

Activity 2 – Measuring pH changes in the blood

Introduction

The pH of the blood changes in different circumstances. The body tries to maintain the pH between 7.35 and 7.45 as part of homeostasis. pH above or below this level can alter the function of cells and proteins in the body. This can cause damage.

Aim of activity

This activity will teach pupils how the pH of blood changes during, exercise, illness and injury.

Materials

Each pupil will need:

- Three Litmus Papers
- Well plate
- Pipette
- Universal indicator
- Gloves
- Labcoat
- Goggles
- Worksheet

For lesson preparation:

- Food colouring, red
- Water
- Four beakers
- Vinegar

Pre-lesson preparation

1. Prepare three beakers of solution with increasing acidity. Prepare one beaker with a neutral pH. The students will test each solution using litmus paper.
Neutral solution – blood of a healthy person
Solution 1 – Blood following exercise (slightly acidic due to CO₂)
Solution 2 – Blood during minor illness (more acidic due to immune cells and messengers)
Solution 3 – Blood after major illness (most acidic due to a mixture of CO₂ and the immune response)

Instructions

1. Introduce the activity to students by discussing how pH of blood must be maintained to stay healthy and keep enzymes and proteins in the body functioning at their optimum.
2. Hand out the work sheets and ask the students to take a sample of each solution and place it in separate wells

3. Then ask the students to test the neutral solution, discuss how this represents a normal healthy person
4. Then test Solution 1, discuss how CO₂ is slightly acidic and it can build up during strenuous exercise.
5. Then test Solution 2, discuss how immune cells release toxic molecules and messengers during illness, which can change the pH
6. Then test Solution 3, ask the students what situations they think would make the blood more acidic.
7. Discuss how during injury patients have reduced blood circulating and therefore retain CO₂ and also release immune cells so the increase in both created a more dramatic pH change.