Determination of ABO blood group

Principle

The classification of blood groups based on the presence or absence of antigens A and B on the surface of red blood cells is called ABO blood grouping. This system of blood grouping was identified by Landsteiner et al. in the year 1900. Bernstein (1925) described that three types of alleles, I^A, I^B & I^0 are responsible for the ABO blood grouping system.

Blood group	Genotypes	Antigen	Antibody	Compatible donor blood groups	Incompatible donor blood groups
A	I^AI^A, I^AI^0	A	b	'O' and 'A'	'B', 'AB'
B	I^BI^B , I^BI^0	B	a	'O' and 'B'	'A' , 'AB'
AB	I^AI^B	Both 'A' and 'B' antigens	Neither 'a' nor 'b' antibody	'A' , 'B', 'AB' and 'O'	None
O	I^0I^0	Neither 'A' nor 'B' antigen	Both 'a' and 'b' antibodies	O	'A' , 'B' and 'AB'

All the above-mentioned three alleles share the same locus, hence are called multiple alleles. I^0 allele is recessive to both I^A and I^B alleles. Again, I^A and I^B are codominant alleles. Interaction between similar types of antigen and antibody cause blood to agglutinate. So 'O' blood group is known as 'Universal donor' blood group as in this case RBC lacks A and B antigens and so such blood can be donated to all other blood groups. Similarly, a man with AB blood group can receive blood from all other blood groups and is therefore known as 'Universal recipient'.

The second most important blood group system, after the ABO blood group system is the Rh blood grouping system. This is based on the presence or absence of the blood group antigen called Rhesus factor (abbreviated as Rh factor). Rh factor was discovered in 1937 by Karl Landsteiner and Alexander S. Wiener, who, at the time, believed it to be a similar antigen found in rhesus monkey red blood cells. The terms Rh factor, Rh positive, and Rh negative refer to the Rh(D) antigen only.

Materials required

1. Clean grease-free slides
2. Cotton
3. Rectified spirit
4. Sterile needle
5. ABO blood grouping kit
6. Clean match sticks

Method

1. Clean the slides and mark three points as A, B and D.
2. Clean one of the fingers by rubbing with cotton soaked in rectified spirit.
3. When the finger dries, prick the tip of the finger with the sterile needle so that blood comes out.
4. Put one drop of blood each near the points A, B and D.

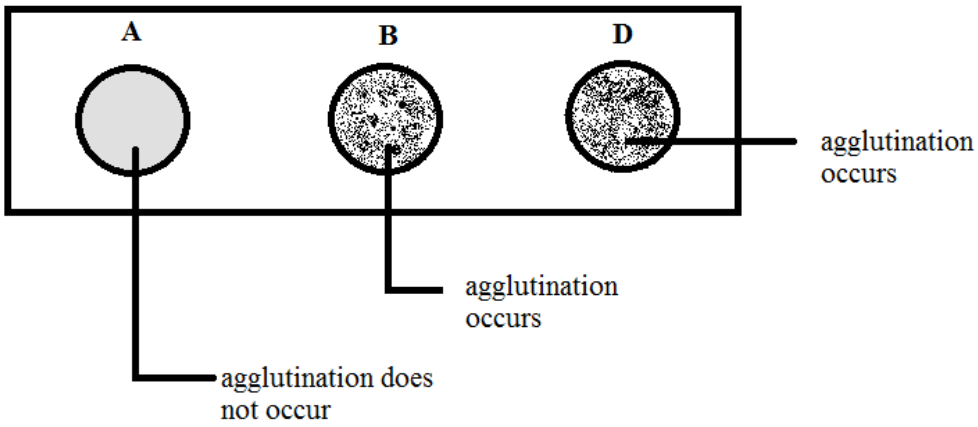
5. Put one drop of anti-serum A, B and D on the blood drops near the points A, B and D respectively.
6. Mix the liquids at each of the three points with the wooden ends of three separate clean matchsticks.

Observation

Theoretically, we know that

1. If blood near point A agglutinates, then the blood group is 'A'.
2. If blood near point B agglutinates, then the blood group is 'B'.
3. If blood near both the points A and B agglutinate, then the blood group is 'AB'.
4. If neither of blood near point A or B agglutinates, then the blood group is 'O'.
5. If blood near point D agglutinates, then the blood group is 'Rh positive', else it is "Rh negative'.

In this experiment it was found that blood near points 'B' and 'D' agglutinate. So the blood used here is B positive.



[Here students will write their own blood groups and draw accordingly.]

Conclusion

Since the blood used in the present experiment agglutinated with anti-B and anti-D serum, therefore it can be concluded that it belongs to blood group B positive.