

Microbes in Human Welfare — Assignment 2

Class 12 Biology · Higher-difficulty challenge set + integrated problems · Answer key included · Narayan Gurukul Academy

Instructions: (1) Attempt all questions; start with the topic-wise challenge set, then attempt the integrated (multi-topic) problems.
(2) Give all answers with correct SI units. $g = 10 \text{ m/s}^2$ unless stated.
(3) A final answer key is provided at the end — try the full set before checking it.

Part A — Topic-wise challenge questions

Microbes in Household Products

1. Which microbe forms curd?
2. What is the role of lactic acid bacteria in the human body?
3. Describe the process of cheese-making.

Industrial Production — Fermented Beverages, Antibiotics and More

1. Which microbe produces ethanol?
2. Name two antibiotics produced by microbes.
3. Describe the role of microbes in industrial production.

Sewage Treatment

1. What is BOD?
2. Why is BOD a measure of pollution?
3. Describe the two stages of sewage treatment.

Biogas Production

1. Name the microbes involved in biogas production.
2. Why is biogas a clean fuel?
3. Describe the production of biogas.

Biocontrol Agents

1. Give two examples of biocontrol agents.
2. How does *Bacillus thuringiensis* work?
3. Why is biological control preferred over chemical pesticides?

Biofertilisers

1. What is the role of *Rhizobium* in agriculture?
2. What is the role of mycorrhiza?
3. Describe the types of biofertilisers.

Part B — Integrated problems (multi-topic)

1. Describe the role of microbes in industrial production.
2. Describe sewage treatment and biogas production.
3. Explain the use of microbes as biocontrol agents and biofertilisers.
4. Describe the role of microbes in household products.
5. Describe the production of antibiotics with an example.
6. Explain the types of biofertilisers with examples.

Answer Key

Microbes in Household Products

Lactic acid bacteria (*Lactobacillus*) make curd; yeast makes bread rise; *Streptococcus* and moulds (*Penicillium*) are used in cheese; LAB improve nutrition and convert lactose to lactic acid.

Industrial Production — Fermented Beverages, Antibiotics and More

Yeast ferments sugars to ethanol (beverages); *Penicillium notatum* gives penicillin; *Aspergillus niger* gives citric acid; microbes also produce enzymes and vitamins.

Sewage Treatment

Primary (physical) treatment removes solids; secondary (biological) treatment uses aerobic bacteria (and anaerobic digestion of sludge); BOD measures organic pollution.

Biogas Production

Methanogens (*Methanobacterium*) produce methane-rich biogas from sludge in a digester; it is a clean, renewable fuel.

Biocontrol Agents

Ladybird controls aphids; *Bacillus thuringiensis* controls caterpillars; *Trichoderma* is a fungal biocontrol agent; eco-friendly and specific.

Biofertilisers

Rhizobium (in legume root nodules) fixes nitrogen; mycorrhiza (fungus + root) improves phosphorus uptake; *Azotobacter* is a free-living nitrogen fixer.

Integrated problems

1: Fermented beverages, antibiotics and organic acids. 2: Primary + secondary treatment; methanogens produce biogas. 3: Ladybird/Bt and *Rhizobium*/mycorrhiza. 4: Curd, bread, cheese. 5: *Penicillium notatum* → penicillin. 6: Bacterial (*Rhizobium*, *Azotobacter*) and fungal (mycorrhiza).