Activity 2: Teacher Notes and Answers

# Teacher Notes

## Researching biohazards and their categorisation

**Hazard Group 1**

* Unlikely to cause harm to humans
* Very unlikely to spread to the community
* Cell lines that have been safely used for years
* Non-pathogenic strains of some bacteria/viruses
* Disabled strains of bacteria/viruses
* Attenuated strains of bacteria/viruses
* Examples: non-pathogenic *E. coli* K-12*,* a species of yeast *Saccharomyces cerevisiae*, *Lactobacillus acidophilus.*

**Hazard Group 2**

* Can cause human disease
* May be a hazard to lab workers
* Likelihood of infection spreading to the community is low
* There are usually effective vaccines or treatments available
* Examples: most strains of *E. coli*, streptococcus, measles, noroviruses, zika virus.

**Hazard Group 3**

* Can cause severe human disease
* Can be a serious hazard to lab workers
* Infection may spread to the community
* There are usually effective vaccines or treatments available
* Examples: HIV, Hepatitis-B & C, SARS-Cov-2.

**Hazard Group 4**

* Causes severe human disease
* Is a serious hazard to lab workers
* Infection is likely to spread to communities
* No effective vaccines or treatments available
* No effective preventative methods
* This category of biohazard is only permitted in specialised labs
* Examples: rabies, Ebola, Lassa fever virus.

# Answers

## Matching biohazards to Hazard Groups

Match the biohazards to the correct Hazard Group:

* The probiotic *Lactobacillus acidophilus* **(Group 1)**
* Herpes simplex viruses 1 and 2 (treatments are readily available, low fatality rate) **(Group 2)**
* Yellow fever (vaccines available but not widely given out, high fatality rate) **(Group 3)**
* Mumps (most of the population is vaccinated against it, low fatality rate) **(Group 2)**
* *Agrobacterium radiobacter* (a bacterium that can infect humans with weakened immune systems, very low fatality rate). **(Group 1)**

## Biohazard categorisation

1. A micro-organism, cell culture or endoparasite that may or may not have been genetically modified, which may cause infection, allergy, toxicity or otherwise create a hazard to human health.
2. Biohazards in Hazard Group 1 are unlikely to cause disease, due to being disabled, attenuated or non-pathogenic, whereas biohazards in Hazard Group 2 can cause human disease.
3. Biohazards in Hazard Group 3 have available vaccines or effective treatment, however those in Hazard Group 4 are biohazards without vaccines or effective treatment.
4. Three or more examples of each Hazard Group:

* **Hazard Group 1:** non-pathogenic *E. coli* K-12, a species of yeast *Saccharomyces cerevisiae*, *Lactobacillus acidophilus*
* **Hazard Group 2:** most strains of *E. coli*, streptococcus, measles, noroviruses,  
  zika virus
* **Hazard Group 3:** HIV, Hepatitis-B and C, SARS-Cov-2
* **Hazard Group 4:** rabies, Ebola, Lassa fever virus.

1. Definitions of key words:
2. Attenuated: a modified or weakened strain of pathogenic organism that no longer causes disease.
3. Effluent: liquid waste that is discharged into rivers or seas.
4. Endoparasite: a parasite that lives inside its host.
5. Non-pathogenic: an infectious organism that does not cause disease, harm or death to another organism.
6. Microorganism: living organisms too small to be visible with the naked eye, these include protozoa, bacteria, fungi and viruses (not all scientists include viruses as living organisms).
7. Cell culture: the process of growing cells under controlled conditions, usually outside their natural environment.
8. Genetically modified: refers to plants, animals, fungi or microorganisms whose DNA has been altered using genetic engineering techniques such as transferring a gene(s) from one organism to another or modifying the DNA and reinserting back into the same organism.
9. Infection: a microorganism replicating inside the body resulting in a disease.
10. Allergy: a condition caused by an overreaction of the immune system to typically harmless substances
11. Toxicity: the degree to which a substance is poisonous