

Ch. 5: Control of Microbial Growth

Answers to end-of-chapter questions:

1. The primary reason that milk is pasteurized is to destroy microorganisms in order to prevent spoilage.
2. The primary reason that wine is pasteurized is the same as the primary reason that milk is pasteurized; to destroy microorganisms and prevent spoilage.
3. Mycobacteria are the most chemically-resistant non-spore-forming bacterial pathogen (due to their waxy cell wall).
4. High acid foods will already have few bacteria growing on them, so high temperatures are not needed except to inhibit the growth of fungal microbes.
5. Cell death usually occurs at a regular, linear rate. Therefore, the higher the starting population, the longer it will take for the population to reach zero.
6. An iodophore is a solution of iodine linked to a carrier molecule which slowly releases free iodine when diluted to certain concentrations, while a tincture of iodine is iodine dissolved in alcohol. *Pseudomonas* can often survive in iodophores, which often cause nosocomial infections in cases of improperly diluted iodophores.
7. Microwaving a food product kills bacteria by raising the temp; not always effective, as food often heats unevenly.
8. Food preservation involves materials or processes with *bacteriostatic* action; they halt bacterial growth, but do not kill bacteria already present. Pasteurization should *kill* all bacteria.
9. Heat-sensitive liquids may be sterilized using *radiation* or *filtration*.
10. Ethylene oxide gas is commonly used to sterilize pacemakers, artificial hips, pillows, blankets, electrical equipment, Petri dishes, pipets. . .

Multiple Choice.

- | | | | |
|------|------|------|-------|
| 1. C | 4. B | 7. E | 10. E |
| 2. D | 5. B | 8. D | |
| 3. A | 6. C | 9. C | |

Applications

1. Food preparation, cleaning, and food storage are all things he should discuss.
2. Chemical preservatives often eliminate the need to heat-sterilize the food. It also germination and subsequent growth of *Clostridium botulinum*.

Critical Thinking

1. **Line A** shows a population with a higher initial population than C started with, but whose D value is similar to that of C. B shows an initial population equivalent to that of A, but with a larger D value.
2. The size of the zone of inhibition might also be affected by the size of the particles in the medicine (smaller particles travel faster), and the affinity of the medicine for the agar.

Medical Micro: Ch. 5-8 Notes

Ch. 6: Metabolism (abbreviated form)

Metabolism

Catabolism

vs.

Anabolism

Potential Energy

vs.

Kinetic Energy

Exergonic reactions

Vs.

Endergonic reactions

Metabolic pathway -

Intermediate

End-product

Enzymes

Substrate

Product

Lock-and-key Model

Enzyme inhibition

ATP

Central Metabolic Pathways:

Glycolysis

Pentose phosphate pathway

Tricarboxylic acid cycle

Other metabolic pathways:

Respiration

Fermentation

Catabolism of organic compounds other than glucose

Photosynthesis

Medical Micro: Ch. 5-8 Notes

Light-dependent reactions

Light-independent reactions (dark reactions)

Carbon fixation (the Calvin Cycle)

Anabolic Pathways:

Lipid synthesis

Amino acid synthesis

Nucleotide synthesis

Why no *monosaccharide* synthesis?

On p.160, do short answer questions 1-3, 5, 7, and 8, and mult. choice questions 1, 2, and 4-6

Ch.7 – The Blueprint of Life: from DNA to Protein

DNA structure and function

RNA structure and function

DNA Replication : 1 DNA molecule → 2 DNA molecules; provides new cells with their own copy

Protein Synthesis: a short section of DNA is *transcribed* into an mRNA strand, which travels out of the nucleus to a ribosome, where it is *translated* into a chain of amino acids by carrier tRNAs

Gene Expression: Which proteins get made is determined by which *genes* (sections of DNA) get activated, which is determined by environmental and genetic factors (ex: nutrients, oxygen, crowding)

Ch. 8 – Bacterial Genetics

Genetic change in Bacteria

Can be caused by: 1) **Mutations** during *vertical gene transfer*

2) **DNA acquisition**, aka *horizontal gene transfer*

Mutations during Vertical Gene Transfer

Spontaneous mutations

Base substitutions/Point mutations

Frameshift mutations

Transposons (jumping genes)

Induced Mutations

Chemical mutagens

Transposition/Insertional inactivation

Radiation

Repair of Damaged DNA

Proofreading

Mismatch repair

Light Repair

Dark Repair

Base repair

SOS Repair

DNA acquisition, aka Horizontal Gene Transfer

DNA-mediated transformation

Competence

Homologous recombination

Electroporation

Transduction

Conjugation

Plasmid Transfer, Chromosome Transfer, F' Donors