Speaker one

All right. So have you ever left your milk outside the fridge at room temperature, and then wondered why it's gone sour and then smelt sort of weird?

Speaker two

No, but but it's because bacteria in the milk has started the decay process, converting the sugar in the milk to lactic acid, a byproduct of anaerobic respiration.

Speaker one

In today's investigation, we're going to model this reaction by using the enzyme lipids.

Speaker one

My favourite

Speaker two

It's your favourite?

Now lipids breaks down the lipids into fatty acids. And glycerol. And the more fatty acids are produced and the milk becomes more acidic and the pH decreases.

Speaker one

Okay. So we can observe this change in pH with an indicator called Chris or red. If it turns red, the solution is alkaline. And if it turns yellow it's acidic.

Speaker two

Okay, that makes sense. Now for this experiment you need the following equipment. So do pause the video and take a look.

Speaker one

Before we start you're going to need to put on the safety specs. So I want you to add five centimetres cubed of lipids into this boiling tube. Yeah.

Speaker two

All right got that.

Speaker one

And then you're going to add another five of milk into this boiling tube.

Speaker two

In it goes.

Speaker one

Now, fantastic. Now you've done that I'm adding seven centimetres cubed of sodium bicarbonate.

Speaker two

Ooh yeah, yeah.

Speaker one

That's going into the full fat one.

Speaker two

Okay. So you're adding that to the milk.

Speaker one

Yeah.

Speaker two

To make it alkaline.

Speaker one

Exactly.

Speaker two

Okay. That sounds good.

Speaker one

And then now I'm going to add five drops of crystal red.

Speaker two

All right. Let's give it a shake. So that's alkaline?

Speaker one

Hmmm mmmm.

Let me stick both of these into a water bath

Speaker two

at 30 degrees?

Speaker one

30 degrees. Let's double check that.

Speaker two

I guess we need these to get up to temperature as well.

Speaker one

You need to get these up to temperature. Exactly.

Speaker two

So give it a few minutes.

Speaker one

Give it a few minutes.

Speaker two

And we've had the solutions in there for a little while. So let's check the temperature.

Speaker one

Yeah we're at 30.

Speaker two

Perfect. So we can start the reaction okay.

So what we need is one cubic centimetre of the lips. And we need to put that in the milk solution. But at the same time I need to start the stopwatch as well

Speaker one

okay.

Speaker two

So, three, two, one, inch perfect. Now yes. If you take it off we can stir it because we need to get the reaction going.

Speaker one

Oh I'm stirring.

How long do I have to stir that for?

Speaker two

Well, after five minutes, if we don't see a reaction, then we'll call it quits. We're at five minutes now.

Speaker one

Okay.

Speaker two

Can you see any change in reaction?

Speaker one

Nope. No change in colour.

Speaker two

So it might be because of the temperature. So let me write that down and name change.

Speaker one

So that's a 30 degrees, no change.

Speaker two

No change.

Speaker one

So repeat the experiment for five different temperatures. We're going to be using 20,30,40,50 and 60.

Now 20. That's just room temperature. So don't use that.

Speaker two

No water bath.

Speaker one.

No water bath I'm sorry.

Speaker two

Now the independent variable is the temperature. The dependent variable is the time taken for the milk solution to turn yellow. Now there are other variables too... the variables are: the milk, the sodium carbonate, lipaids and creosote allred.

Speaker one

So you've got to make sure the same for each temperature. To get reliable results. Repeat the test for each temperature three times. Calculate the mean time taken for the solution to turn yellow. And then you can you can start looking it right.

Speaker two

I like a good graph. Now enzymes work slowly at low temperatures, and this can be seen from the graph as the rate of reaction takes longer.

Speaker one

As the temperature is increased, the time taken for the solution to turn yellow decreases. Now this is because the rate of lipaids increases at 50 degrees. The reaction is at its fastest as it takes the least amount of time for the indicator to turn yellow.

Now this is the optimum temperature for the activity of the enzyme lips. The temperature at which it works the most effectively and therefore decay occurs the fastest. At 60 degrees, there will be no reaction. Now this is because the enzymes will have all denatured, therefore there'll be no data point to plot in your nice little graph.

Speaker two

I know, I'm disappointed actually.

At low temperatures, bacteria and fungi are less active, so the decay is slow.

Speaker one

And this is why we keep food like milk in a fridge. You get it from the experiment?

Speaker two

I do, yes.

Speaker one

Now, would you like to have a sniff?

Speaker two

No no please no no no no no no

Speaker one

No, I'm not going to. `