The Effect of pH on Catalase

Criteria: Pl (a), Pl (b)

The candidate is asked to design an experiment to study the effect of pH on the activity of the enzyme catalase. A suspension of liver and a series of buffers are provided. Additional laboratory equipment can be requested.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Pl (a)</th>
<th>Pl (b)</th>
<th>DC</th>
<th>DPP</th>
<th>CE</th>
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<tbody>
<tr>
<td>Achievement level awarded</td>
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<td>Achievement of aspects</td>
<td>n, p, n</td>
<td>p, p, n</td>
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**Defining the problem or research question**
The candidate repeats the aim provided by the teacher. This is a good example of where too much guidance has been given by the teacher. The level of achievement for this aspect is not at all.

**Formulating a hypothesis or prediction**
The hypothesis is merely a repetition of the aim set by the candidate. The level of achievement for this aspect is partial.

**Selecting variables**
No relevant variables are identified. The title mentions pH and enzyme activity, but these are not identified as independent and dependent variables. There is no consideration of the variables that need to be controlled, such as temperature and substrate concentration. The level of achievement for this aspect is not at all.

**Selecting appropriate apparatus or materials**
Selection of the appropriate apparatus or materials is limited to a list from which other appropriate equipment is missing (for example, a water bath). Details of the concentration of the hydrogen peroxide solution are not given. The level of achievement for this aspect is partial.

**Designing a method for the control of variables**
There is an attempt to control the variables, but the selected buffers are not mentioned, and neither is the means of keeping the temperature stable. The level of achievement for this aspect is partial.

**Designing a method for the collection of sufficient relevant data**
The method does not explain how data will be collected: “seeing” if there is a reaction cannot be considered as collecting relevant data. Taking the temperature before and after adding the hydrogen peroxide could be a method of measuring the enzyme activity of this exothermic reaction, but it is not clear if this is intended. To obtain sufficient relevant data the experiment would need to be repeated. The level of achievement for this aspect is not at all.
Biology experiment

Aim: The effect of pH on catalase.

Hypothesis: We hope to see a reaction between the buffers and the catalase in one way or another.

Material: 6 test tubes, 1 thermometer, 1 stop watch, distilled water, H₂O₂ solution, pH solution, "liver solution" and 1 seringue.

Method:
We started with filling test-tube 1 - 5, each one with 3 mm of different pH.
We took the temperature of each pH before doing anything else. They all had the same temperature 22°.
Then we filled each test tube with the "liver solution" to see if there were any reaction in the different test tubes.
We took the temperature once again, but there were no change.
Then we added 2 mm of the H₂O₂ solution in each test tube.
We took the temperature for the last time.