Prelab Information

**Purpose** Explore the blood types of four patients by performing blood- clotting tests.

**Time** Approximately 45 minutes

**Question** How can you determine a person’s blood type using blood-clotting tests?

**Scenario** You work in a hospital emergency room. Four patients have just come in from a construction accident. They all have wounds and have lost a lot of blood. The doctors say that they each need a transfusion of one pint of blood. Unfortunately, the blood bank at

the hospital is running low. There is only one pint of blood remaining for each of A+, AB–,

B–, and O+ blood types, and no blood of any other type in stock.

**Summary** You will test the four patients’ (simulated) blood using serums. Then you will determine their blood types so that you can choose blood that they can safely receive.

Safety

 Always wear a lab gown and safety goggles while performing an experiment. 

 Always wear rubber or nitrile gloves when handling human tissue samples such as blood.

 Behavior in the lab needs to be purposeful.

 Check glassware, such as your microscope slides, for cracks and chips prior to use.

 Report all accidents—no matter how big or small—to your teacher.

 In this lab, you will simulate blood with milk, water, and food coloring. However, use gloves anyway.

Lab Procedure

1. Gather Materials

|  |
| --- |
| Testing kits containing simulated blood, anti-A serum, anti-B serum, and anti-Rh serum for each of the tests shown to the right: |

 18 slides *or* a reaction plate

 stereoscope (20× or 40×)

 plastic droppers

 wax pencil

 toothpicks

 Positive control test

 Negative control test

 Patient 1 test

 Patient 2 test

 Patient 3 test

 Patient 4 test

**If you use slides:** Label three slides each *+Control, –Control, Patient 1, Patient 2, Patient 3, Patient 4*. Label the three slides in each group A, B, and Rh.

**If you use a reaction plate:** Label the edges of the plate as shown below.

 **A B Rh** *[unused]*

|  |  |  |  |
| --- | --- | --- | --- |
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|  |  |  |  |

**–Control**

**+Control**

**Patient 1**

**Patient 2**

**Patient 3**

**Patient 4**

1. Perform Negative Control Tests for Comparison Purposes

For this test, use the Negative Control kit and the test area labeled *–Control*. The blood is O–, which is suitable for a negative control test because it has none of the antigens A, B, or Rh.

**a)** Using a clean dropper, transfer one drop of blood each to the A, B, and Rh positions.

**b)** Using a clean dropper, add three drops of anti-A serum to the first drop of blood. With a clean toothpick, gently stir for about 30 seconds.

**c)** Using a clean dropper, add three drops of anti-B serum to the second drop of blood. With a clean toothpick, gently stir for about 30 seconds.

**d)** Using a clean dropper, add three drops of anti-Rh serum to the third drop of blood. With a clean toothpick, gently stir for about 30 seconds.

**e)** Gently put the samples on the stage of a stereoscope. Turn the light on and magnify.

All three tests are negative tests. Note the basic appearance of the blood.

1. Perform Positive Control Tests for Comparison Purposes

**a–d)** Repeat substeps a–d of Step 2, this time using the Positive Control kit and the slide or row of the reaction plate labeled *+Control*. The blood is O+, which is suitable for a positive

control test because it has all of the antigens A, B, or Rh.

**e)** Gently put the samples on the stage of a stereoscope. Turn the light on and magnify.

All three tests are positive tests. Note the agglutination and remember its appearance.

1. Test the Blood of Patient 1 for A, B, and Rh Antigens

**a–d)** Repeat substeps a–d of Step 2, this time using the Patient 1 kit and the slide or row of the reaction plate labeled Patient 1.

**e)** Gently put the samples on the stage of a stereoscope. Turn the light on and magnify.

If you observe agglutination, write “agglutination” in the data table. Otherwise, write “none.”

1. Test the Blood of Patient 2 for A, B, and Rh Antigens

(Repeat Step 4 with Patient 2’s kit.)

1. Test the Blood of Patient 3 for A, B, and Rh Antigens

(Repeat Step 4 with Patient 3’s kit.)

1. Test the Blood of Patient 4 for A, B, and Rh Antigens

(Repeat Step 4 with Patient 4’s kit.)

1. Dispose of all material according to the direction of your teacher.

Data

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Reaction with anti-A** | **Reaction with anti-B** | **Reaction with anti-Rh** |
| **Patient 1** |  |  |  |
| **Patient 2** |  |  |  |
| **Patient 3** |  |  |  |
| **Patient 4** |  |  |  |

Reference Chart

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Blood type** | **Reaction with anti-A** | **Reaction with anti-B** | **Reaction with anti-Rh** | **Can receive blood from** |
| A– | agglutination | none | none | A– and O– |
| A+ | agglutination | none | agglutination | A+, A–, O+, and O– |
| B– | none | agglutination | none | B– and O– |
| B+ | none | agglutination | agglutination | B+, B–, O+, and O– |
| AB– | agglutination | agglutination | none | A–, B–, AB–, and O– |
| AB+ | agglutination | agglutination | agglutination | any blood type |
| O– | none | none | none | only O– |
| O+ | none | none | agglutination | O+ and O– |

Analysis and Conclusion

|  |  |  |  |
| --- | --- | --- | --- |
|  | **What is the patient’s blood type?** | **What blood types can the patient safely receive?** | **Which of the only four available pints of blood (A+, AB–, B–, and O+) should the patient receive for a transfusion?** |
| **Patient 1** |  |  |  |
| **Patient 2** |  |  |  |
| **Patient 3** |  |  |  |
| **Patient 4** |  |  |  |

(You may be asked to justify your answers either with questions online or in a lab report.)