

Blood Serology

There are two parts to the serology section of the Forensics event. One part is to be able to identify the human blood type. There are four basic human blood types based on the proteins on the red blood cell membranes. There are two different proteins that may be present on the cell membranes. One is labeled “A” and the other “B”. Those who have the A protein on their cell membrane have Type A blood. Those who have the B protein on their cell membranes have the Type B blood. Those who have both proteins have Type AB blood. Those who have neither of the proteins have Type O blood.

Tests are done on the blood to determine which proteins are on the red blood cells. A chemical that coagulates the red blood cells if they have that protein on them is called the antigen. Antigen A will coagulate Type A and Type AB blood but not Type B or Type O. Antigen B will coagulate Type B and type AB blood, but not Type A or Type O. Therefore by reacting blood with Antigen A and Antigen B, the Forensic scientist is able to determine the person’s blood Type.

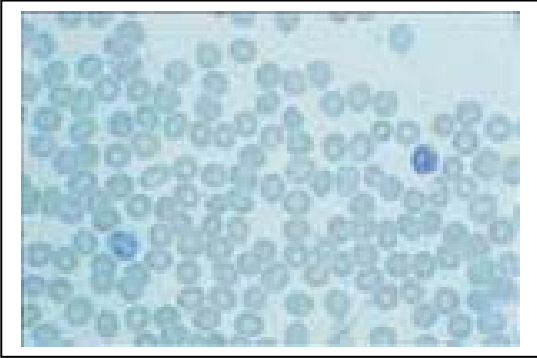
In real life, there is a third protein on some red blood cell membranes. If you have the protein, you are Rh+. If not, you are Rh-. We will not be simulating this test in this event. Real blood is much too dangerous for us to use in a Science Olympiad event, so we will be using simulations, slides, or pictures of slides.

If the event supervisor is using simulations, they are required to tell you how the simulation works. Some popular simulations are based on precipitation reactions. That is the chemical labeled “Antigen A” will precipitate with the chemical labeled “Type A” and “Type AB”, but not with the chemical labeled “Type B” and “Type O”. The chemical labeled “Antigen B” will precipitate with the chemicals labeled “Type B” and “Type AB”, but not with the chemicals labeled “Type A” and Type O”. You will therefore need to be familiar with what a precipitation reaction looks like. It is possible that the event judge will try to make things more realistic by putting red food coloring in the “blood”. You should therefore practice looking for precipitation reactions in solutions that have red food coloring in them.

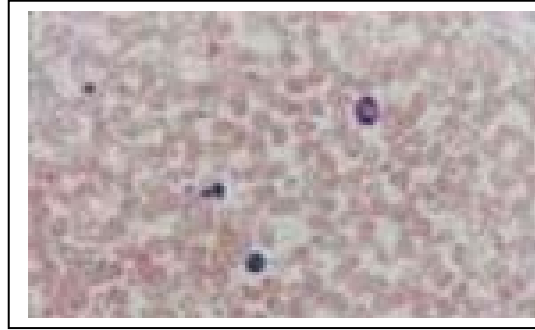
In another type of simulation, food coloring is used. A “positive reaction” is a drastic color change, not just the color getting lighter or darker. So for instance the “Antigen A” bottle will be blue, while the “Antigen B” bottle will be red. Then if Type A” blood is red, “Type B” blood is blue, “Type AB” blood is yellow, and “Type O” blood is plain water, when you mix “Antigen A” with “Type A” you will get purple, which would be a drastic color change. But “Antigen A” with “Type B” will not be a color change, etc.

The second part of the problem is to determine if blood found at the scene is human, other mammalian, or amphibian. The following pictures are provided to allow you to see the differences between the different types of blood.

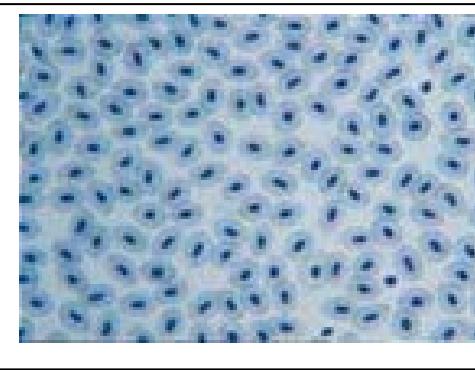
Human Blood



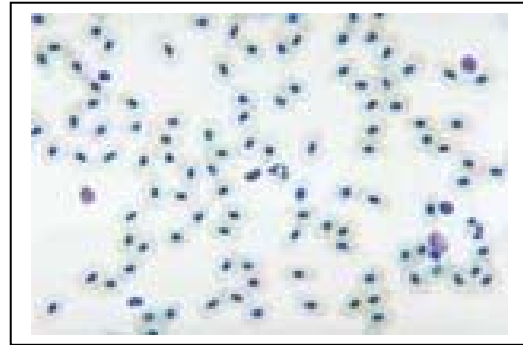
Human Blood



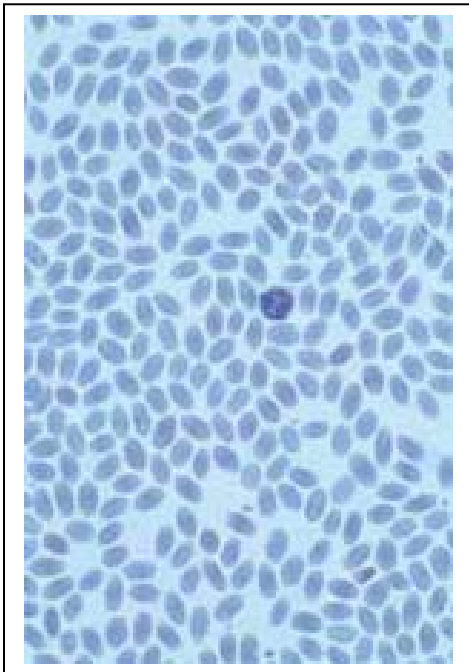
Fish Blood



Frog Blood



Camel Blood



Horseshoe Crab Blood

