SI A&P - Full Discipline Demo - Digital

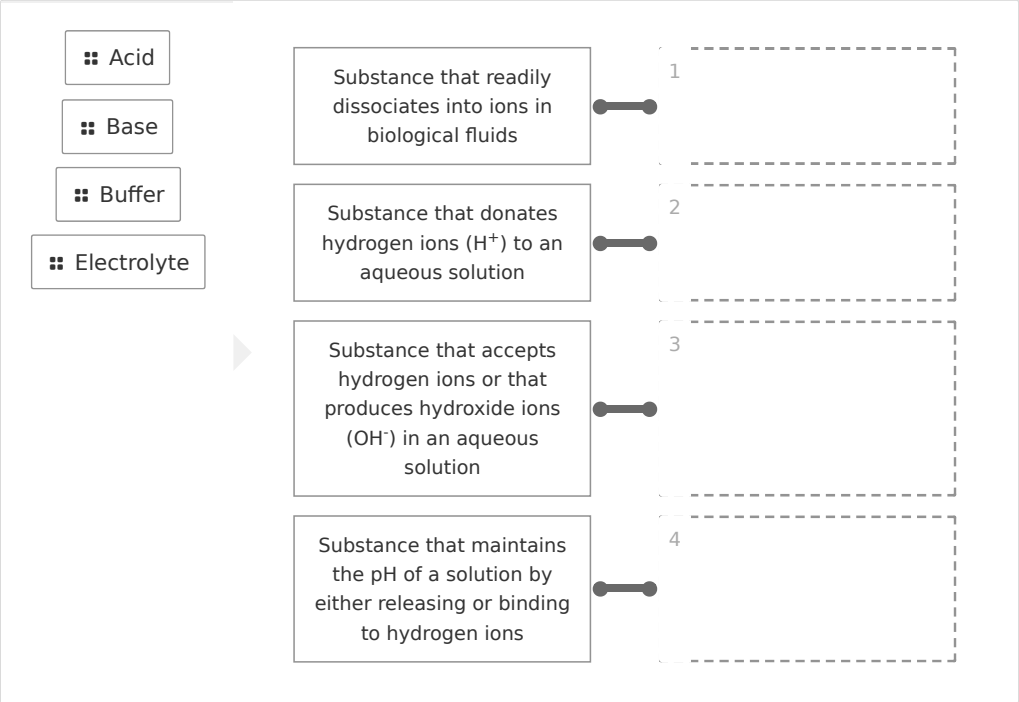
Electrolytes and Acid-Base Balance - No Materials

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Digital
Course	SI A&P - Full Discipline Demo - Digital
Instructor	Sales SI Demo

Test Your Knowledge

Match each term with the best description.



Correct answers:

1 Electrolyte 2 Acid 3 Base 4 Buffer

Categorize each statement as true or false

- Na^+ is critical for nerve impulse transmission and muscle contraction.
- The ions that result from dissociated electrolytes decrease fluid conductivity.
- The most important buffer system in the blood involves carbonic acid (H_2CO_3) and bicarbonate (HCO_3^-).
- The combined actions of the carbonic acid (H_2CO_3)-bicarbonate (HCO_3^-) buffer system allows the blood pH to maintain a range of 3.5-4.5.

True	False
1	2

Correct answers:

1 Na^+ is critical for nerve impulse transmission and muscle contraction.

The most important buffer system in the blood involves carbonic acid (H_2CO_3) and bicarbonate (HCO_3^-).

2

The combined actions of the carbonic acid (H_2CO_3)-bicarbonate (HCO_3^-) buffer system allows the blood pH to maintain a range of 3.5-4.5.

The ions that result from dissociated electrolytes decrease fluid conductivity.

Exploration

What is the most abundant cation in the intracellular fluid?

- Sodium
- Calcium
- Potassium ✔
- Magnesium

pH is a measure of the concentration of hydrogen ions [H^+] in a substance.

- [x] True
- [ ] False

When a buffered solution becomes too alkaline, the weak acid will bind to the _____ in the solution, lowering the pH.

- [ ] acids
- [x] bases
- [ ] electrons
- [ ] water

Exercise 1

What effect did the electrolytes have on the electrical conductivity through the water? Use your observations to explain your answer.

The electrolytes increased electrical conductivity, as evident by the LED light turning on only when the electrolytes were present in the solution.

How do these results relate to the role of electrolytes regarding electrical conductance in the body?

Both neural and muscle cells rely on electrical impulses in order to function. Without a sufficient amount of electrolytes, neural and muscle cells will not be able to function properly.

Which electrolytes were present in the packet used in the procedures. What are the functions of these electrolytes in the human body?

Sodium (Na^+) and chloride (Cl^-) were present in the packet. Na^+ is a critical molecule for nerve impulse transmission and muscle contraction.

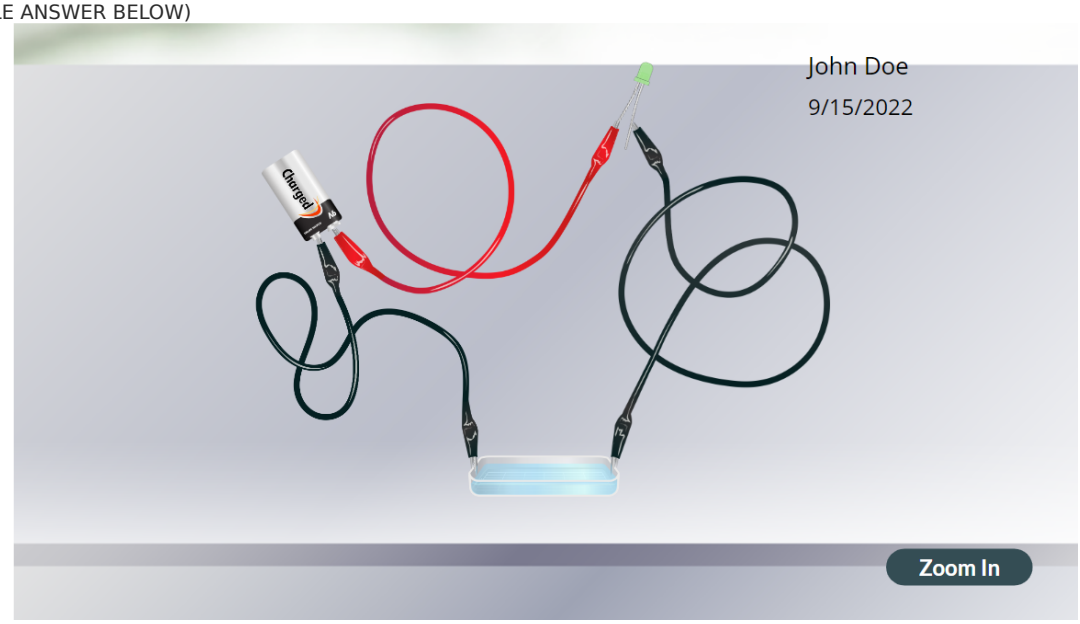
Observation 1: LED with Distilled Water

(SAMPLE ANSWER BELOW)

LED light will either be very dim or produce no light at all.

Photo 1: LED with Distilled Water

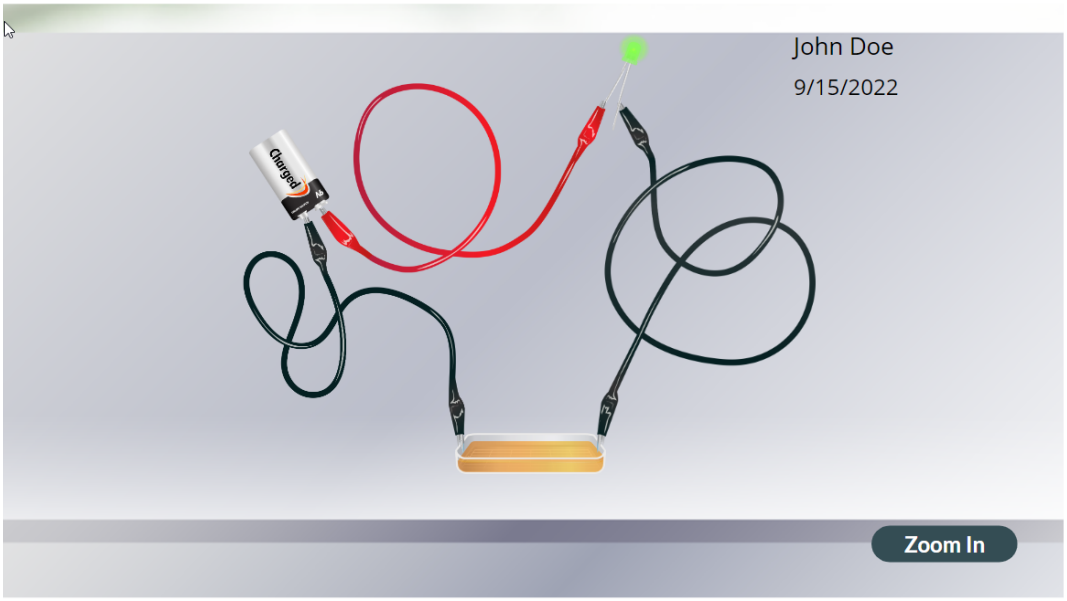
(SAMPLE ANSWER BELOW)



Observation 2: LED with Electrolytes
(SAMPLE ANSWER BELOW)

LED light will be brightly lit.

Photo 2: LED with Electrolytes
(SAMPLE ANSWER BELOW)



Competency Review

Na^+, Ca^{2+}, and K^+ are examples of _____ present in the human body.

- acids
- bases
- buffers
- electrolytes ✔

A substance with a pH below 7.0 is considered an acid.

- True ✔
- False

Electrolytes function to maintain _____ in the human body.

- water balance
- pH
- electrical conductivity
- All of the above ✔

_____ regulates fluid movements in the body and forms hydrochloric acid in the stomach.

- Ca^{2+}
- Cl^- ✔
- K^+
- Na^+

The carbonic acid-bicarbonate buffer system allows the blood pH to maintain a range of 7.35-7.45.

- True ✔
- False

A(n) _____ is part of a setup used to measure the electrical conductivity of a solution.

- 9-volt battery
- alligator clip
- LED
- All of the above ✔

Na^+ and Cl^- electrolytes decrease the conductivity of distilled water.

- True
- False ✔

Extension Questions

Acidosis is a condition in which the pH of the blood falls below the healthy range, and alkalosis is a condition in which the pH of the blood rises above the healthy range. Apply your knowledge of the acid-base balance within the body to predict which body system(s) would be malfunctioning to result in either acidosis or alkalosis? (SAMPLE ANSWER BELOW)

Either the respiratory system or the urinary system malfunctions would cause the imbalance in the blood pH as those are the two body systems most heavily involved in maintaining acid-base balance in the body.