Biology GCSE Investigation

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Background information

Gelatine is a high-grade protein, which is completely naturally occurring. It is usually found in meat, gelatine is made up of: -

- 84% - 90% protein
- 1 – 2% mineral salts
- 8 – 15 % water

Gelatine is a protein, protein is essential for a healthy balanced diet. Proteins are based on amino acids, which are needed by the body to function correctly. Some amino acids the body can make itself, but there are some that the body needs but can not make by itself and must be taken from another source.

Enzymes are biological catalysts that break down molecules into simpler forms. They are found all over the body from the digestive system to fighting infection. Protease is an enzyme that breaks down protein into the base amino acids. Temperature and concentration, and many other factors can affect enzymes.

Variables:

There are many variables that will affect the way in which an enzyme will function and how efficient they are. These variables are:

- Temperature
- Concentration
- Amount

I am going to investigate concentration

Investigation into the Effects of Protease on Proteins such as Gelatine

Plan: -

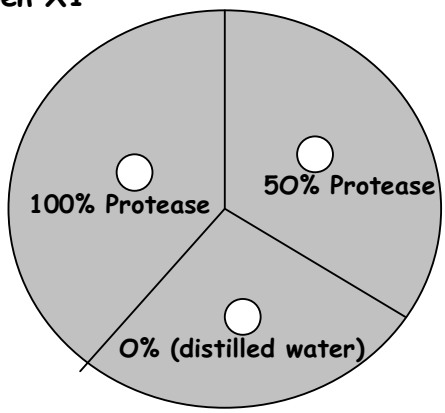
Preliminary investigation

Aim: The aim of this preliminary experiment is to find out, without going into too much detail the effect protease has on gelatine. The purpose of this experiment is to aid the experiment that will follow so that this will give an outline as to how the full experiment should be tackled.

Apparatus Needed:

- Vial of protease X1
- Vial of distilled water X1
- Petri dish with raspberry jelly X1
- Corer X1
- Plastic syringe with micro ml caps X2
- Marker pen X1

Diagram:



Method:

The purpose of this experiment is to aid the main experiment by getting sample results to go by. The raspberry jelly in the Petri dish is full of gelatine, which is a form of protein. The aim is to find out through experimentation and research if and how protease effects gelatine and other proteins.

The Petri dish with the jelly in was turned upside down and the markings that can be seen in the diagram were written on, and the circular dish was separated into three sections. The markings were

written on the underside so that no mistake could be made when reading them, because if they had been written on the upper part of the dish, it may have swivelled and the wrong results would have been recorded. In the 100% protease section, a circular piece of the jelly was removed with the corer, and filled with 0.4 mls of 100% protease. In the 50% protease section 0.2 mls of protease and 0.2 mls of water were filled in to the cored out section, and finally in the distilled water section, the cored out piece was filled with 0.4 mls of distilled water. The experiment was then repeated 13 times and the Petri dishes were left for two weeks before results were recorded.

Results:

Amount of divested Juice Sucked Up in ml													
0%	0	0	0	0	0	0	0	0	0	0	0	0	0
50%	1.4	1.7	1.1	1.3	0.9	2.8	1.4	2.1	1.4	1.8	0.6	1.3	0.8
100%	3.9	4.1	3.1	2.6	2.2	3.8	3.7	3.1	4.1	3.7	1.3	4.2	3.9

Conclusion:

I believe that this preliminary experiment has been overall a success, because it has given me a set of results that I can go by when planning the full investigation. There were a few anomalous results, but only one set of results that was completely anomalous, and I have highlighted that set. These anomalies may be due to incorrect reading from the syringe because it was very difficult to use. Results still show that that the protease breaks down the protein and therefore we can say that the results were successful.

Prediction:

For the full investigation I predict that the more the concentration, the more juice will be extracted from the jelly. I predict that if the results for a much larger experiment involving more concentrations are made, a graph of the results should show a straight line, because the concentration should have a direct correlation on the juice extracted.

Actual Experiment:

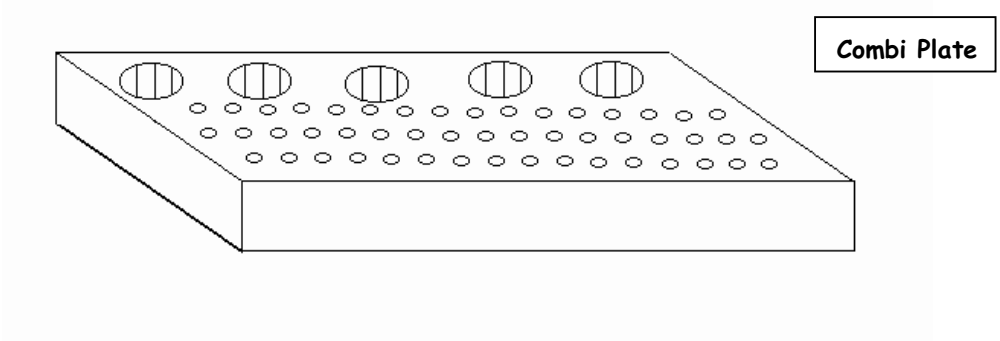
Aim:

To investigate the exact effect that different concentrations of protease have on gelatine and protein in general.

Apparatus:

- **Cork borer**
- **6 Petri dishes**
- **Combi Plate**
- **Gelatine in the form of raspberry jelly**
- **Syringe**
- **Micro tips**
- **Protease**
- **Marker Pen**
- **Water**

Diagram:



Method:

The six Petri dishes were each taken and split into 3 sections with a marker pen, the markings were written on the bottom of the dish just like was done with the preliminary experiment. This was so that the markings did not change like if they were written on the top. The standard size cork borer was then used to cut holes into the jelly. A hole was cut in each of the three sections in the six Petri dishes. Then a Combi plate was used to make different measurements and concentrations of protease, as in the diagram. The range of concentrations that were made in the Combi plate were 0%, 20%, 40%, 60%, 80%, and 100%. 0.2ml of each was put into each hole. The Combi plate was used to mix the protease and the water to get the different concentrations. Each Petri dish contained three lots of each concentration so that this would remain Fair test because of the

repeats. This also helps eliminate any anomalous results in the final results. The dishes were then placed in a refrigerator for seven day, after which they were taken out, and the juices were extracted, and results were taken.

Observations:

Final	0	0.28	0.51	1.12	1.38	1.5

Analysis:

The graph and results I collected were very good. The graph is almost a straight line, which is what I was hoping to achieve. The results were not too anomalous, and they almost showed a direct correlation to the percentage protease.

I was trying to prove a direct correlation, and this would have been shown if there was a straight line on the graph. There almost was, and their anomalous results were very minor.

My original prediction was this: -

Prediction:

For the full investigation I predict that the more the concentration, the more juice will be extracted from the jelly. I predict that if the results for a much larger experiment involving more concentrations are made, a graph of the results should show a straight line, because the concentration should have a direct correlation on the juice extracted.

In conclusion as the percentage of protease is increased, the more protein is broken down. Just as I was able to find out when investigating the background information.