– Equilibrium Constants

Choose the correct EQUILIBRIUM EXPRESSIONS for the following EQUATIONS:
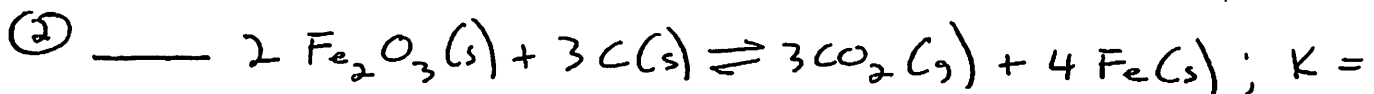
① ____ $H_2(g) + Cl_2(g) \rightleftharpoons 2 HCl(g)$; K =
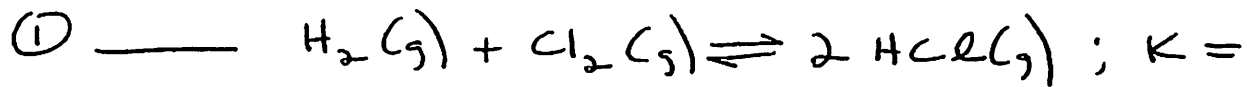
A) $\dfrac{[HCl]}{[H_2]^2[Cl_2]}$ B) $\dfrac{[HCl]^2}{[H_2][Cl_2]}$ c) $\dfrac{[H_2][Cl_2]}{[HCl]^2}$

② ____ $2 Fe_2O_3(s) + 3C(s) \rightleftharpoons 3CO_2(g) + 4Fe(s)$; K =

A) $\dfrac{[Fe]^4[CO_2]^3}{[Fe_2]^2[O_3]^2}$ B) $\dfrac{[Fe]^4[CO_2]^3}{[Fe_2O_3]^2[C]^3}$ c) $[CO_2]^3$ D) $\dfrac{1}{[CO_2]^3}$

③ ____ $COCl_2(g) \rightleftharpoons CO(g) + Cl_2(g)$;   K =
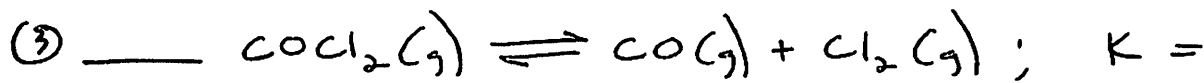
A) $\dfrac{1}{[COCl_2]}$ B) $[COCl_2]$ c) $\dfrac{[Cl_2][CO]}{[COCl_2]}$ D) $\dfrac{[COCl_2]}{[Cl_2][CO]}$

④ ____ $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$;   K =
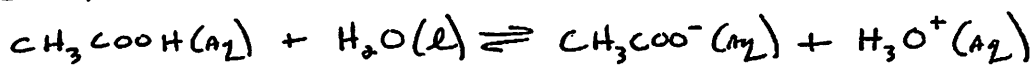
A) $\dfrac{[CaO][CO_2]}{[CaCO_3]}$ B) $\dfrac{[CaCO_3]}{[CaO][CO_2]}$ c) $[CO_2]$ D) $[CO_2][CaO]$

⑤ ____ When ACETIC ACID REACTS WITH WATER, these equilibrium concentrations are found:

$[CH_3COOH] = 0.20M$; $[CH_3COO^-] = 0.0019 M$; $[H_3O^+] = 0.0019M$

The equation for the reaction is:

$CH_3COOH(aq) + H_2O(l) \rightleftharpoons CH_3COO^-(aq) + H_3O^+(aq)$

What is the value of the equilibrium constant (K) ?
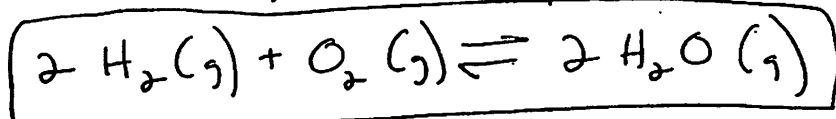
A) 1.8×10^{-3} B) 3.6×10^{-4} c) 1.8×10^{-5} D) 3.6×10^{-5}
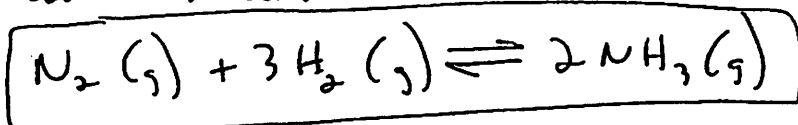
Chemistry — EQUILIBRIUM

① What is the equilibrium expression for the equation

$$2 H_2 (g) + O_2 (g) \rightleftharpoons 2 H_2O (g)$$

$K = \underline{\quad ? \quad}$

② Ammonia, a very important industrial chemical, is produced by the direct combination of the following elements under carefully controlled conditions:

$$N_2 (g) + 3 H_2 (g) \rightleftharpoons 2 NH_3 (g)$$

Suppose, in an experiment, that the reaction mixture is analyzed after equilibrium is reached and it is found, at the particular temperature, that:

$[NH_3] = 0.34 M$

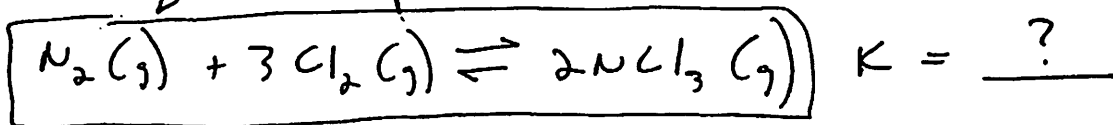$[H_2] = 2.1 \times 10^{-3} M$, and

$[N_2] = 4.9 \times 10^{-4} M$

Calculate the value of K at this temperature.

③ In your own words, describe what Le Chatelier's principle tells us about how we can change the position of a reaction system at equilibrium.

④ Write the equilibrium expression for the following reaction:

$$N_2 (g) + 3 Cl_2 (g) \rightleftharpoons 2 NCl_3 (g) \qquad K = \underline{\quad ? \quad}$$

⑤ Write the balanced chemical equation describing the dissolving of the following solids in water. Then, write the expression for K_{sp} for the process:

$$PbBr_2 (s) \rightleftharpoons$$