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Through a microbiologist's eyes: optimal time to add honey to tea

Worksheet 2

Investigating the effect of heating temperature on honey

How can heat affect honey?

Honey contains heat-sensitive compounds that contribute to its antimicrobial activity, including enzymes and phenolic compounds. Heating can reduce the activity of these compounds. In particular, reduced glucose oxidase activity can lead to lower hydrogen peroxide production, while heat may also alter phenolic compounds. As a result, the overall antimicrobial effect of honey may decrease as the heating temperature increases, which can lead to smaller inhibition zones around the samples.[1] By comparing honey heated to different temperatures, it is possible to estimate the highest temperature at which the honey still retains a clear antimicrobial effect.

Instructions

1. Perform Activity 2 (Investigating the effect of heating temperature on honey).
2. Before incubation, record the honey type and the temperatures tested in table 1.
3. After incubation, observe the sealed Petri dishes without opening them.
4. Measure each inhibition zone using figure 1 as a guide. Measure across the widest part of the clear zone, through the centre of the well, and include the well in the measurement.

   Note: If a zone is irregular, measure it in two perpendicular directions and calculate the mean. If no clear zone is visible, record 0 mm.
5. Record the results in table 2.
6. Compare the inhibition zones and identify the temperature at which antimicrobial activity begins to decrease.
7. Summarise the results by answering the questions below.
   a) At which temperature was the largest inhibition zone observed?
   b) At what temperature did the inhibition zone begin to decrease?
   c) Did the honey retain antimicrobial activity at all tested temperatures?
   d) Why was it important to heat each sample for the same length of time?
   e) Which temperature should be considered the highest suitable temperature for adding this honey to tea? Explain your answer.
   f) What should be investigated next in order to determine when the tea reaches this temperature?

Table 1: Honey sample and temperatures

Honey type	Temperature 1	Temperature 2	Temperature 3	Temperature 4

Table 2: Effect of heating temperature

Honey type	Heating temperatures (°C)	Diameter 1 (mm)	Diameter 2, if required (mm)	Mean inhibition-zone diameter (mm)	Additional observations