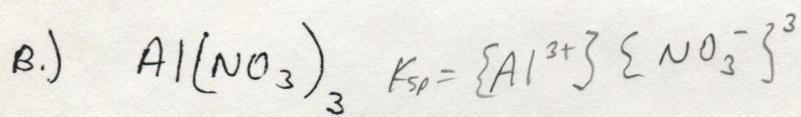
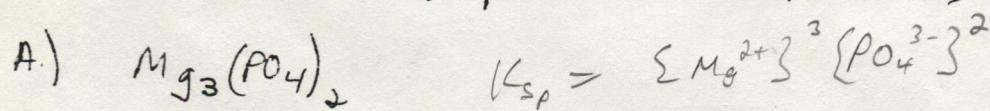


SHOW YOUR WORK FOR  
FULL CREDIT

1) Write the solubility product expressions for



2) The solubility of  $Cr(OH)_3$  is  $4.8 \times 10^{-6}$  moles/L at 25°C. What is its  $K_{sp}$  at this temperature?



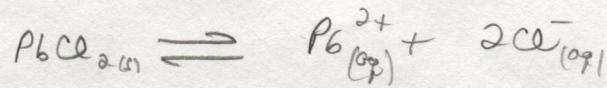
$$K_{sp} = [Cr^{3+}] [OH^-]^3$$

$$K_{sp} = (4.8 \times 10^{-6}) (1.44 \times 10^{-5})^3$$

$$K_{sp} = (4.8 \times 10^{-6}) (2.99 \times 10^{-15})$$

$K_{sp} = 1.4 \times 10^{-20}$

③ At 25°C, a saturated solution of  $\text{PbCl}_2$  contains  $6.2 \times 10^{-6}$  mole of compound in one liter of solution. What is the  $K_{sp}$  of  $\text{PbCl}_2$ ?



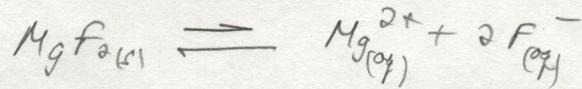
$$K_{sp} = [\text{Pb}^{2+}] [\text{Cl}^-]^2$$

$$K_{sp} = (6.2 \times 10^{-6}) (1.54 \times 10^{-5})^2$$

$$K_{sp} = 6.2 \times 10^{-6} (1.54 \times 10^{-10})$$

$$K_{sp} = 9.5 \times 10^{-16}$$

④ In a saturated solution at 25°C, what is the molar solubility of  $\text{MgF}_2$  ( $K_{sp} = 7.8 \times 10^{-8}$ )?



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

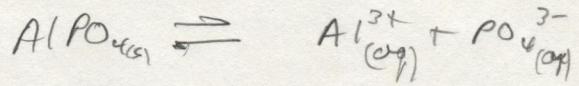
$$7.8 \times 10^{-8} = (x) (2x)^2$$

$$7.8 \times 10^{-8} = 4x^3$$

$$1.9 \times 10^{-8} = x^3$$

$$2.7 \times 10^{-2} \text{ M}$$

(5) If the solubility of  $\text{AlPO}_4$  is  $2.5 \times 10^{-4} \text{ g/L}$ , what is the  $K_{sp}$ ?



$$K_{sp} = [\text{Al}^{3+}] [\text{PO}_4^{3-}]$$

$$K_{sp} = (2.5 \times 10^{-4} \text{ g/L})^2$$

$$\frac{2.5 \times 10^{-4} \text{ g/L}}{121.95 \text{ g/mol}}$$

$$K_{sp} = (2.05 \times 10^{-6} \text{ moles/L}) (2.05 \times 10^{-6} \text{ moles/L})$$

$$K_{sp} = 4.2 \times 10^{-12}$$