

In the next set of questions we are concerned with the sewage treatment process. The primary treatment processes are to be considered group I. The secondary treatment processes are to be considered group II.

20. Removal of solids
- a. A reaction of I but not II
 - b. A reaction of II but not I
 - c. A reaction of both I and II
 - d. Not a reaction of both I and II but necessary if either I or II or both are to occur
21. Aerobic digestion of dissolved organic material
- a. A reaction of I but not II
 - b. A reaction of II but not I
 - c. A reaction of both I and II
 - d. Not a reaction of both I and II but necessary if either I or II or both are to occur
22. Incorporation of dissolved phosphates into algae
- a. A reaction of I but not II
 - b. A reaction of II but not I
 - c. A reaction of both I and II
 - d. Not a reaction of either I and II but occurs as a result of I or II or both
23. Anaerobic sludge digestion
- a. A reaction of I but not II
 - b. A reaction of II but not I
 - c. A reaction of both I and II
 - d. Not a reaction of either I and II but occurs as a result of I or II or both
24. Removal of stones and sand
- a. A reaction of I but not II
 - b. A reaction of II but not I
 - c. A reaction of both I and II
 - d. Not a reaction of either I and II but necessary if either I or II or both are to occur
25. In relation to bacterium's optimal growth requirement, which group would you expect to be MOST likely in decomposition of compost piles
- a. Acidophiles
 - b. Extreme halophiles
 - c. Psychrophiles
 - d. Thermophiles
26. Which genus of bacteria contributes to dental plagues
- a. *Streptococcus*
 - b. *Staphylococcus*
 - c. *Bacillus*
 - d. *Escherichia*

5. For disinfection purposes chlorine is added to the effluent
- Secondary clarifier
 - Sludge digester
 - Trickling filter
 - Rotating biological contactors
 - Aeration tank
6. A wastewater treatment plant may dispose of effluent by
- Discharging onto land
 - Evaporating into the atmosphere
 - Discharging into receiving waters
 - Reclaiming and reusing
 - All of the above
7. An organism has an optimal growth rate when the hydrogen ion concentration is very high. This organisms is a(n)
- Osmotolerant
 - Acidophile
 - Aerotolerant anaerobe
 - Alkaliphile
8. The term facultative anaerobe refers to an organism that
- Doesn't use oxygen but tolerates it
 - Is killed by oxygen
 - Uses oxygen when present or grows without oxygen when oxygen is absent
 - Requires less oxygen than is present in the air
9. The term obligate anaerobe refers to an organism that
- Doesn't use oxygen but tolerates it
 - Is killed by oxygen
 - Uses oxygen when present or grows without oxygen when oxygen is absent
 - Requires less oxygen than is present in the air
10. The term aerotolerant anaerobe refers to an organism that
- Doesn't use oxygen but can grow in the presence of oxygen
 - Is killed by oxygen
 - Uses oxygen when present or grows without oxygen when oxygen is absent
 - Requires less oxygen than is present
11. Which of the following does **not** kill endospores
- Autoclave
 - Incineration
 - Hot air sterilization
 - Pasteurization
12. Sweet and salty foods frequently do not require refrigeration to prevent spoilage because they have
- Insufficient nutrients
 - Low pH

COLLEGE OF SCIENCE

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Second Year

BIOL 252 MICROBIAL ECOLOGY

APRIL, 2014

TWO HOURS

INDEX NUMBER.....

PROGRAMME OF STUDY:

Answer ALL questions. Please shade the correct answer on the scannable form and also circle on the question paper

1. Which one of the following impurities is easiest to remove from wastewater
 - a. Bacteria
 - b. Colloids
 - c. Dissolved solids
 - d. Suspended solids

2. The green scum seen in freshwater bodies is
 - a. Blue green algae
 - b. Red algae
 - c. Green algae
 - d. Both a and c

3. Which of the following material takes the longest time for biodegradation
 - a. Cotton
 - b. Paper
 - c. Bone
 - d. Jute

4. Non-biodegradable nutrients are created by
 - a. Nature
 - b. Excessive use of resources
 - c. Humans
 - d. Natural disasters

- c. High concentration of solutes
 - d. Toxic alkaline chemicals
13. Which of the following is a limitation of the autoclave
- a. It takes too long to sterilize
 - b. It lacks the ability to inactivate viruses
 - c. It lacks the ability to kill endospores
 - d. It will destroy heat labile materials
14. Which of the following is best used for long term storage of microbial samples
- a. Storage in a freezer at -10°C
 - b. Storage in a freezer at ultra low temperatures -70°C
 - c. Storage in a refrigerator on an agar slant
 - d. Storage on a Petri plate at room temperature
15. Methanogens are potentially of great importance because
- a. They produce methane
 - b. They consume methane
 - c. Methane is an excellent energy source
 - d. Both a and c

Match the types of wastewater treatment listed in the following questions with the following processes. Choices may be used once, more than once or not at all

Primary treatment, secondary treatment, tertiary treatment

16. Removal of solids
- a. Primary treatment
 - b. tertiary treatment
 - c. secondary treatment
 - d. None of these
17. Activated sludge
- a. Primary treatment
 - b. tertiary treatment
 - c. secondary treatment
 - d. None of these
18. Chemical precipitation of phosphorus
- a. Primary treatment
 - b. tertiary treatment
 - c. secondary treatment
 - d. None of these
19. Trickling filter
- a. Primary treatment
 - b. tertiary treatment
 - c. secondary treatment
 - d. None of these

ANSWER ALL QUESTIONS

1. Gamma rays and X rays are effective in killing microorganisms because
- a. Dislodge electrons from atoms, creating ions
 - b. Damage DNA
 - c. Produce powerful oxidizing agents (peroxides)
 - d. All of these
 - e. None of these
2. Heat sensitivity (rubber and plastics) and bulky materials (mattresses) can be sterilized using
- a. Dry heat
 - b. Autoclaving
 - c. UV radiation
 - d. Gaseous ethylene oxide
 - e. None of these
3. Mucous secreting membranes are found in the
- a. Urinary system
 - b. Digestive system
 - c. Respiratory passages
 - d. All of the above
4. All the following are true about releasing untreated sewage into river except
- a. It is a health hazard
 - b. It increases the BOD
 - c. It decreases the dissolved oxygen

It kills disease-causing
bacteria by

starch the water
all following

is greater than 0
B. is greater than 1
C. is exactly or approximately equal to 0
D. could be more than one of the above relationships

In the Alice series of Lewis Carroll's *Alice in Wonderland* and the prequel *Alice Through the Looking-Glass*, the characters in the surrounding lands of Minamata Bay are noted by tendency to believe

- a. Stargazing
- b. Mathematics
- c. Electricity
- d. Metalism
- e. Iron

for the next set of questions, compare the validity of two statements

11 Ruminant organisms include

- i - obligate aerobes
- ii - anaerobic fungi

- a. i only is true
- b. ii only is true
- c. Both i and ii are true
- d. Neither i nor ii are true

12 Predatory bacteria

- i - do not exist because bacteria are too small
- ii - have to be larger than their prey

- a. i only is true
- b. ii only is true
- c. Both i and ii are true
- d. Neither i nor ii are true

12. The following are general measures of control of disease except _____.
- General measures
 - Personal measures
 - Control of the disease
13. The outcome of epidemic depends on initial and effective response to the disease _____.
- Outbreak
 - Out
 - Epidemic
 - Pandemic
 - Epidemic
14. Disease is susceptible to _____.
- Environmental factors
 - Specific infective agents
 - Inherent defects of the body
 - All of the above
 - None of the above
15. Who was the first epidemiologist?
- Francis Crick
 - Walter Gilbert
 - Fred Sanger
 - John Snow
 - James Watson
24. The classic epidemiological studies carried out in London between 1849 - 1856 were due to _____ outbreak.
- Small pox
 - Cholera
 - Influenza
 - Typhoid fever
 - Yellow fever

3. Matched pairs

Match the types of wastewater treatment listed in the following questions with the following processes. Choices may be used once, more than once, or not at all.

a. Primary treatment

b. Secondary treatment

c. Tertiary treatment

d. None of these

1. Activated sludge

a. Primary treatment

b. Second treatment

c. Tertiary treatment

d. None of these

2. Chemical precipitation of phosphorus

a. Primary treatment

b. Second treatment

c. Tertiary treatment

d. None of these

3. Trickling filter

a. Primary treatment

b. Second treatment

c. Tertiary treatment

d. None of these

4. i – The use of manganese in magnetosomes by magneto-aerotactic bacteria
ii – the use iron in magnetosomes by magneto-aerotactic bacteria

24. a. Compaction
 b. It only is true
 c. Both i and ii are true
 d. neither i nor ii are true

25. _____ members of the genus *Frankia* are

- i. Capable of nitrogen fixation for trees and shrubs
ii. Readily cultivated bacteria

- a. i only is true
b. ii only is true
c. both i and ii are true
d. neither i nor ii are true

26. _____ throughout the world, soils are being imported by mineral nitrogen releases from

71. A cellular nonliving agent consisting of a protein coat that surrounds a nucleic acid core are called

- a. Viruses
- b. Prions
- c. Prokaryotes
- d. Viroids
- e. Nucleoproteins

72. Adenovirus has genes that suppress expression of class I MHC and thus evade being targeted by

- a. T cells
- b. Cells
- c. Enzymes
- d. Lytic factors

73. An example of an infection that is not communicable would be

- a. Streptococcus infections
- b. Staphylococcus infections
- c. Clostridium infections
- d. HIV infections

74. If a child has chickenpox and contracts a staphylococcal infection associated with the pox, the staphylococcal infection would be classified as

- a. Primary
- b. Secondary
- c. Subacute
- d. Chronic

75. The outcome of an infection depends on the

- a. Virulence of the pathogen
- b. Response of the host

- a. Disadvantages of adding nitrogenous fertilizers include loss of soil microflora, loss of soil structure and subsequent soil fertility.
- b. Addition of additional nitrogenous fertilizer may produce excess of secondary nitrate ions which may cause
- c. Reduction of availability of mineral nutrients due to
- d. Excessive amount of nitroslamines can be formed.
- 51 Addition of nitrogen containing fertilizer will not go through process
- a. Resulting in release of NO and N₂O which are greenhouse gases.
- b. Causing methane gas to be consumed
- c. Causing methane gas to be produced
- d. Causing antibiotic production in bacteria leads to antibiotic resistance
- e. Assimilation of NO₃⁻ by the plants

52 Methanotrophic bacteria

- a. Oxidize methane gas
- b. Produce methane gas
- c. Utilize methane as the electron source for reduction processes

26. I – the amount of reduction potential required for nitrate assimilation
II – the amount of reduction potential required for nitrification

- a. I is greater than II
- b. II is greater than I
- c. I is exactly or approximately equal to II
- d. I may stand in more than one of the above relations to II

Microorganism interactions and microbial ecology

27. Which of the following statements is true?

- a. Symbiosis refers to different organisms living together.
- b. Members of a symbiotic relationship cannot live without each other.
- c. Symbiosis refers to different organisms living together.

50. Which of the following infections is caused by a protozoan?

- a. *Toxoplasma gondii*
- b. *Toxocara canis*
- c. *Toxoplasma gondii*
- d. *Toxocara canis*
- e. *Toxocara canis*

51. Histoplasmosis is an occupational disease among

- a. Home gardeners
- b. Farmers
- c. Farmers
- d. Spelunkers
- e. Veterinarians

52. Only _____ and humans demonstrate the disease and harbor the fungus causing histoplasmosis.

- a. Aphids
- b. Spider mites
- c. Rats
- d. bats
- e. cats

53. All of the following are reasons for the current rise in emerging diseases EXCEPT:

- a. expansion from urban to rural areas brings people into closer contact with the animals and microbes that cause these diseases
- b. changes occurring in the infectious agents that allows them to infect new hosts
- c. increased travel between continents
- d. increasing numbers of unvaccinated and therefore susceptible children and adults

10. Which of the following statements correctly describes the relationship between phytoplanktonic organisms and heterotrophic organisms?
- (I) phytoplanktonic organisms
 - (II) heterotrophic organisms

- (A) I only is true
- (B) II only is true
- (C) Both I and II are true
- (D) Neither I nor II are true

For the next items, each item lists two categories numbered I and II.

10. I — parasitic organisms
II — bacteria

- (A) All members of I are also members of II, but not all members of II are members of I.
- (B) All members of II are also members of I, but not all members of I are members of II.
- (C) All members of I are members of II and all members II are members of I.
- (D) No member of I is also member of II.

but tolerate desiccation and grow in environments of very high salt concentrations and temperatures above boiling belong to which of these domains?

- a. Prokaryotes
- b. Eukarya
- c. Archaea
- d. Animalia
- e. Protozoa

56. All of the following are true with regard to fungi EXCEPT

- a. They are eukaryotes
- b. Some are single-celled and others are multicellular
- c. Most are photosynthetic and derive their energy from sunlight
- d. Yeast, molds, and mushrooms are examples of fungi
- e. All of the above are true regarding fungi

57. Organisms that are large, complex, single-celled, lacking a cell wall, and frequently classified by their means of locomotion are

- a. Bacteria
- b. Yeast
- c. Viruses
- d. Fungi
- e. Protozoa

33. Which of the following is NOT a primary product of photosynthesis?
- a. Sugars
 - b. Hydrogen
 - c. Oxygen
 - d. Water
 - e. Carbon dioxide
34. Inter-species hydrogen transfer reactions between methanospirillum and methanophthrix are an example of
- a. Competition
 - b. Syntrophy
 - c. Oxidation
 - d. Fixation
 - e. Carboxylation
35. Of all the fungi that cause disease in compromised hosts, none are as widely distributed as which of the following species?
- a. Aspergillus
 - b. Candida
 - c. Pneumocystis
 - d. Blastomycoses
 - e. Coccidioides

42 Schizonts are formed by division of the merozoite from the erythrocyte by lysis.

- a. Trophozoite
- b. Schizont
- c. Merozoite
- d. Macrogametocyte
- e. Macrogamete

43 When an infected _____ takes a human blood meal, it introduces flagellated promastigotes into the skin of the definitive host.

- a. Mosquito
- b. Deer tick
- c. Sand fly
- d. Buffalo gnat

44 Epididymo-orchitis

- a. Is associated with prostatitis
- b. Is a complication of gonococcal urethritis
- c. Is a manifestation of genital infection with ureaplasma spp
- d. Occasionally complicates mumps
- e. May be caused by a variety of organisms

1. *Staphylococcus aureus* and *coagulase-negative staphylococci*

- a. *Coagulase-negative staphylococci*
- b. *Methicillin*
- c. *Indirectly or in relation to climate or country of the infection*
- d. *Discontinuation of antibiotic therapy with insecticide*

2. *Enterococcus faecalis*

- a. A frequent cause of pyrexia of unknown origin
- b. A gram-negative bacillus
- c. Usually sensitive to aminoglycosides
- d. Often resistant to *tephalosporin* antibiotics
- e. Associated with infection in hip prostheses

3. Methicillin-resistant *staphylococcus aureus*(MRSA)

- a. Is usually sensitive to vancomycin
- b. Is more likely to cause deep-seated infection
- c. Is often resistant to many antistaphylococcal antibiotics
- d. May cause asymptomatic colonization
- e. May be phage-typed for epidemiological purposes

4. Aminoglycoside antibiotics such as gentamicin

- a. Act on the bacterial cell wall
- b. Are active against *staphylococci*
- c. Are effective in the treatment of anaerobic infections
- d. Are contra-indicated in patients with renal impairment
- e. May cause loss of visual acuity in the elderly

5. In bacterial endocarditis

- a. Blood cultures may be negative
- b. *Staphylococci* are rare causative organisms
- c. The inability to control infections with antibiotic therapy is an indication for replacement of the affected valve

- 2. Epidemiology
- a. Epidemiologist
- b. Epidemiology
- c. Epidemiologist
- d. Epidemiology
- e. Epidemiology

13. What is the relationship between the total number of individuals affected by a disease and the rate of infection?

- a. Mortality
- b. Prevalence
- c. Incidence rate
- d. Infection rate
- e. Outbreak rate

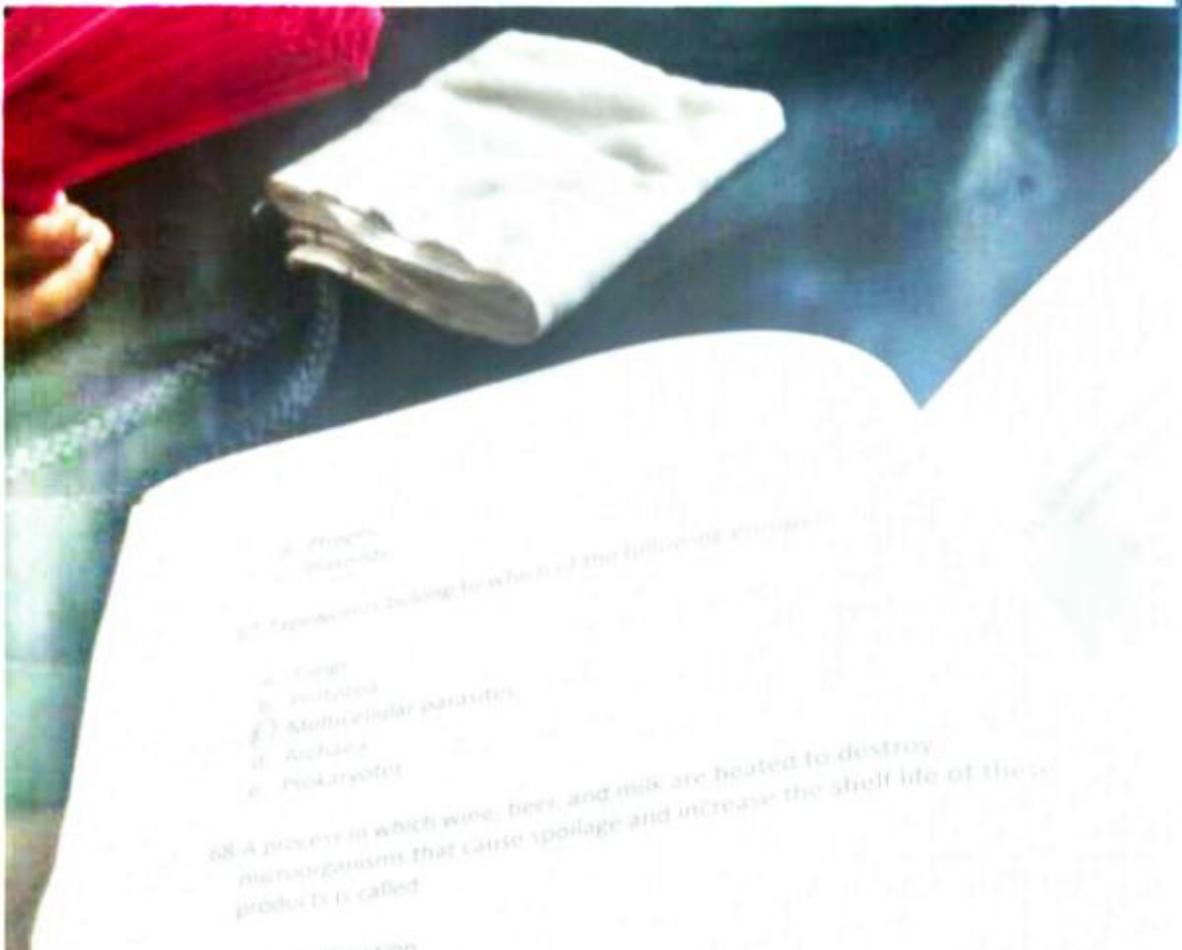
14. Typhoid Mary spread disease through her:

- a. teaching
- b. Cleaning
- c. Cooking
- d. All of the above
- e. None of the above

15. Remote sensing can be used to study the distribution of disease and environmental correlates of microbial diseases. It involves which of the following?

- a. Blood sampling
- b. Questionnaires

9. Which carrier
- Carrier
 - Transmitter
 - Carrier
 - Chronic carrier
 - All of the above
10. Which coating is substituted by cutting off outer coating molecule?
- Fimbrin
 - Antigen
 - Spores
 - Fibres
11. Which virulence-enhancing mechanism of a pathogen is considered to be a mobile genetic element?
- Bacteriophages
 - Plasmids
 - Transposons
 - All of the above
 - None of the above
12. The key factor responsible for the rise in drug resistant pathogens is
- Antigenic drift
 - Antigenic shift
 - Inappropriate use of antimicrobial therapy
 - Bad hygiene
 - Vaccination
13. Usually, pandemic disease spread among

- 
67. Prokaryotes are defined by which of the following features?
- a. Eukaryotes
 - b. Prokaryotes
 - c. Multicellular parasites
 - d. Archaea
 - e. Eukaryotes
68. A process in which wine, beer, and milk are heated to destroy microorganisms that cause spoilage and increase the shelf life of these products is called:
- a. Centrifugation
 - b. Sterilization
 - c. Pasteurization
 - d. Autoclaving
 - e. Polymerization
69. Which of the following are ways that prokaryotes differ from eukaryotes?
- a. They usually are much smaller
 - b. They lack a nuclear envelope
 - c. Most have a cell wall made of peptidoglycan
 - d. They lack mitochondria and other membrane-bound organelles
 - e. They lack a cytoskeleton
70. Which of the following experimental requirements was necessary for Pasteur to disprove spontaneous generation?
- a. Providing a nutrient source that would support microbial growth
 - b. Providing air
 - c. Preventing airborne microorganisms that were initially present in the broth
 - d. All of the above

host state:

normal

- a Disease
- b Secondary complication
- c Infection
- d Quality health

64. Organisms that cause disease only when introduced into an abnormal location or into an immunologically compromised host may best be classified as:

- a Virulent
- b Pathogens
- c Opportunistic pathogens
- d Infectious pathogens

65. Organisms such as rickettsia or viruses may be described as:

- a Obligate intracellular parasites
- b Facultative pathogens
- c Extracellular parasites
- d Avirulent

66. Prodigious amounts of energy

- c. The long-run
d. The equilibrium level of output

Table 1. The amount of nutrients in tropical edosystems

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- d. It may stand as more than one of the above
 e. It is greater than 115 exactly or approximately equal to 115

Table 1. The percentage of vascular plants with mycorrhizae
The percentage of vascular plants without mycorrhizae

34. The primary mode of transmission of hepatitis C virus is:
- a. Vertical transmission
 - b. Horizontal transmission
 - c. Vector-borne
 - d. Fecal-oral
35. A patient presents with fever, chills, headache, and myalgia. The symptoms are most consistent with:
- a. Subclinical
 - b. Acute
 - c. Chronic
 - d. Focal
36. The transmission of Hepatitis B virus by the stick of a needle is an example of which of the following modes of transmission?
- a. Direct contact
 - b. Vector
 - c. Airborne
 - d. Fomite
37. This part of the bacteria cell wall is responsible for the toxic properties of the endotoxin produced by some bacteria.
- No antigenic polysaccharide*

38. Which of the following was discovered by Van Leeuwenhoek in the late 1600s, when he examined his own stools?

- a. Naegleria
- b. Giardia
- c. Pneumocystis
- d. Cryptosporidium
- e. Entamoeba

39. Which is responsible for causing primary amebic meningoencephalitis?

- a. Naegleria
- b. Giardia
- c. Pneumocystis
- d. Cryptosporidium
- e. Entamoeba

40. The causative agent of malaria is a/an

- a. Amoeba
- b. Protozoa
- c. Sporozoa
- d. Flagellated protozoa
- e. Mosquito