AP Chemistry
Chapter 17 Jeopardy

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Round 1 – Chapter 17

K_{sp}	Buffers	Strong-Strong Titrations	Strong-Weak Titrations	Solubility	Precipitates
100	100	100	100	100	100
200	200	200	200	200	200
300	300	300	300	300	300
400	400	400	400	400	400
500	500	500	500	500	500

K_{sp} 100

In a saturated solution of $Zn(OH)_2$ at 25°C, the value of $[OH^-]$ is 2.0×10^{-6} M. What is the value of the solubility-product constant, K_{sp}, for $Zn(OH)_2$ at 25°C?

- 4.0×10^{-18}
- 8.0×10^{-18}
- 1.6×10^{-17}
- 4.0×10^{-12}
- 2.0×10^{-6}

a

K_{sp} 200

If 0.0490g of $AgIO_3$ dissolves per liter of solution, calculate the solubility-product constant.

3.03×10^{-8}

K_{sp} 300

The chemical equation below represents the equilibrium that exists in a saturated solution of Ag_2CO_3. If S represents the molar solubility of Ag_2CO_3, which of the following mathematical expressions shows how to calculate S based in K_{sp}?

$$Ag_2CO_{3(s)} \leftarrow\rightarrow 2\ Ag^+_{(aq)} + CO_3{}^{2-}{}_{(aq)}$$

a. $S = (K_{sp})^{1/2}$

b. $S = (K_{sp}/2)^{1/2}$

c. $S = (K_{sp}/2)^{1/3}$

- $S = (K_{sp}/4)^{1/3}$

d

K_{sp} 400

How many moles of NaF must be dissolved in 1.00 liter of a saturated solution of PbF_2 at 25°C to reduce the $[Pb^{2+}]$ to 1×10^{-6} molar? (K_{sp} PbF_2 at 25°C = 4.0×10^{-8})

a. 0.020 mole

b. 0.040 mole

c. 0.10 mole

- 0.20 mole

- 0.40 mole

d

K_{sp} 500

Calculate the solubility of $Cu(OH)_2$ in grams per liter of solution. The K_{sp} for $Cu(OH)_2$ is 4.8×10^{-20}.

2.23×10^{-5} g/L

Buffers 100

A student prepares a solution by combining 100 mL of 0.30 M $HNO_{2(aq)}$ and 100 mL of 0.30 M $KNO_{2(aq)}$. Which of the following equations represents the reaction that best helps to explain why adding a few drops of 1.0 M $HCl_{(aq)}$ does not significantly change the pH of the solution?

a. $K^+_{(aq)} + Cl^-_{(aq)} \rightarrow KCl_{(s)}$

b. $HNO_{2(aq)} \rightarrow H^+_{(aq)} + NO_2^-{}_{(aq)}$

c. $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$

d. $H^+_{(aq)} + NO_2^-{}_{(aq)} \rightarrow HNO_{2(aq)}$

d

Buffers 200

The chemical equation below represents the acid ionization equilibrium for $HC_4H_7O_2$ for which pK_a = 4.8. Which of the following is the best estimate for the pH of a buffer prepared by mixing 100. mL of 0.20 M $HC_4H_7O_2$ with 100. mL of 0.10 M $NaC_4H_7O_2$?

$HC_4H_7O_{2(aq)} + H_2O_{(l)} \leftarrow\rightarrow H_3O^+_{(aq)} + C_4H_7O_2^-{}_{(aq)}$

a. 1.0

b. 4.5

c. 4.8

d. 7.0

b

Buffers 300

What is the ratio of HCO_3^- to H_2CO_3 in blood with a pH of 7.4? The K_a for H_2CO_3 is 4.3×10^{-7}.

10.8

Buffers 400

Mixtures what would be considered buffers include which of the following?

I. 0.10 M HCl + 0.10 M NaCl

II.0.10 M HF + 0.10 M NaF

III.0.10 M HBr + 0.10 M NaBr

IV.I only

V.II only

VI.III only

VII.I and II

VIII.II and III

b

Buffers 500

A buffer solution contains 0.1 mol of C_2H_5COOH and 0.13 mol C_2H_5COONa in 1.50L. What is the pH of the buffer after the addition of 0.01 mol of HI?

$(K_a = 1.3 \times 10^{-5})$

4.93

Strong-Strong Titrations 100

A student mixes 40. mL of 0.10 M $HBr_{(aq)}$ with 60. mL of 0.10 M $KOH_{(aq)}$ at 25ºC. What is the $[OH^-]$ of the resulting solution?

a. $[OH^-]$ = 0.060 M

b. $[OH^-]$ = 0.033 M

c. $[OH^-]$ = 0.020 M

d. $[OH^-]$ = 0.00000010M

c

Strong-Strong Titrations 200

A 20mL sample of 0.200M HBr is titrated with 0.200M NaOH solution. Calculate the pH of the solution after 19.9mL of base has been added.

3.30

Strong-Strong Titrations 300

A 20mL sample of 0.200M HBr is titrated with 0.200M NaOH solution. Calculate the pH of the solution after 20.0mL of base has been added.

7.00

Strong-Strong Titrations 400

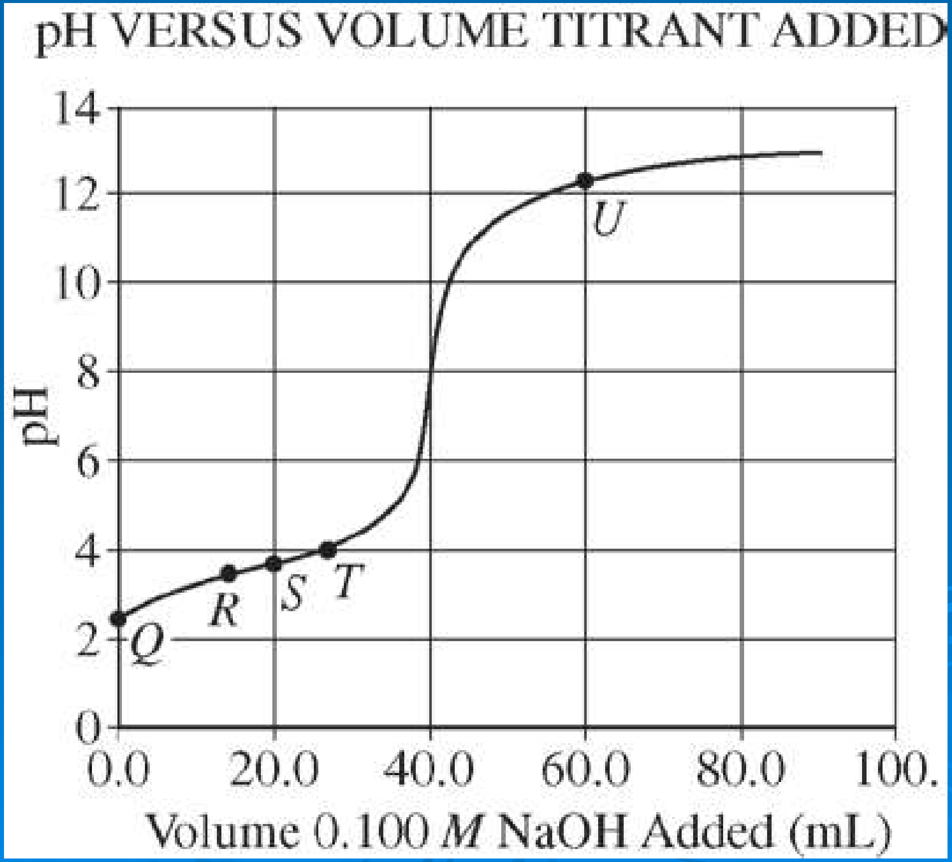
At which point on the titration curve is $[A^-]$ closest to twice that of [HA]?

a. R

b. S

c. T

d. U



c

Strong-Strong Titrations 500

A 20mL sample of 0.200M HBr is titrated with 0.200M NaOH solution. Calculate the pH of the solution after 35.0mL of base has been added.

12.74

Strong-Weak Titrations 100

The net ionic equation for the reaction that occurs during the titration of nitrous acid with sodium hydroxide is

a. $HNO_2 + Na^+ + OH^- \rightarrow NaNO_2 + H_2O$

b. $HNO_2 + NaOH \rightarrow Na^+ + NO_2^- + H_2O$

c. $H^+ + OH^- \rightarrow H_2O$

d. $HNO_2 + H_2O \rightarrow NO_2^- + H_3O^+$

e. $HNO_2 + OH^- \rightarrow NO_2^- + H_2O$

e

Strong-Weak Titrations 200

Consider the titration of 30.0mL of 0.03M NH_3 with 0.025M HCl. Calculate the pH after 10.0mL of the titrant has been added. (K_b = 1.8×10^{-5})

9.67

Strong-Weak Titrations 300

Consider the titration of 30.0mL of 0.03M $NH_3$with 0.025M HCl. Calculate the pH after 20.0mL of the titrant has been added. (K_b = 1.8 x 10^{-5})

9.16

Strong-Weak Titrations 400

A 0.08 M solution of CH_3COOH ($pK_a = 4.74$) is titrated with 0.10 M $NaOH_{(aq)}$. What is the pH at the equivalence point of the titration and why?

a. pH < 7, because $NaOH_{(aq)}$ is a strong base.

b. pH = 7, because the titration reaction is a neutralization reaction.

c. pH > 7, because $CH_3COO^-_{(aq)}$ is a weak base.

d. pH > 7, because the concentration of $NaOH_{(aq)}$ is greater than that of $CH_3COOH_{(aq)}$.

C

Strong-Weak Titrations 500

Consider the titration of 30.0mL of 0.030M NH_3 with 0.025M HCl. Calculate the pH after 37.0mL of the titrant has been added.

($K_b = 1.8 \times 10^{-5}$)

3.43

Solubility 100

High solubility of an ionic solid in water is favored by which of the following conditions?

I. The existence of strong ionic attractions in the crystal lattice

II. The formation of strong ion-dipole attractions

III. An increase in entropy upon dissolving

IV. I only

V. I and II only

VI. I and III only

VII. II and III only

VIII. I, II, and III

d

Solubility 200

Would PbF_2 be more soluble in acidic solution than in pure water? Write the equation.

Yes

$PbF_2 + 2H^+ \leftrightarrow Pb^{2+} + 2HF$

Solubility 300

Would $AuCl_3$ be more soluble in acidic solution than in pure water? Write the equation.

No

$AuCl_3 + 3H^+ \leftrightarrow Au^{3+} + HCl$

strong acid

Solubility 400

Would $Hg_2C_2O_4$ be more soluble in acidic solution than in pure water? Write the equation.

Yes

$Hg_2C_2O_4 + 2H^+ \leftrightarrow 2Hg^+ + H_2C_2O_4$

Solubility 500

The concentration of $F^-_{(aq)}$ in drinking water that is considered to be ideal for promoting dental health is 4.0×10^{-5} M. Based on the information below, the maximum concentration of $Ca^{2+}_{(aq)}$ that can be present in drinking water without lowering the concentration of $F^-_{(aq)}$ below the ideal leave is closest to

$$CaF_{2(s)} \leftrightarrow Ca^{2+}_{(aq)} + 2\ F^-_{(aq)} \quad K_{sp} = 4.0 \times 10^{-11}$$

a. 0.25 M
b. 0.025 M
c. 1.6×10^{-6} M
d. 1.6×10^{-15} M

b

Precipitates 100

Will $Ca(OH)_2$ precipitate from solution if the pH of a 0.05M solution of $CaCl_2$ is adjusted to 8.0?

($K_{sp} = 6.5 \times 10^{-6}$)

$Q < K_{sp}$ so no $Ca(OH)_2$ will precipitate

Precipitates 200

Will Ag_2SO_4 precipitate with 100mL of 0.05M $AgNO_3$ is mixed with 10mL of 5.0×10^{-2}M Na_2SO_4 solution? ($K_{sp} = 1.5 \times 10^{-5}$)

$Q < K_{sp}$ so no Ag_2SO_4 will precipitate

Precipitates 300

Will $Ca(OH)_2$ precipitate from solution if the pH of a 0.02M solution of $Co(NO_3)_2$ is adjusted to 8.5?

($K_{sp} = 1.3 \times 10^{-15}$)

Q > K_{sp} so $Co(OH)_2$ will precipitate

Precipitates 400

Will $AgIO_3$ precipitate when 20mL of 0.01M $AgNO_3$ is mixed with 10mL of 0.015M $NaIO_3$?

($K_{sp} = 3.1 \times 10^{-8}$)

Q > K_{sp} so $AgIO_3$ will precipitate

Precipitates 500

A solution of Na_2SO_4 is added dropwise to a solution that is 0.010M in Ba^{2+} ($K_{sp} = 1.1 \times 10^{-10}$) and 0.01M Sr^{2+} ($K_{sp} = 3.2 \times 10^{-7}$). Which will precipitate first?

$BaSO_4$ precipitates first