

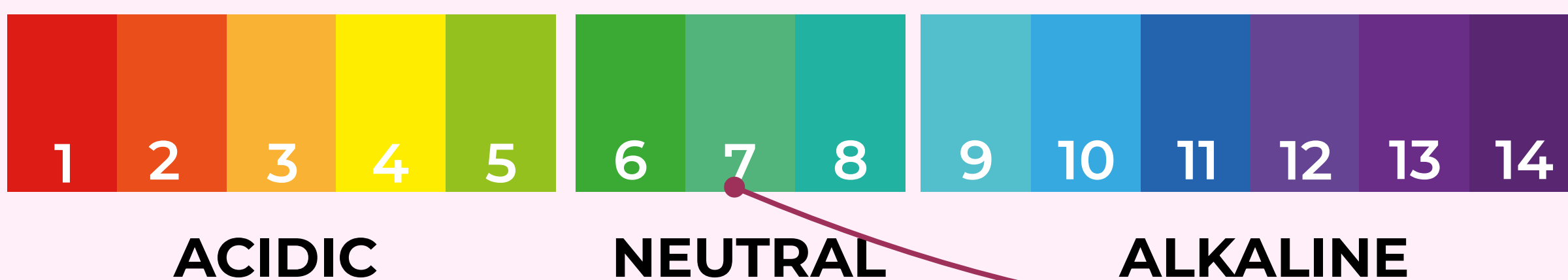
THE EVIDENCE BEHIND PH BALANCE

Scientific Example

Buffers are widely used in science to help maintain stability in human processes like the pH levels in our blood (LibreTexts, 2013). A buffer consists of either a weak acid and its conjugate base and vis versa. The pH scale ranges from acidic (1-6), neutral (7), and basic (8-14). A buffer acts to resist the changes in pH by adding H^+ to a more basic solution or taking H^+ out of an acidic solution (Santa Monica College, 2017). A buffer that occurs in our bodies known as the bicarbonate buffer is used to remove and increased amount of H^+ in our blood that occur from the formation of carbonic acid (Shaw & Gregory, 2022). The CO_2 in our lungs is transported into our blood (plasma) and when it reacts with water it forms carbonic acid (Shaw & Gregory, 2022).

Nature of Science Connection

When using a buffer, scientists must determine the exact pH of the solution they are working with. To do this, they use a pH metre or indicator to measure if the solution is acidic, neutral, or basic. Depending on the pH of the solution, scientists can choose a specific buffer that will be suitable under the solution's conditions. In our blood the pH level sits at pH 7.4 and it becomes acidic in the presence of carbonic acid. The buffer used to revert the pH back to stable conditions will take out the H^+ ions because it is in an acidic environment. If the wrong buffer were used it could cause major problems. This strongly displays that scientific knowledge is based on evidence. The use of buffers to maintain pH would not be possible without knowing the ion counts in the solution.



THE PH OF HUMAN BLOOD IS 7.4, WHICH IS SLIGHTLY BASIC!

Why This Matters

The concept that scientific knowledge is based on evidence is the foundation of scientific discoveries. Without evidence, science would simply be an opinion. This principle allows people to trust the information they are given. This can help teachers teach science more accurately and effectively because they aren't teaching their own opinion, and it remains consistent throughout the world. If science were built on the personal opinions of each scientist, the quality of education would significantly decrease because everyone would be taught differently.

Learning or Classroom Use

This case card could be used by a teacher as an introduction to a lesson. Buffers and pH are widely used in human biological systems. Using this case card to introduce the concept of how science is evidence based or how buffers work to control pH can engage the students with a personal example.

References

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