Lampiran 9

KUNCI JAWABAN PRETEST

1. . Diketahui : kelarutan $(Ca_3(PO_4)_2$= amol/L

Ditanya : $K_{sp}(Ca_3(PO_4)_2$

Penyelesaian :

$(Ca_3(PO_4)_{2(aq)} \rightleftharpoons 3\ Ca^{2+}_{(aq)} + 2\ PO_4^{3-}{}_{(aq)}$

a 3a 2a

$K_{sp} = [Ca^{2+}]^3\ [PO_4^{3-}]^2$

$= (3a)^3\ (2a)^2$

$= 108a^5$

2. Diketahui : kelarutan $Mg(OH)_2 = 1 \times 10^{-2}$mol/L

Ditanya : $K_{sp}Mg(OH)_2$

Penyelesaian :

$Mg(OH)_{2(aq)}\ Mg^{2+}{}_{(aq)} + 2\ OH^-{}_{(aq)}$

ss 2s

$K_{sp} = [Mg^{2+}]\ [OH^-]^2$

$= (s)\ (2s)^2$

$= 4s^3$

$= 4\ (1 \times 10^{-2})^3$

$= 4 \times 10^{-6}$

3. Diketahui : kelarutan PbI_2 (Mr = 461) = 922 mg/L

Ditanya : K_{sp} PbI_2

Penyelesaian :

Kelarutan PbI_2 dalam mol/L $= \frac{\text{massa}}{\text{Mr}}$

$= \frac{922 \text{ x } 10{-}3 \text{ gram/L}}{461 \text{ gram/mol}}$

$= 2 \text{ x } 10^{-3}$mol/L

$PbI_{2\,(aq)} \rightleftharpoons Pb^{2+}{}_{(aq)} + 2\ I^{-}{}_{(aq)}$

ss 2s

$K_{sp} = [Pb^{2+}]\ [I^{-}]^2$

$= (s)\ (2s)^2$

$= 4s^3$

$= 4\ (2 \text{ x } 10^{-3})^3$

$= 3{,}2 \text{ x } 10^{-8}$

4. Diketahui : konsentrasi Ca^{2+}dalam $CaF_2 = 2 \text{ x } 10^{-4}$mol/L

Ditanya : $K_{sp}CaF_2$

Penyelesaian :

$CaF_{2\,(aq)} \rightleftharpoons Ca^{2+}{}_{(aq)} + 2\ F^{-}{}_{(aq)}$

$2 \text{ x } 10^{-4}$ $2 \text{ x } 10^{-4}$ $2(2 \text{ x } 10^{-4})$

$K_{sp} = [Ca^{2+}]\ [F^{-}]^2$

$= (2 \text{ x } 10^{-4})\ (2 \text{ x } 2 \text{ x } 10^{-4})^2$

$= 3{,}2 \text{ x } 10^{-12}$

5. Diketahui : $K_{sp}AgCl = 10^{-10}$

$K_{sp}AgI = 10^{-16}$

$K_{sp}\ Ag_2CrO_4 = 3{,}2 \times 10^{-12}$

$K_{sp}\ Ag_2S = 1{,}6 \times 10^{-11}$

$K_{sp}\ Ag_2C_2O_4 = 1{,}1 \times 10^{-11}$

Ditanya : garam yang memilikikelarutan paling besar?

Penyelesaian :

a. $AgCl_{(s)} \rightleftharpoons Ag^{+}_{(aq)} + Cl^{-}_{(aq)}$

sss

$s = \sqrt{Ksp}$

$s = \sqrt{10^{-10}}$

$s = 10^{-5}$

b. $AgCl_{(s)} \rightleftharpoons Ag^{+}_{(aq)} + Cl^{-}_{(aq)}$

sss

$s = \sqrt{Ksp}$

$s = \sqrt{10^{-16}}$

$s = 10^{-8}$

c. $Ag_2CrO_{4(s)} \rightleftharpoons 2Ag^{+}_{(aq)} + CrO_4^{2-}{}_{(aq)}$

s 2s s

$K_{sp} = [Ag^{+}]^2\ [CrO_4^{2-}]$

$= (2s)^2\ (s)$

$= 4s^3$

$$s = \sqrt[3]{\frac{K_{sp}}{4}}$$

$$s = \sqrt[3]{\frac{3{,}2x10-12}{4}}$$

$$s = 9{,}2.10^{-5}$$

d. $Ag_2S_{(s)} \rightleftharpoons 2Ag^{+}_{(aq)} + S^{2-}_{(aq)}$

s 2s s

$K_{sp} = [Ag^{+}]^2 [S^{2-}]$

$= (2s)^2 (s)$

$= 4s^3$

$$s = \sqrt[3]{\frac{K_{sp}}{4}}$$

$$s = \sqrt[3]{\frac{1{,}6x10-11}{4}}$$

$$s = 1{,}58.10^{-4}$$

e. $Ag_2C_2O_{4(s)} \rightleftharpoons 2Ag^{+}_{(aq)} + C_2O_4^{2-}{}_{(aq)}$

s 2s s

$K_{sp} = [Ag^{+}]^2 [CrO_4^{2-}]$

$= (2s)^2 (s)$

$= 4s^3$

$s = \sqrt[3]{\frac{K_{sp}}{4}}$

$s = \sqrt[3]{\frac{1{,}1x10-11}{4}}$

$s = 1{,}4.10^{-4}$

Garam yang memiliki kelarutan paling besar adalah garam Ag_2S

6. Diketahui : $K_{sp}\ AgN_3 = K_{sp}Pb(N_3)_2 = K_{sp}Sr(F_2)$pada suhu yang sama

   Ditanya : Perbandingan nilai s AgN_3, $Pb(N_3)_2$,dan$Sr(F_2)$ pada suhu yang sama

   Penyelesaian :

   $AgN_{3\,(s)} \rightleftharpoons Ag^{+}_{(aq)} + N^{3-}_{(aq)}$

   s s s

   $K_{sp}\ AgN_3 = [Ag^{+}][N^{3-}]$

   $= s \times s$

   $= s^2$

   $Pb(N_3)_{2\,(s)} \rightleftharpoons Pb^{2+}_{(aq)} + 2\ N^{3-}_{(aq)}$

   s s 2s

   $K_{sp}Pb(N_3)_2 = [Pb^{2+}][N^{3-}]^2$

   $= (s)\ (2s)^2$

   $= 4s^3$

$SrF_{2\,(s)} \rightleftharpoons Sr^{2+}_{(aq)} + 2\,F^{-}_{(aq)}$

$K_{sp}\ SrF_2 = [Sr^{2+}][F^-]^2$

$= (s)\ (2s)^2$

$= 4s^3$

Jadi, pada suhu yang sama s AgN_3< s $Pb(N_3)_2$=sSrF_2

7. Diketahui : timbal (II) iodida

Ditanya : Hasil kali kelarutan timbal (II) iodide

Penyelesaian :

$PbI_{2\,(aq)} \rightleftharpoons Pb^{2+}_{(aq)} + 2\,I^{-}_{(aq)}$

$K_{sp} = [Pb^{2+}]\,[I^-]^2$

8. Diketahui : $K_{sp}Mg(OH)_2 = 1{,}2 \times 10^{-11}$

Larutan $MgCl_2$ 0,2 M ditambah NaOH sehingga pH naik

Ditanya : Pada pH berapa mulai terbentuk endapan

Penyelesaian:

$MgCl_{2(s)} \longrightarrow Mg^{2+}_{(aq)} + 2Cl^{-}_{(aq)}$

0,2M 0,2M 0,4M

$Mg(OH)_{2(s)} \rightleftharpoons Mg^{2+}_{(aq)} + 2OH^{-}_{(aq)}$

$K_{sp} = [Mg^{2+}]\,[OH^-]^2$

$1{,}2 \times 10^{-12}M^3 = 0{,}2M\ [OH^-]^2$

$\dfrac{1{,}2 \times 10^{-12}\ M^3}{0{,}2M} = [OH^-]^2$

$7{,}7 \times 10^{-6}\ M = [OH^-]$

pOH = 6 – log 7,7

pOH = 5,11

pH = 14 – 5,11 = 8,89 ≅ 9