

## Quiz Two

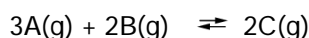
Name \_\_\_\_\_

Version #2

1. Hydrogen iodide, HI, is formed in an equilibrium reaction when gaseous hydrogen and iodine gas are heated together. If 20.0 g of hydrogen and 20.0 g of iodine are heated, forming 10.0 g of hydrogen iodide, what mass of hydrogen remains unreacted?

- A. Need to know the equilibrium constant in order to calculate the answer.
- B. 15.0 g hydrogen remains
- C. 19.9 g hydrogen remains
- D. 10.9 g hydrogen remains
- E. 10.0 g hydrogen remains

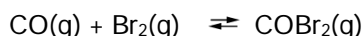
2. Compounds A, B, and C react according to the following equation.



At 100°C a mixture of these gases at equilibrium showed that  $[A] = 0.855 \text{ M}$ ,  $[B] = 1.23 \text{ M}$ , and  $[C] = 1.75 \text{ M}$ . What is the value of  $K_c$  for this reaction?

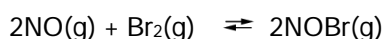
- A. 0.601
- B. 1.66
- C. > 10
- D. 0.309
- E. 3.24

3. A mixture of 0.500 mole of carbon monoxide and 0.400 mole of bromine was placed into a rigid 1.00-L container and the system was allowed to come to equilibrium. The equilibrium concentration of  $\text{COBr}_2$  was 0.233 M. What is the value of  $K_c$  for this reaction?



- A. 5.23
- B. 0.191
- C. 1.22
- D. 0.858
- E. 1.165

4. Nitric oxide and bromine were allowed to react in a sealed container. When equilibrium was reached  $P_{\text{NO}} = 0.526 \text{ atm}$ ,  $P_{\text{Br}_2} = 1.59 \text{ atm}$ , and  $P_{\text{NOBr}} = 7.68 \text{ atm}$ . Calculate  $K_p$  for the reaction.

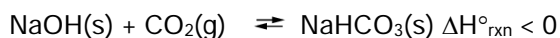


- A. 134
- B.  $7.45 \times 10^{-3}$
- C. 0.109
- D. 9.18
- E. 91.8

5. At 850°C, the equilibrium constant  $K_p$  for the reaction  $\text{C}(s) + \text{CO}_2(g) \rightleftharpoons 2\text{CO}(g)$  has a value of 10.7. If the total pressure in the system at equilibrium is 1.000 atm, what is the partial pressure of carbon monoxide?

- A. 0.915 atm
- B. 0.489 atm
- C. 0.362 atm
- D. 0.667 atm
- E. 0.921 atm

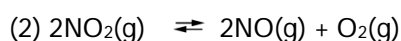
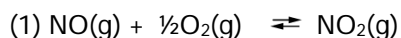
6. The following reaction is at equilibrium at a pressure of 1 atm, in a closed container.



Which, if any, of the following actions will decrease the concentration of  $\text{CO}_2$  gas present at equilibrium?

- A. adding more solid NaOH
- B. None of these choices is correct.
- C. increasing the volume of the container
- D. lowering the temperature
- E. adding  $\text{N}_2$  gas to double the pressure

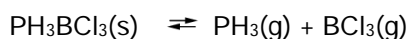
7. Consider the following two equilibria and their respective equilibrium constants:



Which one of the following is the correct relationship between the equilibrium constants  $K_1$  and  $K_2$ ?

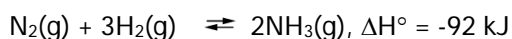
- A.  $K_2 = 2/K_1$                       B.  $K_2 = -K_1/2$                       C.  $K_2 = 1/(2K_1)$                       D.  $K_2 = (1/K_1)^2$                       E.  $K_2 = 1/(2K_1)^2$

8. When 0.152 mol of solid  $\text{PH}_3\text{BCl}_3$  is introduced into a 3.0 L container at a certain temperature,  $8.44 \times 10^{-3}$  mol of  $\text{PH}_3$  is present at equilibrium:



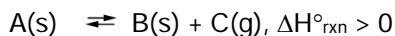
Construct a reaction table for the process, and use it to calculate  $K_c$  at this temperature.

9. The Haber process for ammonia synthesis is exothermic:



If the equilibrium constant  $K_c$  for this process at  $500.^\circ\text{C}$  is  $6.0 \times 10^{-2}$ , what is its value at  $300.^\circ\text{C}$ ?

10. Consider the equilibrium:



Predict and explain how or whether the following actions would affect this equilibrium.

- a. adding more solid A
- b. lowering the temperature
- c. increasing the pressure on the system by reducing its volume
- d. adding helium gas to increase the total pressure