THE UNIVERSITY OF MANITOBA

November 15, 2017 Mid-Term-2 EXAMINATION

PAPER NO: __1__ LOCATION: 223 Wallace Building PAGE NO: 1 of 2

DEPARTMENT & COURSE NO: CHEM / MBIO 2770 TIME: 0.83 HOUR

EXAMINATION: Elements of Biochemistry I EXAMINER: J. O'Neil

Instructions

- *Please mark the Answer Sheet using PENCIL ONLY.*
- *Enter your NAME and STUDENT NUMBER on the Answer Sheet.*
- *The exam consists of multiple-choice questions. Enter your answers on the Answer Sheet.*
- *There is only 1 correct answer for each question.*
- *PLEASE READ ALL THE QUESTIONS CAREFULLY!*
- *The last page may be used for calculations.*

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1. α-keratin:
   - A) Is a soft gel and easily dissolves in water.
   - B) Contains an amino acid sequence with many copies of Gly-Xxx-Pro.
   - C) Is a hard material made of stacked β-sheets.
   - D) Is the primary constituent of hair, feathers, and nails.
   - E) Is a tough insoluble fibre made of three left-handed α-helices.

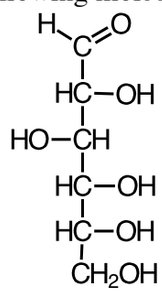
2. Identify the correct statement about the Michaelis constant of an enzyme:
   - A) It equals $\frac{1}{2}V_{max}$.
   - B) It decreases as the affinity of the enzyme for substrate increases.
   - C) It is a first-order rate constant with units s^{-1}.
   - D) It is equivalent to the turnover number.
   - E) It is the y-axis intercept in a reciprocal plot of the Michaelis-Menten equation.

3. Which statement **correctly** describes the hydrolysis of a peptide bond by chymotrypsin?
   - A) The positive charge on the transition state is neutralized by groups in the protein.
   - B) A covalent intermediate forms between the N-terminus of the substrate and the Asp in the catalytic triad.
   - C) The enzyme behaves as a base-catalyst only.
   - D) Water is not a reactant.
   - E) Electron flow is first from the enzyme into the substrate, followed by flow back into the enzyme from the substrate.

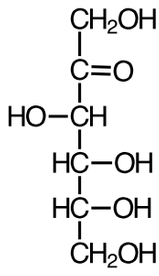
4. What percent of an enzyme is saturated when the substrate concentration is 10 μm and the K_M is 4 μm?
   - A) 25%
   - B) 40%
   - C) 71%
   - D) 75%
   - E) 140%

5. Reduction of glucose yields:
   - A) Glucitol.
   - B) Gluconic acid.
   - C) Mannitol
   - D) Glucuronic acid.
   - E) Ascorbic acid.

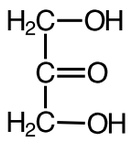
6. Identify the following molecules.



i



ii

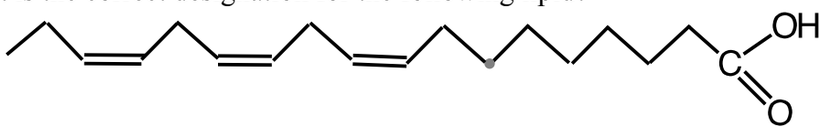


iii

A) i = *D*-mannose; ii = *D*-fructose; iii = *D*-glyceraldehyde
B) i = *D*-fructose; ii = *D*-glucose; iii = *D*-ribose
C) i = *D*-gulose ii = *D*-ribose; iii = *D*-fructose
D) i = *L*-fructose; ii = *D*-glyceraldehyde; iii = *D*-ribose
E) i = *D*-glucose; ii = *D*-fructose; iii = dihydroxyacetone

7. Identify lactose:
A) Glucose (α1←→β2) Fructose
B) Glucose (β1→4) Glucose
C) Glucose (α1→4) Glucose
D) Galactose (β1→4) Glucose
E) Glucose (α1→6) Glucose

8. What is the correct designation for the following lipid?



A) 17:3 ($\Delta^{9,12,15}$)
B) 18:3 ($\Delta^{9,12,15}$)
C) 17:3 ($\Delta^{8,11,14}$)
D) 18:3 ($\Delta^{8,11,14}$)
E) 18:3 ($\Delta^{10,13,16}$)

9. The melting points of fatty acids _____i_____ with increasing chain length and _____ii_____ with increasing numbers of double bonds.
A) i = decrease; ii = decrease;
B) i = increase; ii = increase;
C) i = increase; ii = decrease;
D) i = decrease; ii = increase;
E) none of the above

10. Identify the **<u>correct</u>** statement about fatty acids:
A) They are soluble in organic solvents.
B) Fatty acids are usually composed of odd numbers of carbon atoms.
C) Sites of unsaturation are usually in the *trans* configuration.
D) They are coloured compounds with conjugated double bonds.
E) They form bilayers when dissolved in water.

SCRATCH