

ONLINE ANSWERS

Achievement Standard 90950 (Science 1.11)

Unit 10: Practice assessments (page 207)

Practice assessment 1: Food decomposition

The following answers are examples only.

Aim

To investigate the effect of temperature on the growth of fungi on damp bread.

Method

Should include at least 4 temperatures (freezer – approx. 0 °C; fridge – approx. 4 °C; room temperature – approx. 16 °C; incubator – approx. 24 °C). Should state that bread must be kept evenly damp and all other conditions kept the same.

Conclusion

At low temperatures, in the fridge and freezer, fungi did not grow quickly on the damp bread but at higher temperatures, as the photos show, fungi quickly covered the whole surface of the bread.

Discussion

Micro-organisms usually need warmth to carry out their life processes such as growth (life process) which is why fungi did not grow quickly on the bread that was kept in the cold (link to temperature investigation). Extracellular digestion (life process) involves the release of enzymes into the bread but the bread cannot be digested without enough warmth to allow the enzymes to work. In addition, materials cannot be absorbed back into the hyphae (structure) of the fungi without enough heat energy to allow diffusion of materials towards and into the hyphae.

In the warmer pieces of bread, the fungi were able to quickly grow and reproduce (life process) by feeding on the digested bread. This is why the warmer bread was covered in fungi in three days and grey areas, containing maturing sporangia (structure), began to appear. The bread was quickly decomposed into a smelly semi-liquid material.

To achieve this (practice) assessment

Observations or findings are used to describe how micro-organisms and environmental conditions (warmth) are important in the decomposition of food.

- Describes the effect of temperature on fungal growth on food.

For Merit: 'Achievement', plus uses findings AND biological ideas to explain how micro-organisms and environmental conditions such as warmth are important in decomposition of food.

- Explains how temperature and the structure and life processes of fungi are important in the decomposition of food.

Practice assessment 2: Food preservation

The following answer is an example only.

Fermenting meat by making salami

1. First, the meat is minced and flavourings/seasonings (salt, garlic, pepper) are added.
2. Nitrates, lactose and a starter culture of lactic acid bacteria are added (Adding nitrates changes environmental conditions) to help prevent the

growth of anaerobic botulism and other pathogenic bacteria (control) that cause food poisoning, which can kill people. Botulism bacteria are rare, but the environmental conditions (with moisture, warmth, little oxygen) inside salami are good for the growth of such bacteria.

3. Ingredients are mixed for five minutes and the mixture is pushed into sausage casing, taking care not to leave large air bubbles (change to environmental conditions, i.e., air removed) in the mixture that would encourage the growth of aerobic bacteria (control).

4. Sausage casings containing the salami mixture are hung in a warm, humid area (24 °C; humidity of 85% to 95%) (change to environmental conditions) for 35 hours to allow fermentation to occur. During this time, the lactic acid bacteria in the starter culture reproduce by binary fission and ferment the lactose to produce lactic acid. The lactic acid lowers the pH of the meat to below pH 5 (change to environmental conditions). Most decomposers and pathogenic micro-organisms cannot grow and reproduce in acidic environments (control).

5. The salami is hung in a dryer at 30 °C for two weeks to remove the water (change to environmental conditions) so the meat is too dry for micro-organisms to grow or reproduce in it (control). During the drying process, the salami loses at least 35% (up to 50%) of its original weight because of water loss, so it can remain edible almost indefinitely.

To achieve this (practice) assessment

Food-preservation research findings are used to describe how a method of food preservation changes environmental conditions.

- Describes a method of food preservation that changes environmental conditions to control micro-organism growth and reproduction.

For Merit: 'Achievement', plus uses research findings and biological ideas to explain how the method of food preservation controls micro-organism growth and reproduction to keep the food edible.