

SYSTEM ABO-Rh DETERMINATION

REF: ABO-Rh 12 Students

No human materials are used in this experiment.

1. OBJECTIVE OF THE EXPERIMENT

The ability to determine the blood type of the blood is an invaluable instrument in the fields of medicine and criminology. Using this kit, students will perform the same technique that is used for blood type determination. For this, the blood is mixed with Anti-serum A, Anti-serum B and Anti-serum D to see if there is the agglutination reaction that will indicate the blood type. While the test procedure used in this kit is the same as that used with true blood, **this kit contains synthetic blood and synthetic antiserum. This eliminates any risk associated with exposure to actual blood or blood products.** These materials can be discarded after use. There are no biological materials in synthetic blood or in synthetic antiserum that may cause health risks when disposed of.

Blood type	A	B	AB	O
Erythrocyte				
Antibodies in human plasma			None	
Antigens on erythrocytes	Antigen A	Antigen B	Antigens A & B	None

2. EXPERIMENT COMPONENTS

The kit supplies the necessary material for **individual practice** with 12 students. Students will be divided into **3 groups of 4 people** to use common reagents (micropipettes, blood and antiserum).

- a) 50 slides, **each student have 4**, since there are 4 blood samples to determine their type.

- b) 150 toothpicks to stir. **There are 50 toothpicks per group (12 per student).**
- c) 12 micropipettes of 1.2 ml. **There are 4 micropipettes per group (one per blood sample).**
- d) 12 samples of synthetic blood to determine their blood type and 9 samples of antiserum. They are presented in 3 individual bags, **one bag for each group of 4 students.**
- VERY IMPORTANT: It is possible that some blood sample is separated in two phases; you have to mix the content of all the samples bloods until the homogenous solution is seen.**

3. PRACTICE

1. Each student must have 4 slides (one per blood sample). With a supplied micropipette, place 1 or 2 drops of **blood 1 (red cap)** at 3 different places on the slide (observe the photos of the examples). It is convenient to identify each slide with the sample to be analyzed.

VERY IMPORTANT: All students in the same group use the same micropipette to deposit the drops of blood.

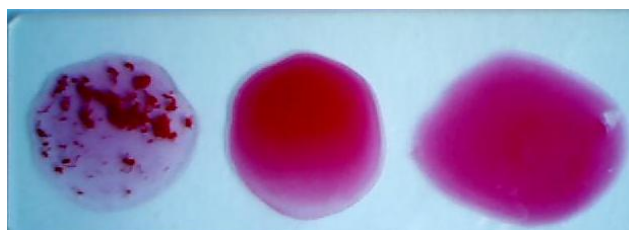
2. Add 1 or 2 drops of **Anti-serum A (blue liquid)** in the blood drops.
3. Add 1 or 2 drops of **Anti-serum B (yellow liquid)** into the blood drops.
4. Add 1 or 2 drops of **Anti-serum D (Rh) (clear liquid)** into the blood drops.
5. Wait 1 minute. Using a different toothpick for each reaction, mix the blood drops with those of Anti-serum for 20 seconds. Avoid contamination between reactions.
6. Examine the mixtures, **if granules are formed**, the agglutination has taken place. If on the contrary the mixture is homogeneous, there is no agglutination.

NOTE: The Rh⁺ agglutination reaction is different from that observed in types A and B, lumps are formed but the red color remains in the entire mixture that can be misleading.

7. Each student must respond to **table 1** with YES or NO. SI, when the agglutination reaction takes place. A positive agglutination reaction indicates the blood type.

8. Repeat steps 1 through 7 for the remaining synthetic blood samples (**green, blue** and **black**).

EXAMPLES OF AGGLUTINATION A-

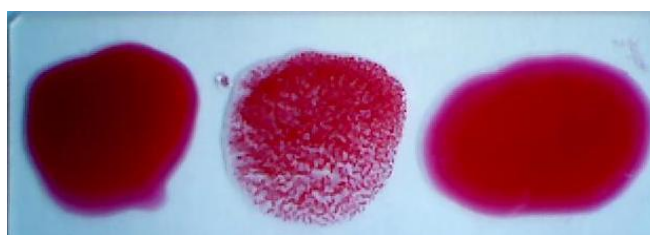


Anti-A

Anti-B

Anti-D (Rh)

EXAMPLES OF AGGLUTINATION B-



Anti-A





Anti-B

Anti-D (Rh)

QUESTIONS TO EVALUATE STUDENTS

The next tables contain written in red the answers to be given by the student; the teacher must provide photocopies with empty tables to be filled out by students

TABLE 1

	BLOOD 1	BLOOD 2	BLOOD 3	BLOOD 4
ANTIGENS				
Anti-A Blue solution	<i>YES</i>	<i>NO</i>	<i>YES</i>	<i>NO</i>
Anti-B Yellow solution	<i>NO</i>	<i>YES</i>	<i>YES</i>	<i>NO</i>
Anti-D(Rh) Transparent solution	<i>NO</i>	<i>YES</i>	<i>YES</i>	<i>NO</i>
BLOOD TYPE	A-	B+	AB+	O-

We present a series of additional questions that can be used to evaluate students' knowledge of the ABO and Rh types and their importance. **The correct ANSWERS are written in RED.**

1. For each given blood type, answer the expected result of the agglutination reaction when the blood is mixed with each antibody.

Blood type	Anti-A	Anti-B	Anti-Rh
A+	<i>YES</i>	<i>NO</i>	<i>YES</i>
A-	<i>YES</i>	<i>NO</i>	<i>NO</i>
B+	<i>NO</i>	<i>YES</i>	<i>YES</i>
B-	<i>NO</i>	<i>YES</i>	<i>NO</i>
AB+	<i>YES</i>	<i>YES</i>	<i>YES</i>
AB-	<i>YES</i>	<i>YES</i>	<i>NO</i>
O+	<i>NO</i>	<i>NO</i>	<i>YES</i>
O-	<i>NO</i>	<i>NO</i>	<i>NO</i>

2. Given the antigens found in red cells (erythrocytes), write in the next table to the blood type and the corresponding antibody in the blood.

Antigen on erythrocytes	Blood type	Antibodies in plasma
A	<i>A</i>	<i>Anti-B</i>
B	<i>B</i>	<i>Anti-A</i>
AB	<i>AB</i>	<i>none</i>
NONE	<i>O</i>	<i>Anti-a and Anti-B</i>