Exploring Catalysts

Background
Decomposition is a type of chemical reaction where a single reactant breaks down into its elements or new compounds. Chemical reactions can be fast or slow and many factors affect this rate. Hydrogen Peroxide is a substance that undergoes decomposition to create water and oxygen gas.

Demonstration Questions
1. Before the demonstration takes place, how are all of the items on display related to one another?

2. After the demonstration takes place, do you have any ideas about how the catalytic converter and the demonstration are related?

3. How are the catalytic converter and the smog pictures related?

4. After observing the demonstration, why did one graduated cylinder react but the other did not?

Problem
What is a catalyst and how does it affect a chemical reaction?

Materials
- 6 - 100 mL beakers
- 3% Hydrogen Peroxide
- Small piece of beef liver
- Small cube of potato
- KI
- NaCl
- MnO₂
- Scoopula
- Forceps

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow teacher instructions for how to clean up materials and dispose of any chemicals.
- Do not consume lab solutions, even if they’re otherwise edible products.
- Food in the lab should be considered a chemical not for consumption.

**Procedure**

1. Set up 6 beakers of the same size (100mL) in a row.
2. Label the contents for each beaker:
   - Beaker 1 = Hydrogen Peroxide (H₂O₂)
   - Beaker 2 = Hydrogen Peroxide (H₂O₂) + Liver
   - Beaker 3 = Hydrogen Peroxide (H₂O₂) + Potato
   - Beaker 4 = Hydrogen Peroxide (H₂O₂) + KI
   - Beaker 5 = Hydrogen Peroxide (H₂O₂) + MnO₂
   - Beaker 6 = Hydrogen Peroxide (H₂O₂) + NaCl
3. Measure 10 mL of Hydrogen Peroxide into each beaker.
4. Using the forceps, add the liver to beaker 2. Record your observations in the data table below.
5. Using the forceps, add the potato to beaker 3. Record your observations in the data table below.
6. Using the scoopula, add a small scoop of KI to beaker 4. Record your observations in the data table below.
7. Using the forceps, add the MnO₂ to beaker 5. Record your observations in the data table below.
8. Using the forceps, add the NaCl to beaker 6. Record your observations in the data table below.
9. When making observations for each reaction that occurs, be sure to consider: speed of reaction, changes that occur in substances, measurable temperature change, etc.

**Results**

<table>
<thead>
<tr>
<th>SUBSTANCE</th>
<th>OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂O₂</td>
<td></td>
</tr>
<tr>
<td>H₂O₂ + Beef Liver</td>
<td></td>
</tr>
<tr>
<td>H₂O₂ + Potato</td>
<td></td>
</tr>
<tr>
<td>H₂O₂ + KI</td>
<td></td>
</tr>
<tr>
<td>H₂O₂ + MnO₂</td>
<td></td>
</tr>
<tr>
<td>H₂O₂ + NaCl</td>
<td></td>
</tr>
</tbody>
</table>
**Analysis & Conclusion**

1. Compare and contrast the results of each reaction.

2. Write a balanced reaction for what is occurring in each of the beakers.

3. How did each substance affect the rate of the reaction?

4. What is a catalyst?