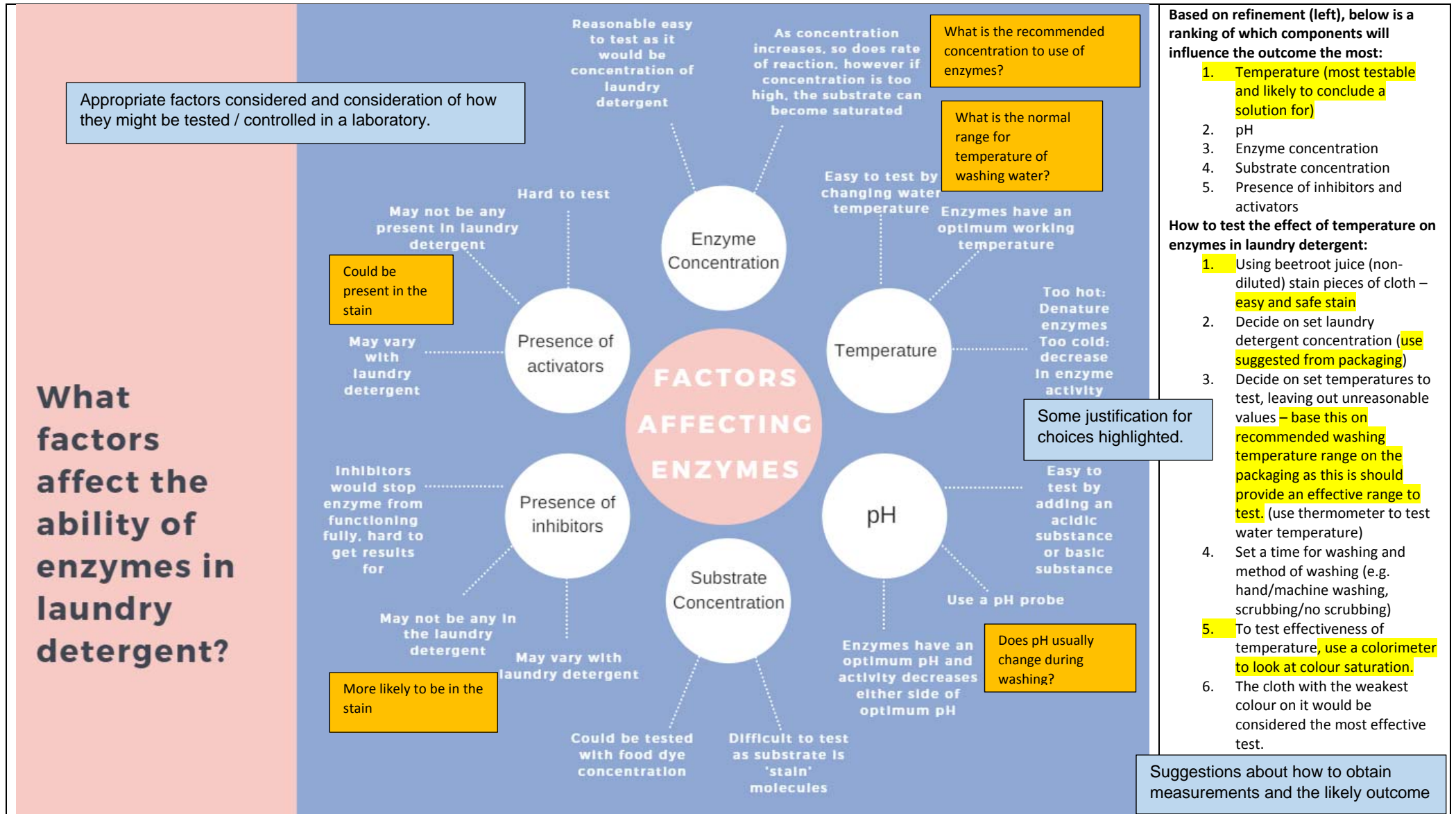


Deconstruction of Practical Investigation

Problem: What factors affect the ability of enzymes in laundry detergent?

Factors:



Deconstruction of Practical Investigation

Aim: To test the effect of temperature on enzymes present in laundry detergent.

Hypothesis: The enzymes in the laundry detergent will be most effective at the enzymes optimum temperature.

Independent Variable: Temperature

Format of hypothesis does not follow convention.
Independent and dependent variable identified.

Dependent Variable: Colour saturation

Appropriate factors to be kept constant and how they will be controlled.
Factors that may not be able to be controlled should also be discussed.

Factors to stay constant:

Factor	How it will be maintained
Material	All material used per experiment will be from the same source to ensure that as little as possible colour variation in material can occur.
Enzyme concentration	Assuming the laundry detergent used has been well mixed, prior to packaging, the same amount of laundry detergent will be placed in each tub of water.
Substrate concentration	The same amount of beetroot juice will be applied to each piece of material, as all pieces of material is cut to the same size.
Temperature consistency	The water used will maintain temperature by being placed in a water bath.

Method:

Materials list and consideration of safety/ethical issues should also be included.

Specific details e.g. how much beetroot juice to be used, should be included.


1. Cut white material into 20 x 20cm pieces, ensuring all pieces came from the same source.
2. Stain each piece of fabric with beetroot juice.
3. Fill a water bath container with 2L of water at set temperature (use a thermometer to test temperature). Then add 1 scoop (or the recommended amount) of laundry detergent to water and dissolve in water. Place stained material in water for 20 minutes.
4. After 20 minutes remove material and hang to dry.
5. Once dry, use a colorimeter to test the colour saturation of what remains of the stain (if a colorimeter is not available, could use a scanner and Adobe Photoshop to determine this as well).
6. Compare levels of colour saturation, and the weakest colour saturation will be the most effective temperature.

Results table:

Partial data table.

Temperature (°C)	Colour Saturation
20	
40	
60	
80	
100	

There is a partial link between the deconstruction and the design of the investigation by justifying the steps in the method.

Performance Standards	Investigation, Analysis and Evaluation	Knowledge and Application
A	<p>Designs a logical, coherent, and detailed biological investigation.</p> <p>Obtains records, and represents data, using appropriate conventions and formats accurately and highly effectively.</p> <p>Systematically analyses data and evidence to formulate logical conclusions with detailed justification.</p> <p>Critically and logically evaluates procedures and their effects on data.</p>	<p>Demonstrates deep and broad knowledge and understanding of a range of biological concepts.</p> <p>Develops and applies biological concepts highly effectively in new and familiar contexts.</p> <p>Critically explores and understands in depth the interaction between science and society.</p> <p>Communicates knowledge and understanding of biology coherently, with highly effective use of appropriate terms, conventions, and representations.</p>
B	<p>Designs a well-considered and clear biological investigation.</p> <p>Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.</p> <p>Logically analyses data and evidence to formulate suitable conclusions with reasonable justification.</p> <p>Logically evaluates procedures and their effects on data.</p>	<p>Demonstrates some depth and breadth of knowledge and understanding of a range of biological concepts.</p> <p>Develops and applies biological concepts mostly effectively in new and familiar contexts.</p> <p>Logically explores and understands in some depth the interaction between science and society.</p> <p>Communicates knowledge and understanding of biology mostly coherently, with effective use of appropriate terms, conventions, and representations.</p>
C	<p>Designs a considered and generally clear biological investigation. </p> <p>Obtains, records, and represents data, using generally appropriate conventions and formats with some errors but generally accurately and effectively.</p> <p>Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.</p> <p>Evaluates some procedures and some of their effects on data.</p>	<p>Demonstrates knowledge and understanding of a general range of biological concepts.</p> <p>Develops and applies biological concepts generally effectively in new or familiar contexts.</p> <p>Explores and understands aspects of the interaction between science and society.</p> <p>Communicates knowledge and understanding of biology generally effectively, using some appropriate terms, conventions, and representations.</p>
D	<p>Prepares the outline of a biological investigation.</p> <p>Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.</p> <p>Describes data and undertakes some basic interpretation to formulate a basic conclusion.</p> <p>Attempts to evaluate procedures or suggest an effect on data.</p>	<p>Demonstrates some basic knowledge and partial understanding of biological concepts.</p> <p>Develops and applies some biological concepts in familiar contexts.</p> <p>Partially explores and recognises aspects of the interaction between science and society.</p> <p>Communicates basic biological information, using some appropriate terms, conventions, and/or representations.</p>
E	<p>Identifies a simple procedure for a biological investigation.</p> <p>Attempts to record and represent some data, with limited accuracy or effectiveness.</p> <p>Attempts to describe results and/or interpret data to formulate a basic conclusion.</p> <p>Acknowledges that procedures affect data.</p>	<p>Demonstrates limited recognition and awareness of biological concepts.</p> <p>Attempts to develop and apply biological concepts in familiar contexts.</p> <p>Attempts to explore and identify an aspect of the interaction between science and society.</p> <p>Attempts to communicate information about biology.</p>