

**AP MULTIPLE CHOICE QUESTIONS  
CH. 15, SET 3**

1999

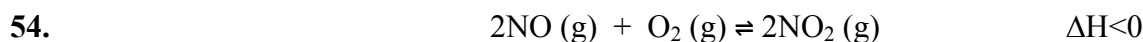


After the equilibrium represented above is established, some pure  $\text{O}_2(\text{g})$  is injected into the reaction vessel at constant temperature. After equilibrium is reestablished, which of the following has a lower value compared to its value at the original equilibrium?

- (A)  $K_{\text{eq}}$  for the reaction  
(B) The amount of  $\text{SO}_3(\text{g})$  in the reaction vessel.  
(C) The amount of  $\text{SO}_2(\text{g})$  in the reaction vessel.  
(D) The total pressure in the reaction vessel.  
(E) The amount of  $\text{O}_2(\text{g})$  in the reaction vessel.

43. A sample of 61.8 g of  $\text{H}_3\text{BO}_3$ , a weak acid, is dissolved in 1,000 g of water to make a 1.0 molal solution. Which of the following would be the best procedure to determine the molarity of the solution? (Assume no additional information is available)

- (A) Titration of the solution with standard acid.  
(B) Determination of the boiling point of the solution.  
(C) Measurement of the specific heat of the solution.  
(D) Measurement of the pH with a pH meter.  
(E) Measurement of the total volume of the solution.

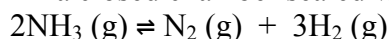


Which of the following changes alone would cause a decrease in the value of  $K_{\text{eq}}$  for the reaction represented above?

- (A) Decreasing the temperature.  
(B) Decreasing the volume of the reaction vessel.  
(C) Adding a catalyst.  
(D) Increasing the temperature.  
(E) Increasing the volume of the reaction vessel.

**Questions 14 – 17**

Three gases are in equilibrium in a closed chamber sealed with a piston. The equilibrium expression is:



- (A) The mole fraction of  $\text{N}_2$  increases.  
(B) The mole fraction of  $\text{N}_2$  remains the same.  
(C) Direction of change cannot be predicted with the given information.  
(D) The mole fraction of  $\text{N}_2$  decreases.  
(E) The mole fraction of  $\text{N}_2$  increases and then decreases.

Which of the above occurs in each of the following cases?

14. The piston is pushed into the chamber?  
15. More  $\text{H}_2$  is added as the piston is adjusted to maintain constant pressure.  
16. The chamber is heated while the piston is held steady.  
17. A catalyst is added while the piston is held steady.
22. A sample of hydrogen gas is in a closed container at 1.0 atmosphere pressure and  $27^\circ\text{C}$ . If the sample is heated to  $127^\circ\text{C}$ , the pressure will be approximately which of the following?  
(A) 4.0 atm      (B) 1.3 atm      (C) .75 atm      (D) .67 atm      (E) .25 atm

57. The equilibrium expression  $K_{\text{eq}} = [\text{CO}_2]$  applies to which of the reactions below?  
(A)  $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$   
(B)  $\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$   
(C)  $\text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightleftharpoons \text{CaCO}_3(\text{s})$   
(D)  $\text{CO}(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g})$   
(E)  $\text{CO}_2(\text{g}) \rightleftharpoons \text{C}(\text{s}) + \text{O}_2(\text{g})$