B

43. See back of book.

44. a) Increase in volume favors the direction in which the number of moles of gas increases-the forward reaction. The percent dissociation is greater than 12.5%.

b) Favor forward reaction – greater than 12.5 % dissociation

c) No change

d) Neon does not change equilibrium conditions because pressure due to reactants and products will not change so equilibrium is not disturbed.

47. See back of book.

48. a) On top of Mt. Everest the oxygen pressure will be low enough to force the reaction to the left and deprive hemoglobin of oxygen. The cells get a much lower supply of oxygen.

b) In a hyperbaric chamber the oxygen pressure will be high enough to force oxygen onto more hemoglobin molecules and increase the oxygen supply to the cells.