pH and Buffered Solutions Worksheet

1. Which of the following would not make a good buffering system?
   a. SO_4^{2-} and H_2SO_4
   b. HCO_3^- and H_2CO_3
   c. NH_3 and NH_4^+
   d. CH_3COO^- and CH_3COOH

2. Explain your answer choice for the above problem?

3. Blood normally has a pH of 7.3. If your doctor finds that the pH of your blood is 6.4 she may treat you for….
   a. acidosis b. alkalosis c. low blood pressure d. hypothermia

4. Calculate the pH of a solution in which the $[H_3O^+]$ equals:
   a. 3.0×10^{-7} M

   b. 0.55 M

   c. 0.0212 M

   d. 0.003 M

5. Calculate the $[H_3O^+]$ of a solution if the pH=
   a. 7.89

   b. 3.5

6. Calculate the $[OH^-]$ of a solution if the pH= 11.68

Answers

1. a (SO_4^{2-} and $H_2S\,O_4$)

2. This is a strong acid, which would completely dissociate. Buffers are formed using weak acids/bases.

3. a (acidosis)

4.
   a. pH = – log (3.0×10^{-7}) = 6.52
   b. pH = – log (0.55) = 0.26
   c. pH = – log (0.0212) = 1.674
   d. pH = – log (0.003) = 2.5

5.
   a. $[H_3O^+] = 10^{-7.89} = 1.3 \times 10^{-8}$ M
   b. $[H_3O^+] = 10^{-3.5} = 3 \times 10^{-4}$ M

6. $[H_3O^+] = 10^{-11.68} = 2.1 \times 10^{-12}$ M

$$[OH^-] = \frac{1.0 \times 10^{-14}}{2.1 \times 10^{-12}} = 0.0048\ \text{M}$$