

Question 1: Label each compound as an Arrhenius acid, Arrhenius base, or neither.

HBr	Arrhenius acid
NaCl	neither
LiOH	Arrhenius base
Ca(OH) <sub>2</sub>	Arrhenius base
H <sub>2</sub> SO <sub>4</sub>	Arrhenius acid
Cl <sub>2</sub>	neither
K <sub>2</sub> SO <sub>4</sub>	neither
Mg(OH) <sub>2</sub>	Arrhenius base

Question 2: Write the conjugate acid of each compound below.

NH <sub>3</sub>	NH <sub>4</sub> <sup>+</sup>
SO <sub>4</sub> <sup>2-</sup>	HSO <sub>4</sub> <sup>-</sup>
OH <sup>-</sup>	H <sub>2</sub> O
HCO <sub>3</sub> <sup>-</sup>	H <sub>2</sub> CO <sub>3</sub>
PO <sub>4</sub> <sup>3-</sup>	HPO <sub>4</sub> <sup>2-</sup>

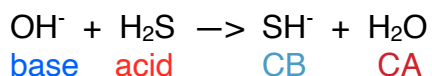
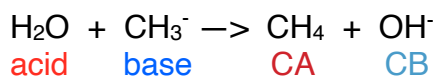
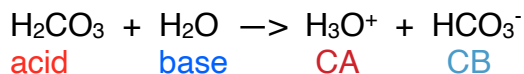
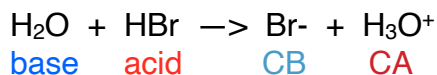
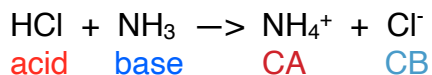
Question 3: Write the conjugate base of each compound below.

H <sub>3</sub> O <sup>+</sup>	H <sub>2</sub> O
HCO <sub>3</sub> <sup>-</sup>	CO <sub>3</sub> <sup>2-</sup>
HCl	Cl <sup>-</sup>
HF	F <sup>-</sup>
H <sub>2</sub> SO <sub>4</sub>	HSO <sub>4</sub> <sup>-</sup>

Question 4: For each reaction below, label the Bronsted-Lowry acid, base, conjugate acid, and conjugate base.

CA = conjugate acid

CB = conjugate base

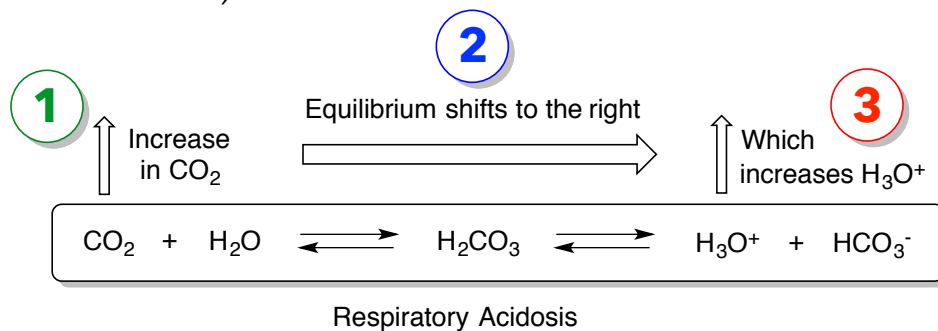


Question 5: Are the following bodily solutions acidic, basic or neutral?

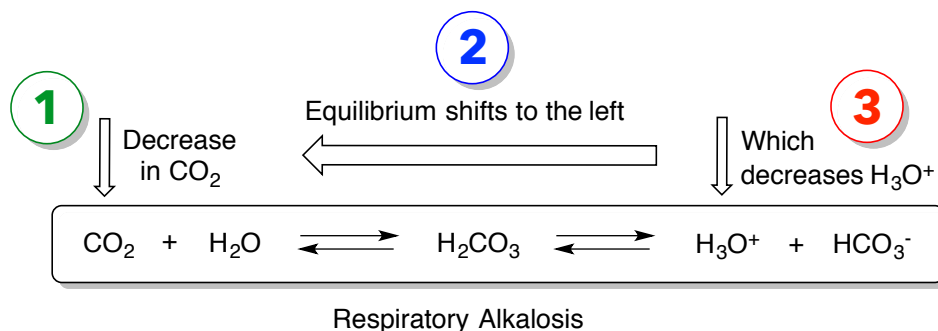
Bodily fluid	pH	Acidic, Basic, Neutral
saliva	6.80	Acidic
pancreatic fluid	8.62	Basic
blood	7.35	Basic
urine	5.90	Acidic
bile	8.4	Basic

Question 6: Explain the difference between respiratory acidosis and alkalosis.

*Respiratory acidosis occurs when the concentration of  $\text{CO}_2$  increases due to a lower respiratory rate, causing a shift in the human blood buffer equilibrium to shift to the right, which produces more  $\text{H}_3\text{O}^+$ . Increased  $\text{H}_3\text{O}^+$  results in making the blood more acidic (hence the name acidosis).*



*Respiratory alkalosis occurs when the concentration of  $\text{CO}_2$  decreases due to a higher respiratory rate, causing a shift in the human blood buffer equilibrium to produce less  $\text{H}_3\text{O}^+$ . Decreased  $\text{H}_3\text{O}^+$  results in making the blood more basic (hence the name alkalosis).*



Question 7: You have a patient that begins to hyperventilate. Your treatment is to have her to breathe into a paper bag held over her mouth. Provide an in-depth explanation of the chemical processes occurring in this treatment? Be sure to include topics such as:  $\text{CO}_2$  concentration, blood pH, equilibrium, and Le Chatelier's principle.

*During hyperventilation, a person inhales and exhales quickly, this reduces the amount of  $\text{CO}_2$  in the blood. This is a case of respiratory alkalosis. The increased pH of the blood beyond the normal 7.35-7.45 range can result in loss of consciousness. The proper treatment for this condition is to increase the  $\text{CO}_2$  concentration of the air they are breathing. A simple method to do this is to trap the  $\text{CO}_2$  the patient breathes out in a paper bag, which is then re-inhaled, thus shifting the equilibrium of the blood buffer back to normal. Both respiratory alkalosis and its treatment are examples of Le Chatelier's principle of applying a stress to a system, which will in turn shift to oppose the stress.*