

Animal Fluid Balance Chapter

Experiment

Basic Level Difficulty Rating: Can Be Done With:

FB-1: Osmoregulation

Overview

For the biochemical reactions in cells to proceed properly, the optimal conditions of the internal environment of the cells must be maintained. The cell membrane forms the barrier that separates the internal environment of the cell from the external environment. The membrane maintains the balance of fluid gained and lost by the cell so that any fluctuations in the osmotic and ionic conditions in the cell are minimized, and reactions can proceed normally.

Animals living in the ocean are exposed to an external environment that has minimal fluctuations in osmotic and ionic conditions. These relatively constant conditions in the external environment, coupled with the similarity of the internal environment to the chemical composition of seawater, makes the maintenance of the internal environment of these animals relatively simple.

Animals living in freshwater are exposed to an environment with low concentrations of ions and a high concentration of water. In this type of environment, cells lose ions and take on water. Animals have developed mechanisms that remove water and retain ions to prevent cells from swelling and bursting.

Conversely, animals living in air are exposed to a very harsh environment with a low concentration of water. Without proper levels of water, cells can dehydrate and shrink. In this environment, animals have developed mechanisms that conserve water and remove excess ions.

The pioneer French physiologist Claude Bernard described the internal fluid of plasma and extracellular fluid that bathes most of the cells in our bodies as the *milieu interieur*. In order to maintain this solution at near constant conditions, organisms use many different processes, which are encompassed by the term *homeostasis*. In most cases, healthy organisms use a negative feedback mechanism that quickly detects any changes in their internal conditions and corrects the internal environment before drastic changes to their cells occur.