ABO Simulated Blood Typing Kit

Student Laboratory Kit

Introduction:

A blood transfusion with blood of a mismatched blood type usually has serious consequences for the recipient of the blood. Today, complete blood analysis is done with sophisticated, costly equipment before transfusions are done. The basic principles of blood typing will be illustrated in this activity using simulated ABO and Rh blood typing sera and simulated bloods.

Concepts:

- Antigens
- Antibodies
- Multiple Alleles
- Codominance

Background:

General

Early attempts to transfer blood from one person to another produced varied results. Sometimes it seemed to help the recipient and other times it produced very serious consequences. Eventually, it was discovered that each individual has a unique combination of substances in his or her blood. Some of these substances may be compatible with another person's blood and some may not be compatible. These findings led to the discovery and development of procedures to type an individuals' blood. It is now known that safe transfusions of blood depend upon properly matching the blood types of the donors and the recipients.

Genetics of Blood Types

ABO blood type is determined by the presence or absence of specific proteins on an individual's red blood cells. A basic genetic principle is that an individual's inherited genes determines which proteins are produced in the individual's body. In the ABO blood typing system (just one of many blood factors) the blood proteins (antigens) are called the A and B proteins. The presence or absence of the A and B proteins on the red blood cells determines the individual's blood type in the ABO typing system. Individuals whose red blood cells contain protein A and lack protein B have type A blood. Those with protein B and lack protein A are called type B. Individuals with both protein A and B are called type AB and individuals with neither of the proteins is called type O.

ABO blood type is a genetic example of multiple alleles. There are three alleles in the gene pool for ABO blood type, i.e., I^A, I^B, and i. I^A codes for protein A, I^B codes for protein B and i codes for neither protein A nor protein B. Within this multiple allele pool the gene interactions illustrate both simple dominance as well as codominance. (Remember each individual has only two alleles for each trait even if there are multiple alleles in the gene pool.) When the I^Ai allele combination occurs, the individual is blood