

Chemistry Pretest 3.3 part 2 Solutions

1. What two products are created by reacting the following acid and base?



The NH_3 will accept a proton from the acid H_2SO_4 and become NH_4^+ while H_2SO_4 will become HSO_4^-

2. Find the pH and pOH of a 0.15 M solution of KOH, which is a strong base.

Since $\text{KOH} \rightarrow \text{K}^+ + \text{OH}^-$, a 0.15 M solution will create 0.15 M of OH^- . So the $\text{pOH} = -\log(0.15) = 0.82$.

$$\text{pH} = 14 - 0.82 = 13.18.$$

3. The pH of a 0.050 M solution of ortho-hydroxybenzoate ($\text{C}_7\text{H}_6\text{O}_3$) is 7.83. Find the K_b of this weak base.

	$\text{C}_7\text{H}_6\text{O}_3 + \text{H}_2\text{O}$	$\text{C}_7\text{H}_7\text{O}_3^+$	OH^-
I	0.050 M	0	0
C	$10^{-(14-7.83)}$	$10^{-(14-7.83)}$	$10^{-(14-7.83)}$
E	$0.050 - 10^{-(14-7.83)}$	$10^{-(14-7.83)}$	$10^{-(14-7.83)}$

$$K_b = (10^{-(14-7.83)}) (10^{-(14-7.83)}) / (0.050 - 10^{-(14-7.83)}) = 9.1 \times 10^{-12}$$

4. The K_{sp} of $\text{Nd}_2(\text{CO}_3)_3$ at 25 °C is 1.08×10^{-33} . What is the solubility of this substance in g/L?

	$\text{Nd}_2(\text{CO}_3)_3$	2Nd^{+3}	3CO_3^{2-}
I		0	0
C	x	2x	3x
E		2x	3x

$$(2x)^2(3x)^3 = 1.08 \times 10^{-33}$$

$$108x^5 = 1.08 \times 10^{-33}$$

Solve for x and then multiply by molar mass; answer 4.68×10^{-5} g/L

5. 1.94×10^{-5} g of yttrium hydroxide, $Y(OH)_3$, dissolve in 100 ml of aqueous solution. What is its K_{sp} ?

	$Y(OH)_3$	Y^{3+}	$3 OH^-$
I		0	0
C	$1.94 \times 10^{-5} / (139.9 \text{ g/mol}) / 0.100 \text{ L} =$ $1.386704789 \times 10^{-6} \text{ M}$	$1.386704789 \times 10^{-6} \text{ M}$	$3 * 1.386704789 \times 10^{-6} \text{ M}$
E		$1.386704789 \times 10^{-6} \text{ M}$	$3 * 1.386704789 \times 10^{-6} \text{ M}$

$$K_{sp} = [Y^{3+}] [OH^-]^3 = [1.386704789 \times 10^{-6} \text{ M}] [3 * 1.386704789 \times 10^{-6} \text{ M}]^3 =$$

$$1.00 \times 10^{-22}$$