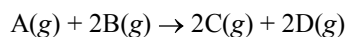


1. For the reaction



the following data was collected at constant temperature. Determine the correct rate law for this reaction.

Trial	Initial [A] (mol/L)	Initial [B] (mol/L)	Initial Rate (mol/(L·min))
1	0.125	0.200	7.25
2	0.375	0.200	21.75
3	0.250	0.400	14.50
4	0.375	0.400	21.75

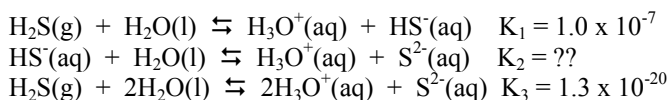
- A. Rate = $k[A][B]$
 B. Rate = $k[A]^2[B]$
 C. Rate = $k[A][B]^2$
 D. Rate = $k[A]$
 E. Rate = $k[A]^3$
2. The decomposition of SOCl_2 is first-order in SOCl_2 . If the half-life for the reaction is 4.1 hr, how long would it take for the concentration of SOCl_2 to drop from 0.36 M to 0.045 M?

- A. 0.52 hr
 B. 1.4 hr
 C. 12 hr
 D. 33 hr
 E. > 40 hr

3. Ammonia will react with oxygen in the presence of a copper catalyst to form nitrogen and water. From 164.5°C to 179.0°C, the rate constant increases by a factor of 4.27. What is the activation energy of this oxidation reaction?

- A. 24.5 kJ/mol
 B. 165 kJ/mol
 C. 242 kJ/mol
 D. 1630 kJ/mol
 E. $> 10^4$ kJ/mol

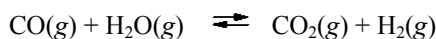
4. Hydrogen sulfide will react with water as shown in the following reactions.



What is the value of K_2 ?

- A. 1.3×10^{-27}
 B. 2.3×10^{-7}
 C. 1.3×10^{-13}
 D. 7.7×10^{12}
 E. 7.7×10^{26}

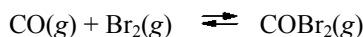
5. The equilibrium constant, K_p , for the reaction



at 986°C is 0.63. A rigid cylinder at that temperature contains 1.2 atm of carbon monoxide, 0.20 atm of water vapor, 0.30 atm of carbon dioxide, and 0.27 atm of hydrogen. Is the system at equilibrium?

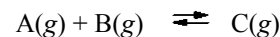
- A. Yes.
 B. No, the forward reaction must proceed to establish equilibrium.
 C. No, the reverse reaction must proceed to establish equilibrium.
 D. The volume of the container must be known before deciding.
 E. The starting concentrations of all substances must be known before deciding.

6. A mixture 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 COBr_2 was 0.233 M. What is the value of K_c for this reaction?



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

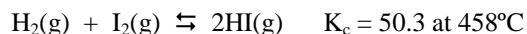
7. The equilibrium constant K_c for the reaction



is 0.76 at 150°C. If 0.800 mol of A is added to 0.600 mol of B in a 1.00-L container at 150°C, what will be the equilibrium concentration of C?

- A. 0.19 M
 B. 0.29 M
 C. 0.36 M
 D. 0.41 M
 E. 0.51 M

8. If 2.00 mol of H_2 and 1.00 mol of I_2 come to equilibrium at this temperature (458°C), how many moles of HI will be in the final mixture? (First, consider this question: Why is the volume of the container not needed for this problem?)



Answers:

1. D 5. B
 2. C 6. A
 3. B 7. A
 4. C 8. 1.87 mol HI