3.5-110

Which of the following is FALSE ?

(a) The solubility product of an electrolyte has a fixed value at a given temperature.

(b) A solubility product is an equilibrium constant.

(c) The solubility product for an insoluble electrolyte is greater than zero.

(d) The units of any solubility product are M^2

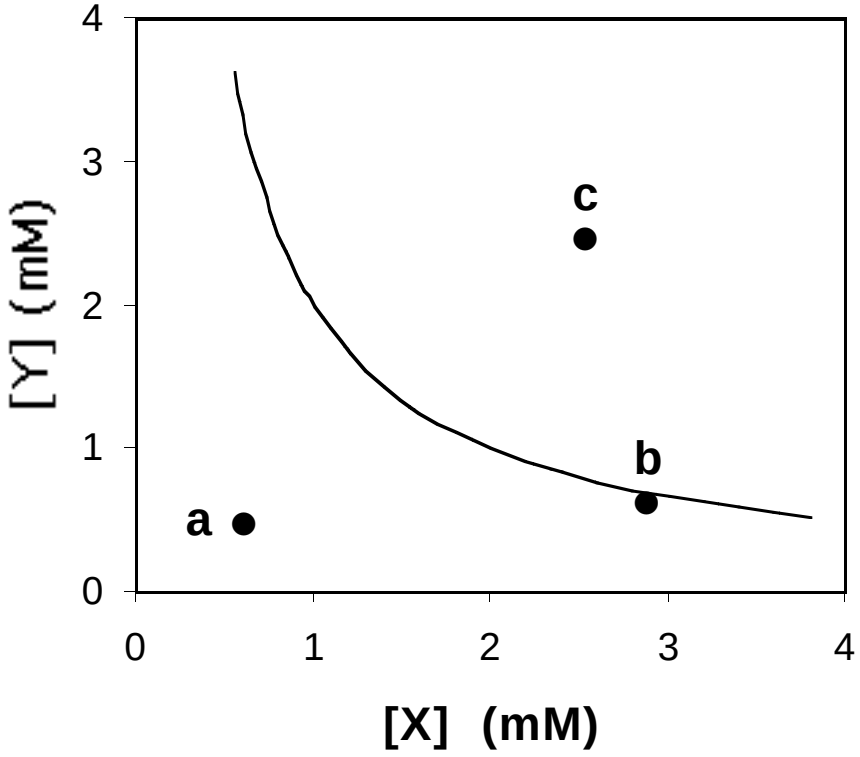
3.5-130

The solubility product expression for $Zn(OH)_2$ is

(a) $[Zn^{2+}]\,[OH^-]$
(b) $[Zn^{2+}]\,[OH^-]^2$
(c) $[Zn^{2+}]\,2\,[OH^-]$
(d) $[Zn^{2+}]\,4\,[OH^-]^2$

3.5-220

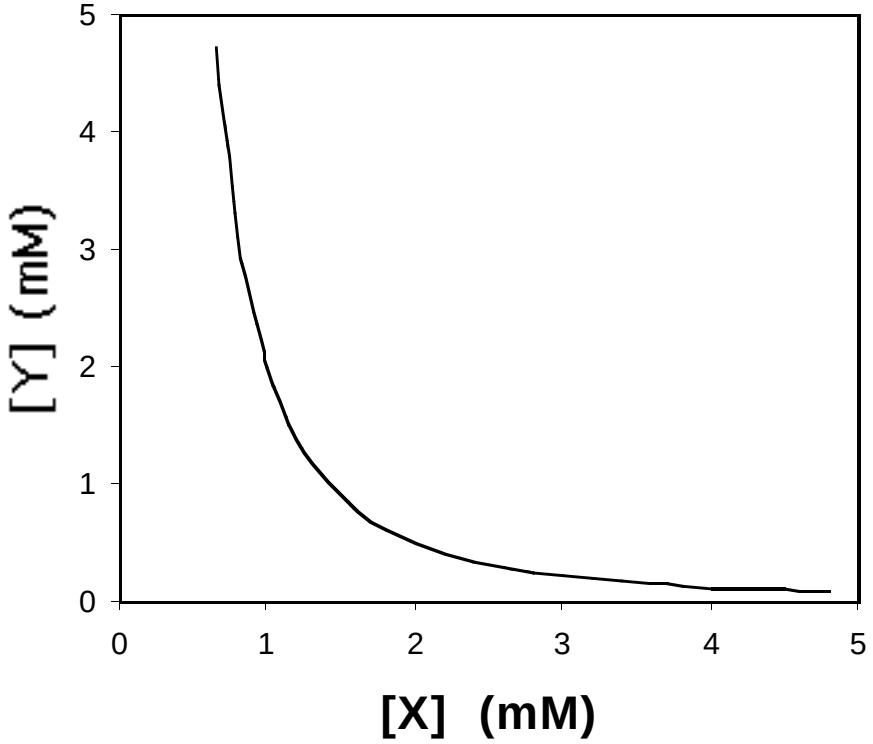
For an XY salt with $K_{sp} = 2 \times 10^{-6}\ M^2$, which point on the following graph represents a saturated solution?



Which represents a supersaturated solution?

3.5-240

The solubility curve



is for a salt of stoichiometry

(a) XY (b) X_2Y (c) XY_2 (d) X_2Y_2

The value of the solubility product is

(a) $2 \times 10^{-3}\ M^3$ (b) $2 \times 10^{-6}\ M^3$
(c) $2 \times 10^{-9}\ M^3$ (d) $4 \times 10^{-9}\ M^3$

3.5-310

At the temperature at which the molar solubility of $(Ag)_2CO_3$ in water is 2×10^{-4} M, the K_{sp} is

(a) 6.0×10^{-4} M

(b) 4.0×10^{-8} M^2

(c) 0.8×10^{-11} M^3

(d) 3.2×10^{-11} M^3

3.5-330

In terms of its K_{sp}, the molar solubility of $Fe(OH)_3$ in water is

(a) $(4\ K_{sp})$

(b) $(K_{sp} / 3)^{1/2}$

(c) $(K_{sp} / 4)^{1/3}$

(d) $(K_{sp} / 27)^{1/4}$

3.5-350

Which of the following has the largest molar solubility in water?

(a) $SrSO_4$ $K_{sp} = 2.8 \times 10^{-7}\ M^2$

(b) $Zn(OH)_2$ $K_{sp} = 4.5 \times 10^{-17}\ M^3$

(c) PbI_2 $K_{sp} = 8.7 \times 10^{-9}\ M^3$

(d) MnS $K_{sp} = 5 \times 10^{-15}\ M^2$

Which has the smallest?

3.5-410

The solubility of AgCl in aqueous NaCl is

(a) greater than
(b) less than
(c) equal to

it solubility in pure water.

3.5-420

In a community with hard water (e.g., $[Ca^{2+}] = 0.01$ M), what is the maximum fluoride concentration that can be achieved by adding NaF?

(Note: $K_{sp}(CaF_2)=3.9x10^{-11}M^3$)

(a) 2.0×10^{-3} M
(b) 6.2×10^{-5} M
(c) 4.0×10^{-3} M
(d) 3.9×10^{-9} M

3.5-430

If $Na_2C_2O_4$ is added to a solution containing 0.1 M Ba^{2+}, 0.001 M Ca^{2+}, and 0.06 M Sr^{2+}, the first salt to precipitate out will be

(a) BaC_2O_4 ($K_{sp}=1.1x10^{-7}$ M^2)

(b) CaC_2O_4 ($K_{sp}=2.3x10^{-9}$ M^2)

(c) SrC_2O_4 ($K_{sp}=5.6x10^{-8}$ M^2)

3.5-440

If NaOH is added to a solution containing 0.01 M Ag^{+}, 0.03 M Mg^{2+}, and 0.1 M Al^{3+}, the first salt to precipitate out will be

(a) AgOH ($K_{sp}=1.5x10^{-8}\ M^2$)

(b) $Mg(OH)_2$ ($K_{sp}=1.2x10^{-11}\ M^3$)

(c) $Al(OH)_3$ ($K_{sp}=3.7x10^{-15}\ M^4$)

3.5-450

The solubility of an unknown salt is found to decrease when NaBr is present. The relationship between the solubility of the unknown (z in g/L) and the concentration of the NaBr (C in g/L) is found to be

$$z\,(C + \alpha * z)^2 = \beta$$

where α and β are two constants.

We can conclude that the unknown salt must be of the type

(a) MBr

(b) M_2Br

(c) MBr_2

(d) M_2Br_2

3.5-510

Which of the following insoluble salts is appreciably more soluble in acid than in water?

(a) $PbBr_2$ (b) CuCl

(c) $Cd(CN)_2$ (d) $Ag(IO_3)_2$

3.5-520

The solubility of which salt is not significantly greater in acid than in pure water?

(a) $BaSO_4$ (b) $Ba(OH)_2$

(c) $Ba_3(PO_4)_2$ (d) $BaCO_3$

3.5-540

In which of the following is $CaCO_3$ most soluble?

(a) water
(b) 0.1 M Na_2CO_3
(c) 0.1 M $CaCl_2$
(d) 0.1 M HCl
(e) 0.1 M NaCl

3.5-550

If $K_{sp}(PbSO_4) = 1.8 \times 10^{-8}\ M^2$ and $K_a(HSO_4^-) = 1.0 \times 10^{-2}\ M$, the equilibrium constant for the reaction

$$PbSO_4(s) + H^+(aq) \rightarrow HSO_4^-(aq) + Pb^{2+}(aq)$$

is

(a) $2.8 \times 10^{-10}\ M$ (b) $1.8 \times 10^{-10}\ M$
(c) $1.8 \times 10^{-8}\ M$ (d) $1.8 \times 10^{-6}\ M$

3.5-570

If $K_{sp}(Cd(CN)_2) = 1 \times 10^{-8}\ M^3$ and $K_a(HCN) = 4.9 \times 10^{-10}\ M$, the equilibrium constant for the reaction

$$Cd(CN)_2\ (s) + 2\ H^+\ (aq) \rightarrow Cd^{2+}\ (aq) + 2\ HCN\ (aq)$$

is given by

(a) $2 \times 10^{1}\ M$
(b) $5 \times 10^{-2}\ M$
(c) $4 \times 10^{10}\ M$
(d) $2 \times 10^{-11}\ M$

3.5-610

When 60 mL of 0.05 M $BaCl_2$ is mixed with 40 mL of 0.10 M K_2SO_4,

(a) $[K^+]$= 0.04 M in the resulting solution
(b) $[Ba^{2+}]$= 0.03 M in the resulting solution
(c) No reaction will occur
(d) $BaSO_4$ (K_{sp} = 1 x 10^{-10} M^2) will precipitate

Which of the following is untrue?

(a) $[K^+]$= 0.08 M in the resulting solution
(b) $[Cl^-]$= 0.06 M in the resulting solution
(c) $[Ba^{2+}]$= 0 M in the resulting solution
(d) $[SO_4^{2-}]$= 0.01 M in the resulting solution

In the resulting solution, $[Ba^{2+}]$=

(a) 1 x 10^{-5} M
(b) 1 x 10^{-8} M
(c) 1 x 10^{-10} M