

**ABO BLOOD TYPING****Background**

Around 1900 it was discovered that there are at least 4 different kinds of human blood. The 4 blood types are known as A, B, AB, and O. Blood type O is the most common in the United States (45% of the population). Type A is found in 39% of the population. Type B is 12% of the population, and type AB is found in only 4% of the population.

Blood typing is based on the fact that on the surface of the red blood cells there may be one or more proteins, called antigens. These antigens are called A and B. A person normally produces antibodies against the antigens that are not present on his or her red blood cells. If blood cells are mixed with antibodies the cells will clump together. This is called agglutination. This is why it can be very dangerous if you receive the wrong blood type in a transfusion.

Because of the different blood types, certain blood groups can only give or receive blood from other specific blood groups:

Blood Type	Antigens on Blood Cells	Antibodies in Plasma	Can Give Blood To	Can Receive Blood From
A	A	anti-B	A or AB	O or A
B	B	anti-A	B or AB	O or B
AB	A and B	none	AB	O, A, B, AB
O	none	anti-A and anti-B	O, A, B, AB	O

Blood typing is performed by mixing a small sample of blood with anti-A or anti-B antibodies (called antiserum), and the presence or absence of clumping is determined for each type of antiserum used. If clumping occurs with only anti-A serum, then the blood type is A. If clumping occurs only with anti-B serum, then the blood type is B. Clumping with both antiserums indicates that the blood type is AB. No clumping with either serum indicates that you have blood type O.

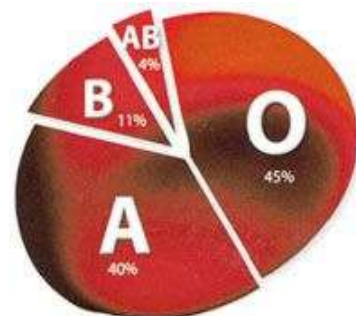
**PURPOSE:** To determine the blood type of each blood sample.

**PRELAB QUESTIONS:**

1. What is the most common blood type in the US?
2. What is blood typing based on?
3. What is agglutination?
4. Based on the table above, what blood type would be considered the “universal receiver”? Which would be the “universal donor”?
5. In this lab, how will you know what blood type the sample is? Explain.

**MATERIALS:**

4 Simulated Blood Samples (at Stations)  
8 toothpicks (per group)  
Anti-A Simulated Typing Serum for each station  
1 well plate (per group)  
Anti-B Simulated Typing Serum for each station



**PROCEDURE:**

There are 4 blood-typing stations set up in the room. You will go to each one and test the “blood” there with the two testing fluids provided. Each group member will observe the reaction of each test, and use these observations to determine the blood type at each station.

1. Your well plate should be used as follows:

Well row #1 = Baby #1      Well row #3 = Baby #3  
Well row #2 = Baby #2      Well row #4 = Baby #4

2. Place a dropper full of Baby #1’s blood in two of the wells in row #1.  
3. Add 5 drops of simulated anti-A serum to each A well in the plate.  
4. Add 5 drops of simulated anti-B serum to each B well in the plate.  
5. Use separate toothpicks to stir each sample of serum and blood.  
6. Repeat steps #2-5 for Baby #2, then Baby #3, then Baby #4.  
7. Record your observations in the table below.

**NOTE:** Clumping indicates a positive reaction. If a sample has a positive reaction to Anti-A serum only, it is type A. If a sample has a positive reaction to Anti-B serum only, it is type B. If a sample has a positive reaction to both serums it is AB. If a sample doesn’t have a positive reaction to either one, it is O.

	Anti-A Serum (Clumping or No Clumping)	Anti-B Serum (Clumping or No Clumping)	Blood Type (A, B, AB, O)
<b>Baby #1 (Row #1)</b>	<div>clumping</div>	<div>clumping</div>	
<b>Baby #2 (Row #2)</b>	<div>No clumping</div>	<div>clumping</div>	
<b>Baby #3 (Row #3)</b>	<div>clumping</div>	<div>No clumping</div>	
<b>Baby #4 (Row #4)</b>	<div>No clumping</div>	<div>No clumping</div>	

**QUESTIONS** (Write out question and answer on separate sheet of paper.)

1. Which baby or babies that you tested could be born to these parents: mother who is type A and father who is type B? Illustrate with Punnett squares.
2. What would the genotypes have to be of those parents if they produced  
Baby #1?    Baby #2?    Baby #3?    Baby #4?
3. Could a man with an AB blood type be the father of an O child? **Explain.** Use Punnett square(s) to illustrate.
4. Could a man with type O blood be the father of an AB child? **Explain.** Use Punnett square(s) to illustrate.
5. Could a type B child with a type A mother have a type A father? **Explain.** Use Punnett square(s) to illustrate.