

Biology 210 Lab Learning Objectives

Exercises 16 - 30

EXERCISE 16 - BACTERIAL GROWTH CHARACTERISTICS

Upon successful completion of this exercise, you will be able to

A - OSMOTIC PRESSURE

1. describe osmotic pressure and how it affects a cell.
2. use turbidity measurement aids to compare the growths of bacteria in the different concentrations of salt.
3. recognize salt loving bacteria and know where they are found.

B - OXYGEN

1. describe and recognize facultative anaerobe, strict aerobe, aerotolerant anaerobe, obligate anaerobe.
2. name at least one example of a facultative anaerobe, strict aerobe, aerotolerant anaerobe, obligate anaerobe.
3. know the parts an anaerobe jar and how it works.

C - PH

1. determine the different strains of bacteria growing at the different pHs with the turbidity measurement aids.
2. understand why pH is important to know for food preservation methods.
3. know where acid loving and alkaline loving bacteria survive in nature.

D - TEMPERATURE

1. determine the optimal growth temperatures for the organisms studied.
2. discuss why it is useful to know the temperatures at which bacteria grow.
3. know the optimum temperature of human pathogens.
4. define the terms thermophile, mesophile, psychrophile.

E - PIGMENT PRODUCTION

1. describe the different types of pigment production.
2. recognize the different types of pigment production.
3. name some examples of human disease causing bacteria that produce a pigment.

EXERCISE 17 - SELECTED PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERISTICS (INTRODUCING THE GRAM - NEGATIVE RODS)

Upon successful completion of this exercise, you will be able to

B - CATALASE

1. perform a catalase test.
2. recognize a positive and negative result.
3. know the enzyme that is being tested.
4. name the media and the reagents used for this test.
5. know what two Genera of bacteria this tests separates for identification purposes.

C - CITRATE

1. perform a citrate test.
2. recognize a positive and negative citrate result.
3. know the enzyme that is being tested.
4. name the media and the reagents used for this test.
5. know how to use this test for identification of an unknown.

D - CARBOHYDRATE FERMENTATION

1. perform a carbohydrate fermentation test with one sugar for practice.
2. recognize a positive and negative result.
3. name some of the other sugars that bacteria can ferment.
4. know that all members of the Enterobacteriaceae (enteric) family ferment glucose.
5. recognize that lactose fermentation is often used to distinguish certain pathogenic enteric species of bacteria.
6. name the media and the reagents used for this test.
7. know the enzymes that are being tested for the different sugars.

E - HYDROGEN SULFIDE PRODUCTION

1. perform the hydrogen sulfide test.
2. recognize a positive and negative result.
3. name the media and reagents used for this test.
4. know the enzyme that is being tested.

EXERCISE 17 - SELECTED PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERISTICS (INTRODUCING THE GRAM - NEGATIVE RODS)

Upon successful completion of this exercise, you will be able to

F - INDOLE PRODUCTION

1. perform the indole test.
2. recognize a positive and negative result.
3. name the media and reagents used.
4. know the enzyme responsible for this test.

G - METHYL RED TEST

1. perform the MR test.
2. recognize a positive and negative result.
3. name the media and reagents used.
4. know the enzyme responsible for this test.

H - MOTILITY

1. inoculate the motility agar with an inoculating loop.
2. know how to determine positive motility and negative motility.
3. know how to double check for motility using a wet mount.

I - NITRATE

1. describe nitrate reduction.
2. recognize a positive and negative result.
3. evaluate the different observations after the addition of the reagents in each step and color change.
4. name the media and reagents used.
5. know the enzymes responsible.

J - OXIDASE

1. perform an oxidase test.
2. recognize a positive and negative result.
3. name two groups of bacteria that are separated from each other with the oxidase test.
4. name the enzyme responsible.
5. know the media used.

K. UREASE TEST

1. perform the urease test
2. recognize a positive and negative result.
3. name the enzyme responsible.
4. know the media used.
5. describe how the pathogens Salmonella and Shigella can be differentiated in the Enterobacteriaceae family.

EXERCISE 18 - GRAM POSITIVE COCCI: STAPHYLOCOCCI

Upon successful completion of this exercise, you will be able to

1. describe the Gram reaction and recognize the arrangement of staphylococci cells on a Gram stained slide.
2. list the types of media that the staphylococci grow on and describe their appearance.
3. perform and describe the catalase, coagulase, and DNase tests
4. know how the catalase, coagulase and DNase tests are used in studying the staphylococci.
5. define nosocomial infections and give examples of some.
6. list some of the normal flora found on skin and in the nasal area.
7. define carrier, opportunistic pathogen and pathogen.
8. describe the types of hemolysis.
9. identify colonies of staphylococci that are beta hemolytic and non hemolytic and give examples of each.
10. compare and contrast the terms pathogen and opportunistic pathogen using the staphylococci as examples.

EXERCISE 19 - GRAM POSITIVE COCCI: STREPTOCOCCI

Upon successful completion of this exercise, you will be able to

1. describe the Gram reaction and recognize the arrangement of streptococci cells on a Gram stained slide.
2. perform the proper technique of obtaining a throat culture on yourself.
3. list some of the normal flora found in the throat and mouth.
4. perform the catalase, 6.5% NaCl, bile esculin tests with the streptococci
5. recognize positive and negative results for catalase, 6.5% NaCl and bile esculin tests.
6. recognize the types of hemolysis on a blood agar plate.
7. name the types of hemolysis and give examples of streptococci for each.
8. perform the identification tests using Bacitracin, SXT and Optochin discs.
9. list some diseases that Group A streptococci cause in humans.
10. list the different groups of streptococci and give examples of each.
11. list examples of streptococci that cause dental plaque.
12. know how agglutination tests help in identifying the beta hemolytic groups of streptococci.

EXERCISE 20 - URINE CULTURES

Upon successful completion of this exercise, you will be able to

1. know how to collect a clean catch urine.
2. perform universal precautions.
3. describe the criteria used for identifying a UTI (urinary tract infection).
4. know how to perform and interpret the results of a urine dipstick.
5. list what positive tests would indicate a UTI on the urine dipstick.
6. list some examples of Gram negative bacteria that cause UTIs.
7. list some examples of Gram positive bacteria that cause UTIs.
8. describe EMB agar and why it is used.
9. know how to calculate the final number of colonies the diluted urine plates.

EXERCISE 21 - ANTISEPTICS AND DISINFECTANTS

Upon successful completion of this exercise, you will be able to

1. define antiseptic and disinfectant.
2. define bacteriostatic and bactericidal.
3. inoculate a plate using a swab.
4. define zone size.
5. evaluate the relative effectiveness of various chemical with various bacteria.
6. know what type of compound ethanol, chlorine and phenol are and their uses.

EXERCISE 22 - ANTIBIOTIC SENSITIVITY TESTING

Upon successful completion of this exercise, you will be able to

1. perform the Kirby-Bauer method of antibiotic susceptibility.
2. describe the importance of doing antibiotic susceptibility tests on bacteria.
3. define and know how to measure the zone of inhibition.
4. list the factors affecting the zone of inhibition.
5. know the difference between narrow and broad spectrum antibiotics.
6. Define MIC.

EXERCISE 23 - ISOLATION OF ANTIBIOTIC-RESISTANT MUTANTS

Upon successful completion of this exercise, you will be able to

1. discuss why spontaneous mutations to antibiotics can occur in some bacteria.
2. define mutation.
3. calculate the ampicillin-resistant spontaneous mutants that occur with *Serratia marcescens*.
4. describe what a negative control is and how it is used.
5. discuss how antibiotic mutations can affect patient treatments.

EXERCISE 24 - UNKNOWNNS

Upon successful completion of this exercise, you will be able to

1. perform the identification of unknown bacteria.
2. use QC slides to aid in the unknown identification.
3. keep stock and working cultures of unknown bacteria for testing.
4. correctly use an identification table for identifying an unknown.
5. make flow charts.
6. write a lab report using scientific format.

EXERCISE 25 - IMMUNOLOGY

Upon successful completion of this exercise, you will be able to

1. define antigen, antibody, agglutination and titer.
2. read and interpret tube agglutination reactions..
3. perform a slide agglutination test.
4. interpret slide agglutination reactions.
5. describe how positive and negative controls are used with agglutination reactions.
6. list the types of blood cells found in human blood and their function.
7. recognize the difference between a white cell, red blood cell and platelet.
8. list the blood groups found in humans.
9. describe how slide hemagglutininations are used for typing human blood cells.

EXERCISE 26 - WATER MICROBIOLOGY

Upon successful completion of this exercise, you will be able to

1. describe what MPN is.
2. describe the presumptive, confirmed and completed tests of the MPN.
3. define indicator and coliform.
4. describe the characteristics of a good sewage indicator.
5. describe the MUG method.
6. describe the Millipore method for determining bacterial counts in water.
7. name some protozoan diseases that are transmitted in contaminated water.
8. list some bacterial species found in water that can cause diseases.

EXERCISE 27 - SPOILAGE OF MEAT

Upon successful completion of this exercise, you will be able to

1. perform standard plates counts on food samples.
2. list the types of microorganisms that grow at refrigerator temperatures.
3. define; psychrophile, psychrotroph ,mesophile, thermophile, hyperthermophile.
4. list some examples of each of the growth temperature groups.
5. discuss what temperature human pathogens grow at and why?
6. list some examples of food borne pathogens.

EXERCISE 28 - MICROBIOLOGY OF WINE - MAKING

Upon successful completion of this exercise, you will be able to

1. list some foods that microbial fermentations are used to help produce.
3. name the yeast responsible for wine fermentation.
4. describe the purpose of sealing the wine flask with a ballon or gas vent.

EXERCISE 29 - MICROBIOLOGY OF MILK

Upon successful completion of this exercise, you will be able to

1. describe raw and pasteurized milk.
2. perform the standard plate count of raw and pasteurized milk and determine the amount of bacteria in each.
3. evaluate the quality of the milk samples based on the bacterial plate counts and the reductase test.
4. define the reductase test used for testing milk.
5. compare the reductase test to the standard plate count of milk.
6. describe the type of fermentation used in yogurt production.
7. list the types of microbes used in yogurt production.

EXERCISE 30 - ISOLATION OF AN ANTIBIOTIC PRODUCER FROM SOIL

Upon successful completion of this exercise, you will be able to

1. perform dilution plates using the spread plate technique.
2. list some of the bacteria found in soil that produce antibiotics.
3. describe why the soil was diluted.