Mould investigations extra questions

Posted by Anonymous on Thu, 2015-04-23 12:58

I have some further questions regarding the mould investigations:

1. I prefer to double bag because we have had leaking bags in the past.

2. I find that 1–2 weeks is a bit too long. We are in Cairns, where it is mostly hot and humid, and I have found that even 1 week can be too long, the mould totally takes over. I usually put bags in the fridge once mould growth starts to get out of hand.

3. I asked about students dropping bread on various surfaces to see what grows on them, because we run a mythbuster elective. One group of students wanted to investigate the 3-second rule (that food is still okay to eat after it has been dropped on the floor for only 3 seconds). I found out afterwards that they dropped some slices on the floor in the toilets!

4. Would putting the bread in sealed ziplock bags encourage the growth of anaerobic organisms?

5. To avoid anaerobic growth on agar in petri dishes, is the correct advice to only tape them with 4 strips of sticky tape and not seal them completely?

Voting:

No votes yet

Australian Curriculum:
The growth and survival of living things are affected by the physical conditions of their environment
Year Level:
6
9
Senior Secondary

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Submitted by sat on 24 April 2015

Regarding your question about students investigating mould and bacterial growth on food items:

Q1. Regarding using double bags:

If you are happy to use double bags then that is quite acceptable, as it increases the containment of any aerosols, which is important and the reason why clear ziplock bags are used. However, using two bags may make it more difficult to observe the mould. If you were to use a single bag then sourcing and purchasing a good quality bag would be important, as there are different qualities of bags.

Q2. Regarding incubation times:

The incubation time for the mould cultures to grow will be dependent upon the growth conditions provided, as we know mould growth is dependent upon temperature and humidity. Consideration therefore needs to be given for the local climate and/or weather conditions. For example, moulds flourish in warm humid conditions and Northern Queensland fits this scenario during the summer months. In Tasmania, it can take up to two weeks for mould to grow even in summer.

Basically, there is no real set timeframe for incubation when controlled conditions are not in place. In this case, daily monitoring would need to be done to determine when mould growth is optimal. Placing the samples in a fridge—one that is designated for laboratory samples and does not contain food for human consumption—is a good idea to slow down the growth of the mould. However, it must be understood that the mould will continue to grow under these low temperature conditions but at a slower rate. Perhaps conducting this experiment in the cooler non-humid winter months would be better, if possible. Although, even in your winter months you would expect reasonably fast mould growth.

Q3. Regarding dropping the bread on different surfaces:

As with all activities, a site-specific risk assessment should be conducted. As mentioned in the previous answer, sampling must not be taken from unhygienic environments such as drains, or areas exposed to body fluids such as toilets, or on surfaces on which meat has been handled, such as in the Home Economics Department. We understand that it is challenging when students are designing their own activities, but part of their process should also be to conduct their own site-specific risk assessment.

Q4. Regarding anaerobic organisms

Anaerobic bacteria, or anaerobes, are bacteria that do not need oxygen to live. In humans, these bacteria generally live in the gastrointestinal tract, but they may also be found in other places outside the body, including in the soil and water, in foods, and in animals. Some anaerobes are beneficial to humans, but others can cause illnesses, such as appendicitis, diverticulitis, and gingivitis.

Growth of anaerobic organisms:

Placing bread in ziplock bags should not encourage the growth of anaerobic organisms. Many microorganisms, in particular anaerobes, tend to be fastidious, (i.e., requiring specialized nutritional and growth conditions), which would not be provided by a slice of bread in a sealed plastic bag. Bread is not a suitable selective medium for isolating these organisms. Bread kept under these conditions goes mouldy because water, that evaporates from inside the bread, is trapped and makes the surface moist, providing good conditions for mould growth. Bread can occasionally spoil due to bacterial growth, either by the growth of bacilli from spores that survive baking, or by contamination with *Serratia marcescens* which turns the bread **red**. The presence of various inhibitory substances/preservatives in many types of bread keeps them from spoiling. This is an additional factor that would minimise the chances of microbes including anaerobes growing.

Provided the safety procedures are followed, the primary risk of growing mould on bread is the release of spore aerosols during the activity—hence the control measure of using sealed containers or ziplocked bags.

If your risk assessment determines that there is concern that the students may open the bags, then the bread samples can be placed into petri dishes instead, which should be sealed with tape in 4 places. The use of petri dishes in this circumstance will provide a humid environment for the mould to grow but make it difficult for students to open and potentially release any spores.

Q5. Sealing Petri dishes with only 4 strips of sticky tape:

Not completely sealing petri dishes is a precaution required for school culture work using standard nutrient agar. This is a different activity from above with a different set of control measures and hazards as follows:

- The type of media used must not be designed to select for pathogens as does Blood and McConkey agar.

- Schools should only use risk group 1 microorganisms (as defined in AS2243.3)—those that pose low individual and community risk. Microorganisms that are unlikely to cause human, plant or animal disease.
- The incubation temperature should be restricted to an upper limit of 30° C to reduce the danger of isolating any pathogens adapted to human body temperature.
- A working knowledge of aseptic technique.
- Samples should not be taken from environments likely to contain organisms harmful to humans (e.g., body surfaces, coughs, sneezes and unsanitary environments such as drains and toilets).
- The agar plates are placed in an autoclavable bag, such as an oven bag, for sterilisation for 25 minutes (110kPa/15psi, 121° C) in an autoclave or pressure cooker before disposal.

Australian Standards AS NSZ 2243.3-2010. Safety in laboratories. Microbiology safety and containment.
