WEB QUIZ # 2

Review of kinetic theory:

1. What is the average kinetic energy of CO at 100 °C?

Answer: 6.65 kJ/mol

2. At 100°C, will the average kinetic energy of CO

   1. Greater than that of CO at 100°C.
   2. Equal to that of CO at 100°C.
   3. Less than that of CO at 100°C.

Answer: 2

3. What is the average speed of CO at 100°C?

Answer: 580m/sec

4. The "rule of thumb" is that at about room temperature, say 300K, if the temperature is
raised by 10°C, the rate of a reaction is doubled. What value of activation energy is
assumed in this "rule of thumb"?

Answer:

5. At 500.0 K, one mole of gaseous ONCl is placed in a one-liter container. At
equilibrium it is 9.0% dissociated according to the equation shown here:

   \[ 2\text{ONCl} \rightarrow 2\text{NO} + \text{Cl}_2 \]

Determine the equilibrium constant.

   a. 4.4 x 10^{-4} \text{ L/mol}
   b. 2.2 x 10^2 \text{ L/mol}
   c. 1.1 x 10^2 \text{ L/mol}
   d. 2.2 x 10^{-4} \text{ L/mol}
   e. 9.1 x 10^{-1} \text{ L/mol}

Answer: a

6. Consider the following system at equilibrium:
\[
\text{N}_2 (g) + 3\text{H}_2 (g) \times 2\text{NH}_3 (g) + 92.94 \text{ kJ}
\]

Which of the following changes will shift the equilibrium to the right?

I. increasing the temperature
II. decreasing the temperature
III. increasing the volume
IV. decreasing the volume
V. removing some \(\text{NH}_3\)
VI. adding some \(\text{NH}_3\)
VII. removing some \(\text{N}_2\)
VIII. adding some \(\text{N}_2\)

a. I, IV, VI, VII
b. II, III, V, VIII
c. I, VI, VIII
d. I, III, V, VII
e. II, IV, V, VIII

Answer: e

7. At -80°C, \(K\) for the reaction

\[
\text{N}_2\text{O}_4(g) \rightleftharpoons 2\text{NO}_2(g)
\]

is \(4.66 \times 10^{-8}\). We introduce 0.050 mole of \(\text{N}_2\text{O}_4\) into a 1.0-L vessel at -80°C and let equilibrium be established. The total pressure in the system at equilibrium will be:

a. 0.23 atm
b. 0.79 atm
c. 1.3 atm
d. 2.3 atm
e. none of these
Answer: b

8. At 500° C the equilibrium constant (K) for the reaction
   \[ \text{H}_2 (g) + \text{I}_2 \rightleftharpoons 2\text{HI} (g) \]

is 45.0. If 0.300 moles of H₂ and 0.200 moles of I₂ are placed into a 10.0-liter container and allowed to react at this temperature, what is the HI concentration (moles/liter) at equilibrium?

Ans. __________________

Answer: 0.0355 M