ABO/Rh Simulated Blood Typing

Purpose: To determine the blood types of unknown persons by understanding the interactions between antibodies and antigens.

Introduction: A blood transfusion with blood of a mismatched blood type usually has serious consequences for the recipient of the blood. Complete blood analysis is done with sophisticated, costly equipment before transfusions are done. The basic principles of the blood typing will be illustrated in this activity using simulated ABO and Rh blood typing sera and simulated bloods.

Materials:
- 4 Blood typing slide wells
- Simulated Anti-A Sera
- Simulated Anti-B Sera
- Simulated Anti-Rh Sera
- 12 Toothpicks
- Marking Pen
- Blood Notes
- Powerpoint
- Unknown Blood Samples:
  - Person W
  - Person X
  - Person Y
  - Person Z

Procedures:
Each member of your group will work collaboratively to determine the blood types of the unknown samples.

1. Label four blood typing wells, "W," "X," "Y," "Z" using a marking pen.
2. Place 4 drops of Person W blood in each of the 3 wells in the slide marked "W." Similarly place 4 drops of X blood in each well on slide "X," Y blood on slide "Y," and Z blood on slide "Z."
3. Add 4 drops of Anti-A Sera to each slide in the Anti-A well. Similarly add Anti-B Sera to each Anti-B well and Anti-Rh Sera to each Anti-Rh well.
4. Use toothpick to stir each well. Be careful not to scratch the plate. Be sure you use a different and clean toothpick for each well. Use only one toothpick per well to avoid cross contamination. Mix each solution thoroughly and let the slides sit for 2 minutes.
5. Observe each well against a white background (paper) and record the results by writing "clumping" or "no clumping" in the ABO/Rh Simulated Blood Typing Table.
6. Based on "clumping" or "no clumping" and the table below, determine the blood type each person and whether they are Rh+ or Rh- (use Blood Notes to help determine Rh+ or Rh-)
7. Based on your lab results, answer the lab questions.
8. Dispose of all materials in the proper waste receptacle.

<table>
<thead>
<tr>
<th>Blood Type</th>
<th>Anti-a Sera</th>
<th>Anti-b Sera</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clumping</td>
<td>no clumping</td>
</tr>
<tr>
<td>B</td>
<td>no clumping</td>
<td>clumping</td>
</tr>
<tr>
<td>AB</td>
<td>Clumping</td>
<td>clumping</td>
</tr>
<tr>
<td>O</td>
<td>no clumping</td>
<td>no clumping</td>
</tr>
</tbody>
</table>

Figure 1. Blood Typing Slide Well.
ABO/Rh Simulated Blood Typing Analysis

<table>
<thead>
<tr>
<th></th>
<th>Anti-A Sera</th>
<th>Anti-B Sera</th>
<th>Anti-Rh Sera</th>
<th>Blood Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person Z</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Answer the following analysis questions:

1. What is Person X's blood type? What antigens are present on the surface of the red blood cells in Person X?

2. What is Person Y's blood type? What antibodies are present in Person Y’s plasma?

3. Person Z needs a transfusion. What blood types might Person Z safely receive? What would happen if Person Z received a blood transfusion of a different blood type than you have listed as safe for Person Z.

4. Explain why the mixing of 2 different blood types will cause clumping in the blood. Describe a medical condition/problem that may occur as a result of mixing 2 different blood types.

5. Explain why a person with Blood Type O produces the a and b antibodies.

6. Why is blood Type AB called the “universal receiver?” Explain.

7. Why is blood Type O called the “universal donor?” Explain.

8. Explain why an Rh- person does not have Anti-Rh sera in their blood plasma.

9. When does an Rh- person begin producing Anti-Rh Sera?

10. Explain the seriousness of having a mother with Rh- blood and a fetus with Rh+ blood.

11. Could a man with Type AB blood be the father of a child with Type O blood? Explain. (A Punnett square will be needed to reinforce your explanation)

12. Could a child with Type B blood have a mother with Type A blood have a father with Type A blood? Explain. (A Punnett square will be needed to reinforce your explanation)