

### Quiz 3

Name KEY

1) Indicate whether each of the following when dissolved in water will make an acidic, basic, or neutral solution, or if there is not enough information given in the formula alone?

KClO<sub>4</sub> NEUTRAL

LiBr NEUTRAL

SO<sub>3(g)</sub> ACIDIC

NaHSO<sub>4</sub> ACIDIC

NH<sub>4</sub>Cl ACIDIC

Na<sub>2</sub>SO<sub>4</sub> BASIC

NH<sub>4</sub>ClO<sub>2</sub> NOT EN. INFO.

CaO BASIC

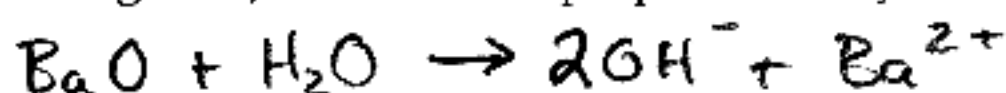
NH<sub>4</sub>ClO<sub>4</sub> ACIDIC

2) At 50 °C where  $K_w = 5.47 \times 10^{-14}$ , what is the pOH if the pH is 7.00? 2) \_\_\_\_\_

$$pK_w = pH + pOH \quad (pK_w = -\log K_w)$$

$$pOH = pK_w - pH = (-\log 5.47 \times 10^{-14}) - 7.00 \Rightarrow pOH = 6.26$$

3) What mass of barium oxide (153.33 g/mol) is needed to prepare exactly 4 L of a solution that has a pH of 12.500? 3) \_\_\_\_\_

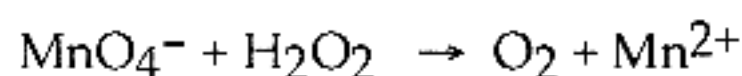


$$[H^+] = 10^{-12.500} = 3.16 \times 10^{-13} M$$

$$[OH^-] = \frac{K_w}{[H^+]} = \frac{1.00 \times 10^{-14}}{3.16 \times 10^{-13}} = 0.0316 M OH^-$$

$$4L \times \frac{0.0316 \text{ mol } OH^-}{L} \times \frac{\text{mol } BaO}{2 \text{ mol } OH^-} \times \frac{153.33 \text{ g}}{\text{mol } BaO} = 9.69 \text{ g}$$

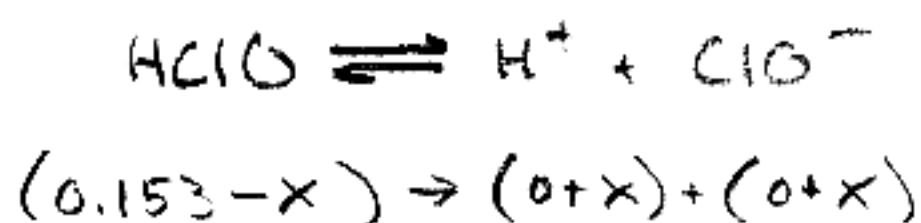
4) A 5.000-mL aqueous sample containing hydrogen peroxide was diluted to approximately 25 mL and analyzed by titration with permanganate as shown in the following unbalanced reaction occurring in acidic solution. The sample required 42.8 mL of 0.0175 M permanganate to reach the end point. What is the concentration of hydrogen peroxide in the original 5.00 mL sample? 4) \_\_\_\_\_



SEE BACK

0.375 M H<sub>2</sub>O<sub>2</sub>

5) What is the pH of a 0.153 M solution of hypochlorous acid ( $K_a = 3.5 \times 10^{-8}$ )? 5) \_\_\_\_\_



$$K_a = \frac{[H^+][ClO^-]}{[HClO]} = \frac{(0+x)(0+x)}{(0.153-x)}$$

$$3.5 \times 10^{-8} = \frac{x^2}{0.153-x} \approx \frac{x^2}{0.153}$$

$$x^2 = 5.4 \times 10^{-9}$$

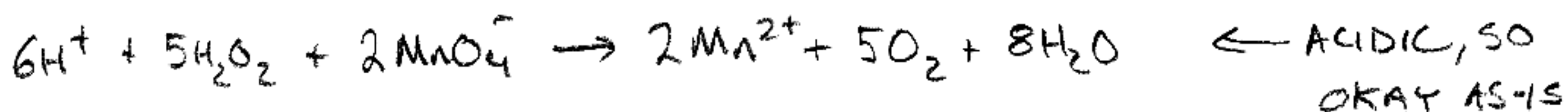
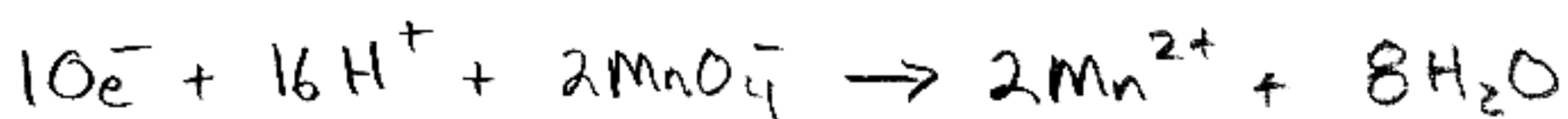
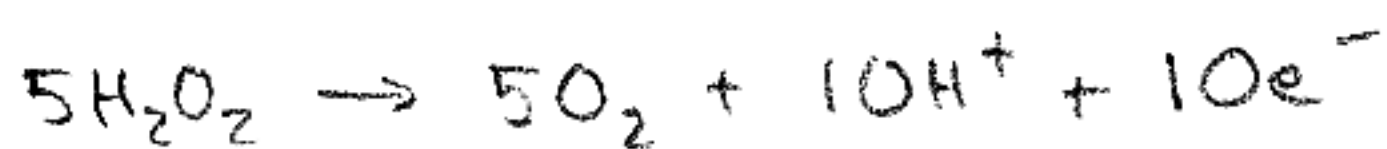
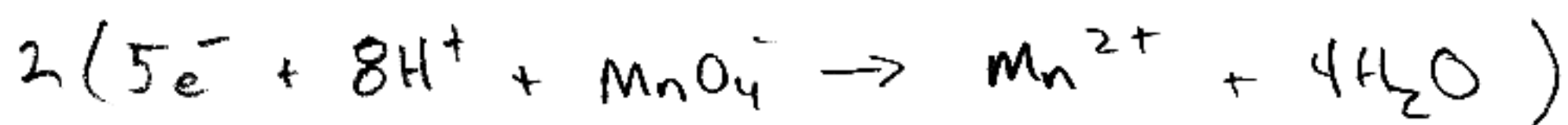
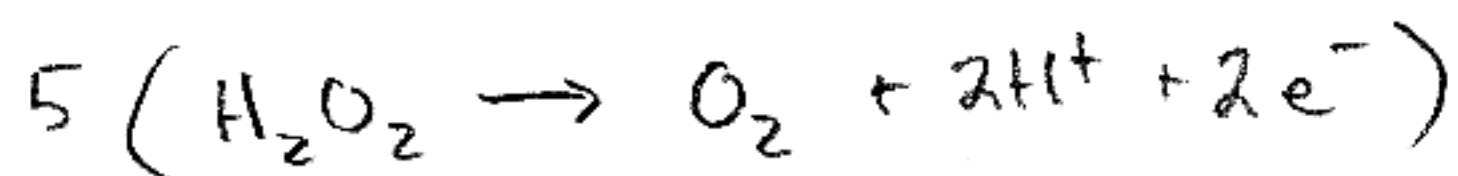
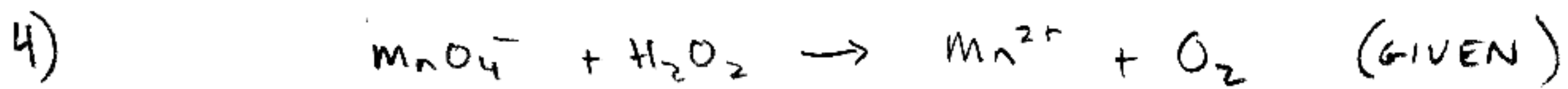
$$x = 7.3 \times 10^{-5}$$

↑  
[H<sup>+</sup>]

$$pH = -\log(7.3 \times 10^{-5})$$

$$pH = 4.14$$

x IS SMALL



$$42.8 \text{ mL} \times \frac{10^{-3} \text{ L}}{\text{mL}} \times \frac{0.0175 \text{ mol MnO}_4^-}{\text{L}} \times \frac{5 \text{ mol H}_2\text{O}_2}{2 \text{ mol MnO}_4^-} \times \frac{1}{5.00 \text{ mL}} \times \frac{\text{mL}}{10^{-3} \text{ L}} = 0.375 \text{ M H}_2\text{O}_2$$