Question #: 1

What is the pH of a 0.20 M solution of hydrocyanic acid at 25°C?
The $K_a$ of HCN at 25°C is $4.9 \times 10^{-10}$.

A. 2.08  
B. 5.00  
C. 3.89  
D. 8.76

Question #: 2

Calculate the percent ionization of a 0.100 M solution of HC$_2$H$_3$O$_2$ ($K_a = 1.8 \times 10^{-5}$).

$$\text{percent ionization} = \frac{1}{\text{molality}} \times 100\%$$

Report your answer with three significant figures. Do NOT include units or a percent sign in your answer.

1. __________

Question #: 3

What are the two products of the ionization of the weak base, CH$_3$NH$_2$, in water?

CH$_3$NH$_2$ (aq) + H$_2$O (l) $\leftrightarrow$ _________ (aq) + _________ (aq)

A. CH$_3$NH$_3^+$  
B. CH$_3$NH$^-$  
C. OH$^-$  
D. H$_3$O$^+$
Question #: 4

What is the value of the equilibrium constant for the reaction shown below? The $K_a$ for acetic acid, HC$_2$H$_3$O$_2$, is $1.8 \times 10^{-5}$.

C$_2$H$_3$O$_2$$(aq) + $H_2$O$(l) \rightleftharpoons$HC$_2$H$_3$O$_2(aq) + OH^–(aq)

A. $1.8 \times 10^{-5}$  
B. $1.8 \times 10^{-19}$  
C. $5.6 \times 10^4$  
D. $5.6 \times 10^{-10}$

Question #: 5

What is the correct ordering, from weakest to strongest, of the conjugate bases of these acids?

HSeO$_4^–$ $K_a = 2.2 \times 10^{-2}$  
HIO $K_a = 2.3 \times 10^{-11}$  
HClO $K_a = 2.9 \times 10^{-8}$  
H$_2$S $K_a = 8.9 \times 10^{-8}$

A. SeO$_4^{2–}$ < IO$^–$ < ClO$^–$ < HS$^–$  
B. SeO$_4^{2–}$ < HS$^–$ < ClO$^–$ < IO$^–$  
C. IO$^–$ < ClO$^–$ < HS$^–$ < SeO$_4^{2–}$  
D. HS$^–$ < IO$^–$ < SeO$_4^{2–}$ < ClO$^–$

Question #: 6

A 0.100 M solution of NaClO has a pH of 10.27. What is $K_b$ for ClO$^–$?

A. $3.5 \times 10^{-7}$  
B. $2.6 \times 10^{-9}$  
C. $1.4 \times 10^{-5}$  
D. $9.2 \times 10^{-6}$
**Question #**: 7

Rank the following binary acids from **weakest** to **strongest**.

A. $\text{H}_2\text{Te} < \text{H}_2\text{Se} < \text{H}_2\text{S} < \text{H}_2\text{O}$  
B. $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$  
C. $\text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te} < \text{H}_2\text{O}$  
D. $\text{H}_2\text{O} < \text{H}_2\text{Te} < \text{H}_2\text{S} < \text{H}_2\text{Se}$

**Question #**: 8

Rank the following oxyacids in order from **weakest** to **strongest**:

A. $\text{H-O-I} < \text{H-O-Br} < \text{H-O-Cl} < \text{H-O-Cl}=\text{O}$  
B. $\text{H-O-Cl}=\text{O} < \text{H-O-Cl} < \text{H-O-Br} < \text{H-O-I}$  
C. $\text{H-O-Cl} < \text{H-O-Cl}=\text{O} < \text{H-O-Br} < \text{H-O-I}$  
D. $\text{H-O-I} < \text{H-O-Br} < \text{H-O-Cl}=\text{O} < \text{H-O-Cl}$

**Question #**: 9

Identify the **two** Lewis bases.

$6\text{Cl}^- + \text{Pt}^{4+} \rightarrow [\text{PtCl}_6]^{4+}$

$\text{Ag}^+ + 2\text{NH}_3 \rightarrow [\text{Ag(NH}_3)_2]^+$

A. $\text{Pt}^{4+}$  
B. $\text{Cl}^-$  
C. $\text{Ag}^+$  
D. $\text{NH}_3$
Question #: 10
Which **two** combinations will **not** act as a buffer?

A. 1.0 M Na$_2$S and 0.50 M H$_2$S  
B. 0.50 M C$_6$H$_5$NH$_2$ and 0.30 M C$_6$H$_5$NH$_3$Cl  
C. 0.010 M HF and 0.030 M NaF  
D. 1.0 M NaCl and 1.5 M HCl

---

Question #: 11
A 100.0 mL buffer solution contains 0.500 M HCHO$_2$ ($K_a = 1.8 \times 10^{-4}$) and 0.500 M NaCHO$_2$. What is the pH of the solution after the addition of 0.0100 mol of HCl?

A. 4.89  
B. 10.63  
C. 3.57  
D. 2.28

---

Question #: 12
Human blood contains a buffer system composed of 0.0012 M carbonic acid, H$_2$CO$_3$, and 0.024 M HCO$_3^-$. If the $K_a$ value for H$_2$CO$_3$ at body temperature is $7.9 \times 10^{-7}$, what is the pH of human blood?

A. 4.62  
B. 7.00  
C. 7.40  
D. 8.43
Question #: 13

Which solution is the most effective buffer?

A. 0.50 M nitrous acid (HNO₂) and 0.50 M sodium nitrite (NaNO₂)
B. 0.50 M nitrous acid (HNO₂) and 0.005 M sodium nitrite (NaNO₂)
C. 0.05 M nitrous acid (HNO₂) and 0.05 M sodium nitrite (NaNO₂)
D. 2.0 M hydrochloric acid (HCl) and 2.0 M sodium hydroxide (NaOH)

Question #: 14

What is the pH of the solution formed when 40.0 mL of 0.125 M HC₂H₃O₂ is titrated with 16.0 mL of 0.500 M KOH? The \( K_a \) for acetic acid is \( 1.8 \times 10^{-5} \).

Report your answer with two decimal places. Do NOT include units in your answer.

pH = _______

1. ________

Question #: 15

What is the pH of the solution formed after 25.0 mL of 0.500 M C₅H₅N is titrated with 5.0 mL of 0.500 M HBr?

\( K_b = 1.7 \times 10^{-9} \) for C₅H₅N

A. 5.83
B. 8.16
C. 4.63
D. 9.37
Fill in the blanks with A, B, C, or D to match the titration description with the appropriate titration curve.

1. Titration of a weak acid with a strong base.
2. Titration of a strong acid with a strong base.
3. Titration of a polyprotic acid with a strong base.
4. Titration of a weak base with a strong acid.

A. 

B. 
C.

D.

1. __________
2. __________
3. __________
4. __________
**Question #**: 17

Using the diagram below, describe the significance of the pH halfway to the equivalence point for the titration of a weak acid with a strong base.

![Diagram showing pH vs. volume of NaOH added](image)

A. At halfway to the equivalence point, pH = pK_a.
B. At halfway to the equivalence point, pH = pOH.
C. At halfway to the equivalence point, pH = 7.
D. At halfway to the equivalence point, pH = K_a.

---

**Question #**: 18

Methyl red, an indicator with a pK_a of 5.0, is red in its acid form and yellow in its basic form. What color will a solution appear if the [In^-]/[HIn] is 15?

A. red
B. yellow
C. orange
D. green
**Question #:** 19

Which equation shows the dissolution of the slightly soluble aluminum hydroxide?

A. \( \text{Al(OH)}_3(s) \leftrightarrow \text{Al}^{3+}(aq) + 3 \text{OH}^-(aq) \)
B. \( \text{Al(OH)}_3(s) + \text{H}_2\text{O}(l) \rightarrow [\text{Al(OH)}_4]^{-}(aq) + \text{H}^+(aq) \)
C. \( \text{Al}^{3+}(aq) + 3 \text{OH}^-(aq) \rightarrow \text{Al(OH)}_3(s) \)
D. \( \text{Al(OH)}_3(s) + 3 \text{H}_3\text{O}^+(aq) \leftrightarrow [\text{Al(H}_2\text{O)}_6]^{3+}(aq) \)

**Question #:** 20

What is the correct relationship between \( K_{sp} \) and molar solubility (S) for scandium fluoride, ScF\(_3\)?

\[ K_{sp} = \]

A. \( 27S^4 \)
B. \( S^2 \)
C. \( 3S^4 \)
D. \( 4S^3 \)

**Question #:** 21

Which compound has the **largest** molar solubility?

A. \( \text{BaSO}_4 \) \( K_{sp} = 1.07 \times 10^{-10} \)
B. \( \text{CaF}_2 \) \( K_{sp} = 1.46 \times 10^{-10} \)
C. \( \text{PbSO}_4 \) \( K_{sp} = 1.82 \times 10^{-8} \)
D. \( \text{Mg(OH)}_2 \) \( K_{sp} = 2.06 \times 10^{-13} \)
Question #: 22

Describe the solubility of PbBr\(_2\)(s) when added to a solution of NaBr(aq) compared to the solubility of PbBr\(_2\)(s) in pure water. The dissociation of PbBr\(_2\) is shown below.

\[ \text{PbBr}_2(s) \leftrightarrow \text{Pb}^{2+}(aq) + 2 \text{Br}^-(aq) \]

A. The solubility of PbBr\(_2\) is greater in the solution containing NaBr.
B. The solubility of PbBr\(_2\) is lower in the solution containing NaBr.
C. The solubility of PbBr\(_2\) is the same in each case.

Question #: 23

The solubility of which salt is \textit{increased} by a decrease in pH?

A. MgF\(_2\)
B. AgI
C. NaCl
D. KBr

Question #: 24

A pH-neutral solution containing 0.100 M Cu\(^{2+}\) and 0.150 M Ni\(^{2+}\) is slowly titrated with a sodium hydroxide solution. Assuming minimal volume changes, which solid precipitates first and what concentration of OH\(^-\) was required? The \(K_{sp}\) for Cu(OH)\(_2\) is \(2.2 \times 10^{-20}\) and for Ni(OH)\(_2\) is \(5.5 \times 10^{-16}\).

A. Cu(OH)\(_2\), \(4.7 \times 10^{-10}\) M
B. Cu(OH)\(_2\), \(6.1 \times 10^{-8}\) M
C. Ni(OH)\(_2\), \(4.7 \times 10^{-10}\) M
D. Ni(OH)\(_2\), \(6.1 \times 10^{-8}\) M
Solid $\text{Na}_2\text{CO}_3$ is slowly added to a solution that is 0.0100 M in $\text{Pb}^{2+}$ and 0.0100 M in $\text{Ag}^+$. What is the remaining concentration of $\text{Pb}^{2+}$ when $\text{Ag}^+$ begins to precipitate?

$\text{Ag}_2\text{CO}_3 \quad K_{sp} = 8.46 \times 10^{-12}$
$\text{PbCO}_3 \quad K_{sp} = 7.40 \times 10^{-14}$

A. $8.75 \times 10^{-7}$ M
B. $8.46 \times 10^{-12}$ M
C. $7.40 \times 10^{-14}$ M
D. $7.95 \times 10^{-5}$ M

Use the terms **coordination compound**, **ligand**, or **complex ion** to complete the following sentence.

Referring to the chemical formula, $K_4[\text{Fe(CN)}_6]$, $\text{CN}^-$ is a __1__, $\text{Fe(CN)}_6^{4-}$ is a __2__, and $K_4[\text{Fe(CN)}_6]$ is a __3__.

1. __________
2. __________
3. __________
**Question #27**

Determine the charge of Co in the coordination compound below.

![Coordination compound diagram]

A. 0  
B. +1  
C. +2  
D. +3  

**Question #28**

Which diagram represents the $d$ orbital electrons for Cr$^{2+}$ in an octahedral high-spin (weak-field) complex?

A. [Diagram of Cr$^{2+}$ orbitals]
A solution initially contains 0.020 M Cr(NO$_3$)$_3$ and 0.180 M NaOH. What concentration of Cr$^{3+}$(aq) remains when chromium(III) and hydroxide ions react to form the complex ion according to the equilibrium below?

Cr$^{3+}$(aq) + 4 OH$^-$ (aq) $\rightleftharpoons$ [Cr(OH)$_4$]$^{-}$ (aq)  \hspace{1cm} K_f = 8.0 \times 10^{29}$

A. $6.1 \times 10^{-30}$ M  
B. $4.2 \times 10^{-42}$ M  
C. $2.5 \times 10^{-28}$ M  
D. $8.0 \times 10^{-38}$ M
What is the equilibrium constant, \( K \), for
\[
\text{AgCl}(s) + 2 \text{NH}_3(aq) \rightleftharpoons \text{Ag(NH}_3)_2^+(aq) + \text{Cl}^-(aq)
\]
given \( K_{sp} = 1.8 \times 10^{-10} \) for AgCl
\( K_f = 1.7 \times 10^7 \) for \( \text{Ag(NH}_3)_2^+ \)

\[
K = \frac{1}{1}
\]

Report your answer with \textbf{two} significant figures. Do \textbf{NOT} include units in your answer. Use the format 2.2E2 or 2.2E-2 for numbers in scientific notation.

1. \underline{\hspace{2cm}}
What is the pH of a 0.20 M solution of hydrocyanic acid at 25°C?
The $K_a$ of HCN at 25°C is $4.9 \times 10^{-10}$.

A. 2.08
✓B. 5.00
C. 3.89
D. 8.76

Calculate the percent ionization of a 0.100 M solution of $\text{HC}_2\text{H}_3\text{O}_2$ ($K_a = 1.8 \times 10^{-5}$).

percent ionization = 1%
Report your answer with three significant figures. Do NOT include units or a percent sign in your answer.

1. 1.34

**Question #**: 3

What are the two products of the ionization of the weak base, CH₃NH₂, in water? 
\[ \text{CH}_3\text{NH}_2 (aq) + \text{H}_2\text{O} (l) \rightleftharpoons \_\_\_\_\_\_ (aq) + \_\_\_\_\_\_ (aq) \]

- A. CH₃NH₃⁺
- B. CH₃NH⁻
- ✓ C. OH⁻
- D. H₃O⁺

**Question #**: 4

What is the value of the equilibrium constant for the reaction shown below? The \( K_a \) for acetic acid, HC₂H₃O₂, is \( 1.8 \times 10^{-5} \). 
\[ \text{C}_2\text{H}_3\text{O}_2^- (aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{HC}_2\text{H}_3\text{O}_2(aq) + \text{OH}^- (aq) \]

- A. \( 1.8 \times 10^{-5} \)
- B. \( 1.8 \times 10^{-19} \)
- C. \( 5.6 \times 10^4 \)
- ✓ D. \( 5.6 \times 10^{-10} \)

**Question #**: 5

What is the correct ordering, from weakest to strongest, of the conjugate bases of these acids?

- HSeO₄⁻ \( K_a = 2.2 \times 10^{-2} \)
- HIO \( K_a = 2.3 \times 10^{-11} \)
- HClO \( K_a = 2.9 \times 10^{-8} \)
\( H_2S \quad K_a = 8.9 \times 10^{-8} \)

\[
\begin{align*}
&\text{A. SeO}^{2-} < \text{IO}^- < \text{ClO}^- < \text{HS}^- \\
&\text{✓B. SeO}^{4-} < \text{HS}^- < \text{ClO}^- < \text{IO}^- \\
&\text{C. IO}^- < \text{ClO}^- < \text{HS}^- < \text{SeO}^{2-} \\
&\text{D. HS}^- < \text{IO}^- < \text{SeO}^{4-} < \text{ClO}^- 
\end{align*}
\]

Question #6

A 0.100 M solution of NaClO has a pH of 10.27. What is \( K_b \) for ClO\(^-\)?

\[
\begin{align*}
&\text{✓A. } 3.5 \times 10^{-7} \\
&B. \ 2.6 \times 10^{-9} \\
&C. \ 1.4 \times 10^{-5} \\
&D. \ 9.2 \times 10^{-6} 
\end{align*}
\]

Question #7

Rank the following binary acids from weakest to strongest.

\[
\begin{align*}
&\text{A. } H_2Te < H_2Se < H_2S < H_2O \\
&\text{✓B. } H_2O < H_2S < H_2Se < H_2Te \\
&C. \ H_2S < H_2Se < H_2Te < H_2O \\
&D. \ H_2O < H_2Te < H_2S < H_2Se 
\end{align*}
\]

Question #8

Rank the following oxyacids in order from weakest to strongest:

\[
\begin{align*}
&\text{✓A. } H-O-I < H-O-Br < H-O-Cl < H-O-Cl=O \\
&B. H-O-Cl=O < H-O-Cl < H-O-Br < H-O-I \\
&C. H-O-Cl < H-O-Cl=O < H-O-Br < H-O-I \\
&D. \ H-O-I < H-O-Br < H-O-Cl=O < H-O-Cl 
\end{align*}
\]
Question #: 9

Identify the two Lewis bases.

6 Cl\(^{-}\) + Pt\(^{4+}\) → [PtCl\(_6\)]\(^{4+}\)
Ag\(^{+}\) + 2 NH\(_3\) → [Ag(NH\(_3\))\(_2\)]\(^{+}\)

A. Pt\(^{4+}\)
✓ B. Cl\(^{-}\)
C. Ag\(^{+}\)
✓ D. NH\(_3\)

Question #: 10

Which two combinations will not act as a buffer?

✓ A. 1.0 M Na\(_2\)S and 0.50 M H\(_2\)S
B. 0.50 M C\(_6\)H\(_5\)NH\(_2\) and 0.30 M C\(_6\)H\(_5\)NH\(_3\)Cl
C. 0.010 M HF and 0.030 M NaF
✓ D. 1.0 M NaCl and 1.5 M HCl

Question #: 11

A 100.0 mL buffer solution contains 0.500 M HCHO\(_2\) (\(K_a = 1.8 \times 10^{-4}\)) and 0.500 M NaCHO\(_2\). What is the pH of the solution after the addition of 0.0100 mol of HCl?

A. 4.89
B. 10.63
✓ C. 3.57
D. 2.28

Question #: 12

Human blood contains a buffer system composed of 0.0012 M carbonic acid, H\(_2\)CO\(_3\), and 0.024 M HCO\(_3^{-}\).

If the \(K_a\) value for H\(_2\)CO\(_3\) at body temperature is 7.9 \times 10^{-7}, what is the pH of human blood?
Question #: 13

Which solution is the most effective buffer?

✓ A. 0.50 M nitrous acid (HNO₂) and 0.50 M sodium nitrite (NaNO₂)
B. 0.50 M nitrous acid (HNO₂) and 0.005 M sodium nitrite (NaNO₂)
C. 0.05 M nitrous acid (HNO₂) and 0.05 M sodium nitrite (NaNO₂)
D. 2.0 M hydrochloric acid (HCl) and 2.0 M sodium hydroxide (NaOH)

Question #: 14

What is the pH of the solution formed when 40.0 mL of 0.125 M HC₂H₃O₂ is titrated with 16.0 mL of 0.500 M KOH? The $K_a$ for acetic acid is $1.8 \times 10^{-5}$.

Report your answer with two decimal places. Do NOT include units in your answer.

\[ \text{pH} = \_\_\_ \]

1. 12.73

Question #: 15

What is the pH of the solution formed after 25.0 mL of 0.500 M C₅H₅N is titrated with 5.0 mL of 0.500 M HBr?

$K_b = 1.7 \times 10^{-9}$ for C₅H₅N

✓ A. 5.83
B. 8.16
C. 4.63
D. 9.37
Fill in the blanks with A, B, C, or D to match the titration description with the appropriate titration curve.

1. Titration of a weak acid with a strong base.
2. Titration of a strong acid with a strong base.
3. Titration of a polyprotic acid with a strong base.
4. Titration of a weak base with a strong acid.
Using the diagram below, describe the significance of the pH halfway to the equivalence point for the titration of a weak acid with a strong base.
✓A. At halfway to the equivalence point, pH = pKₐ.
B. At halfway to the equivalence point, pH = pOH.
C. At halfway to the equivalence point, pH = 7.
D. At halfway to the equivalence point, pH = Kₐ⁻.

**Question #: 18**

Methyl red, an indicator with a pKₐ of 5.0, is red in its acid form and yellow in its basic form. What color will a solution appear if the [In⁻]/[HIn] is 15?

A. red
✓B. yellow
C. orange
D. green

**Question #: 19**

Which equation shows the dissolution of the slightly soluble aluminum hydroxide?
A. Al(OH)_3(s) ⇌ Al^{3+}(aq) + 3 OH^−(aq)
B. Al(OH)_3(s) + H_2O(l) → [Al(OH)_4]^−(aq) + H^+(aq)
C. Al^{3+}(aq) + 3 OH^−(aq) → Al(OH)_3(s)
D. Al(OH)_3(s) + 3 H_3O^+(aq) ⇌ [Al(H_2O)_6]^{3+}(aq)

Question #: 20

What is the correct relationship between $K_{sp}$ and molar solubility (S) for scandium fluoride, ScF₃?

$K_{sp} =$
A. $27S^4$
B. $S^2$
C. $3S^4$
D. $4S^3$

Question #: 21

Which compound has the largest molar solubility?

A. BaSO₄ $K_{sp} = 1.07 \times 10^{-10}$
B. CaF₂ $K_{sp} = 1.46 \times 10^{-10}$
C. PbSO₄ $K_{sp} = 1.82 \times 10^{-8}$
D. Mg(OH)₂ $K_{sp} = 2.06 \times 10^{-13}$

Question #: 22

Describe the solubility of PbBr₂(s) when added to a solution of NaBr(aq) compared to the solubility of PbBr₂(s) in pure water. The dissociation of PbBr₂ is shown below.

PbBr₂(s) ⇌ Pb^{2+}(aq) + 2 Br^−(aq)

A. The solubility of PbBr₂ is greater in the solution containing NaBr.
B. The solubility of PbBr₂ is lower in the solution containing NaBr.
C. The solubility of PbBr₂ is the same in each case.
Question #: 23

The solubility of which salt is increased by a decrease in pH?

✓ A. MgF₂
   B. AgI
   C. NaCl
   D. KBr

Question #: 24

A pH-neutral solution containing 0.100 M Cu²⁺ and 0.150 M Ni²⁺ is slowly titrated with a sodium hydroxide solution. Assuming minimal volume changes, which solid precipitates first and what concentration of OH⁻ was required? The $K_{sp}$ for Cu(OH)₂ is $2.2 \times 10^{-20}$ and for Ni(OH)₂ is $5.5 \times 10^{-16}$.

✓ A. Cu(OH)₂, $4.7 \times 10^{-10}$ M
   B. Cu(OH)₂, $6.1 \times 10^{-8}$ M
   C. Ni(OH)₂, $4.7 \times 10^{-10}$ M
   D. Ni(OH)₂, $6.1 \times 10^{-8}$ M

Question #: 25

Solid Na₂CO₃ is slowly added to a solution that is 0.0100 M in Pb²⁺ and 0.0100 M in Ag⁺. What is the remaining concentration of Pb²⁺ when Ag⁺ begins to precipitate?

$K_{sp}$ for Ag₂CO₃ $= 8.46 \times 10^{-12}$

$K_{sp}$ for PbCO₃ $= 7.40 \times 10^{-14}$

✓ A. $8.75 \times 10^{-7}$ M
   B. $8.46 \times 10^{-12}$ M
   C. $7.40 \times 10^{-14}$ M
   D. $7.95 \times 10^{-5}$ M

Question #: 26

Use the terms coordination compound, ligand, or complex ion to complete the following sentence.
Referring to the chemical formula, $\text{K}_4[\text{Fe(CN)}_6]$, CN$^-$ is a 1, Fe(CN)$_6^{4-}$ is a 2, and K$_4$[Fe(CN)$_6$] is a 3.

1. ligand
2. complex ion
3. coordination compound

**Question #: 27**

Determine the charge of Co in the coordination compound below.

A. 0
B. +1
C. +2
D. +3

**Question #: 28**

Which diagram represents the $d$ orbital electrons for Cr$^{2+}$ in an octahedral high-spin (weak-field) complex?

✓ A.
A solution initially contains 0.020 M Cr(NO₃)₃ and 0.180 M NaOH. What concentration of Cr³⁺ (aq) remains when chromium(III) and hydroxide ions react to form the complex ion according to the equilibrium below?

\[ \text{Cr}^{3+} (aq) + 4 \text{OH}^- (aq) \rightleftharpoons [\text{Cr(OH)}_4]^- (aq) \quad K_f = 8.0 \times 10^{29} \]
What is the equilibrium constant, $K$, for
\[ \text{AgCl(s)} + 2 \text{NH}_3(aq) \leftrightarrow \text{Ag(NH}_3)_2^+(aq) + \text{Cl}^-(aq) \]
given $K_{sp} = 1.8 \times 10^{-10}$ for AgCl
$K_f = 1.7 \times 10^7$ for Ag(NH$_3$)$_2^+$

$K = \frac{1}{1}$

Report your answer with **two** significant figures. Do **NOT** include units in your answer. Use the format 2.2E2 or 2.2E-2 for numbers in scientific notation.

1. 3.1E-3|3.1e-3|3.1E-03|3.1e-03|0.0031|.0031|