

Backboard Information on Blood Typing Analysis

Blood is the liquid tissue circulating through veins and arteries within the body. Blood is classified as connective tissue and it is a window into the body and your health. One of the first tests ordered by doctors for patients with medical complaints is blood tests.

Blood is made up of 4 components. 55% of blood is a yellowish liquid called plasma which contains 90% water and 10% salts and chemicals. The most numerous cells in the blood are red blood cells which comprise about 40% of blood. Red blood cells are produced in the bone marrow and are living cells without a nucleus. They live for only 100 to 120 days. Red blood cells carry hemoglobin, which is used to transport oxygen, and this gives blood its red color. 4% of the blood is made up of white blood cells which act as the body's defense system. Produced in the spleen and lymph nodes, white blood cells attack bacteria, which invade the body. 1% of blood is made up of blood platelets, which are necessary for blood clotting. Formed from bone cells in bone marrow, individuals born without platelets have the genetic disease, hemophilia.

Early attempts to transfer blood from one person to another produced varied results. **If compatible blood types were mixed, the transfusions were successful. If incompatible blood types were mixed, the transfused blood clumped** due to a chemical reaction with antibodies in the recipient's blood and the patient died of a heart attack.

Around 1900, Karl Landsteiner discovered there are at least four different types of blood based on the presence or absence of certain clumping chemicals called **agglutinogens** on the surface of red blood cells. This is known as the **ABO blood groups**. The four blood groups characterized by the absence of A or B agglutinations are A, B, AB, and O.

In **Type A blood** the person has antigen A proteins attached to their red blood cells and anti-B antibodies within the fluid of the blood; **Type B blood** has antigen B proteins attached to the red blood cells and anti-A antibodies within the fluid of the blood; **Type AB** where the person has both antigens A and B attached to their red blood cells and no anti-A or anti-B antibodies; and, **Type O** where there are no antigens A or B attached to the red blood cells but carries both anti-A and anti-B antibodies.

In the United States Type O blood is most common with 45% of the population having this blood type. Next is frequency is Type A found in 39% of the population, Type B found in 12% of the population and Type AB is found in 4% of the population. Finally blood types are **hereditary. You inherit your blood type from your parents.**

Whenever blood has been shed, the identification and typing of the blood stains are of primary importance to the crime investigator. The ABO blood groups are used to screen out possible suspects in a crime. The **first step** is to distinguish blood stains from other similar looking compounds such as paint. **Second** a test is performed to determine the blood type. Although a positive match for blood type is not sufficient along to convict a person of a crime, it is one more piece of evidence to be used along with other evidence. It is one type of evidence often obtained during a crime investigation.

Instruction Card

BLOOD TYPING ANALYSIS

Blood was found at the scene of the crime by the broken window. You are to determine the blood type through a simulation of blood transfusions. The droplets of blood at the **scene of the crime** belong to an individual who **can only safely receive blood from donor blood groups A and O.**

Recipient blood

Donor Blood	A	B	AB	O
A	yes	no	yes	no
B	no	yes	yes	no
AB	no	no	yes	no
O	yes	yes	yes	yes

Procedure:

1. In the data table **YES** means the blood transfusion is safe [no agglutination/clumps formed]. **NO** means the transfusion is unsafe [agglutination/clumps formed]
2. Examine the data table and determine the blood type of the crime scene blood.



