



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN MOLECULAR CELL BIOLOGY

SBC 305: APPLIED MICROBIAL BIOCHEMISTRY

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DATE: TUESDAY 27TH MARCH 2012

TIME: 2.00 P.M. – 4.00 P.M.

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INSTRUCTIONS

Section A: Answer ALL the Questions (20 marks)

1. Antibiotics tend to be:
A) Primary metabolites
B) Secondary metabolites
C) Tertiary metabolites
D) Quaternary metabolites
E) Any of the above

2. Amino acids are used as food additives for which of the following reasons?
A) As natural antibiotics
B) As natural growth inhibitors
C) For nutritive purposes
D) As antioxidants
E) As food preservatives

3. _____ are microbially produced and can serve as gelling agents.
A) Amino acids
B) Biopolymers
C) Lipids
D) Polysaccharides
E) Fatty acids

4. Which of the following have NOT been used in various bioconversions?
A) Unicellular bacteria
B) Actinomycetes
C) Yeasts
D) Molds
E) Viruses

5. Which of the following best describes biodegradation?
- A) A minor change in an organic molecule
 - B) Fragmentation of a complex organic molecule
 - C) Complete transformation of the organic molecule to mineral forms
 - D) All of the above
 - E) None of the above
6. Which of the following was/were used to increase biodegradation after the *Exxon Valdez* oil spill?
- A) Nutrient additions
 - B) Chemical additions
 - C) Biosurfactant additions
 - D) High pressure steam
 - E) All of the above
7. Nonbiological foreign chemicals are termed:
- A) Antibiotics
 - B) Probiotics
 - C) Prebiotics
 - D) Xenobiotics
 - E) Neurobiotics
8. _____ seem to be the most efficient at degradation of nonbiological chemicals.
- A) Algae
 - B) Animals
 - C) Bacteria
 - D) Fungi
 - E) Plants
9. Which of the following microorganism oxidizes sulfur compounds but not Fe^{2+} during mineral leaching?
- A) *T.thiooxidans*
 - B) *T.acidophilus*
 - C) *T. organoparus*
 - D) *T.ferrooxidans*

10. Which of the following is the correct order of producing methane anaerobically from complex organic compounds in waste waters?
- Hydrolysis, acidogenesis, Acetogenesis, methanogenesis
 - Hydrolysis, Acetogenesis, acidogenesis, methanogenesis
 - Hydrolysis, methanogenesis, Acetogenesis, acidogenesis
 - Acidogenesis, hydrolysis, Acetogenesis, methanogenesis
 - Hydrolysis, acidogenesis, methanogenesis, acetogenesis
11. Which of the following is a medical use of citric acid?
- The acid is used in effervescent powders which depend on the CO₂ produced from the reaction between citric acid and sodium bicarbonate
 - Citric acid is used in hair rinses and hair and wig setting fluids
 - It is used for artificial flavoring in various foods including soft drinks
 - Sodium citrate is used in processed cheese manufacture
 - It is used in astringent lotions such as aftershave lotions because of its low pH
12. Lactic acid has: low volatility, a melting point of 16.8°C, boiling point of 122°C at 15mm, flash point of 110°C, relative density of 1.249 at 15°C; soluble in water, alcohol, furfural; slightly soluble in ether; insoluble in chloroform, petroleum ether and carbon disulphide; yellow to colorless crystals or syrupy 50% liquid. **TRUE OR FALSE.**
13. Lactic acid is used in medicine to introduce calcium into the body in the form of calcium lactate in diseases of calcium deficiency. **TRUE OR FALSE.**
14. State the uses of citric and lactic acids medically and in the food industry. (7 marks)

Section B: Answer ALL the Questions (5 marks each)

- (a) State the two steps involved in the “anaerobic ammonium oxidation” bacteria. (2 marks)
 - (b) Indicate how hydrazine is generated and detoxified by anammox bacteria. (3 marks)
- Write briefly on “environmental hormones”.
- Describe direct leaching of mineral ores.
- The fate of organic compounds introduced into the soil is determined by a combination of physical, chemical and biological factors. List them.

5. The *crowded plate* method is used in the primary screening of antibiotics. Describe it and state its disadvantages.
6. Explain the advantages associated with the use of methanol as a substrate for single cell protein.

Section C: Answer TWO Questions (10 marks each)

1. Describe the use of composting in bioremediation.
2. Using a tabulation describe five naturally occurring transmissible catabolic plasmids under the headings: primary substrate, plasmid, size, and bacterial host strain.
3. Describe the pathway of anaerobic degradation of toluene by *Azoarcus* and *Thauera* species.