BCH2333 2009 Final -Mezl's questions I do not have the other parts. vm ADD 00ANSEALL
Answers are on bottom.

29. Coulomb's law gives :

A) the repulsion between two molecules as a function of their charge and the dielectric constant
B) the repulsion between two molecules as a function of their mass and their dipole moment
C) the attraction between two molecules as a function of their charge and the dielectric constant
D) the attraction between two molecules as a function of their mass and the dielectric constant
E) the attraction between two molecules as a function of their mass and their dipole moment

30. Going from the highest to the lowest, the order of these dielectric constants is:

A) water > ethanol >toluene B) water > toluene >ethanol C) toluene >water > ethanol
D) toluene > ethanol > water E) ethanol > toluene > water

31. An alcohol group is hydrogen bonded to an aldehyde oxygen. The distance between the center of one oxygen and the center of the other oxygen is about:

A) 0.16 nm B) 0.28 nm C) 0.35 nm D) 0.45 nm E) 2.2 nm

32. If you put 1 g of a sugar into your blood, which of the following would contribute the LEAST to the osmotic pressure?

A) deoxyribose B) glucuronic acid C) glucose D) lactose E) mannitol

33. In pure water, about ..... water molecules are ionized.

A) 0.01% of the B) one in 10^6 C) one in 10^9 D) one in 10^{12} E) one in 10^{14}

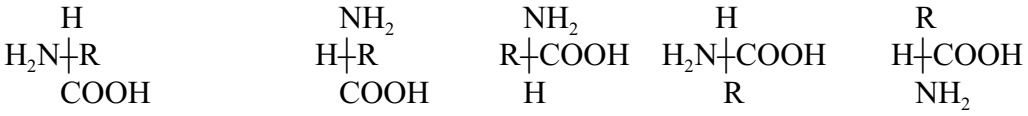
34. A 1 L solution contains a 40 mM pH 7 buffer. The pK of the weak acid is 7. You add 1 mL of 1 N base. The new pH is about :

A) 6.8 B) 7.0 C) 7.3 D) 7.45 E) 7.6

35. Penicillin inactivates the enzymes that

A) replicate DNA
B) translate mRNAs
C) cross link collagens
D) cross link the peptidoglycans of bacterial cell walls
E) cross link the lipid bilayer of the bacterial membrane

36. Which of these is an L-amino acid?

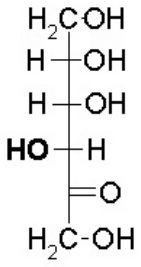


(A) (B) (C) (D (E)

37. L-idose is a 6 carbon sugar. You take carbon 6 and you replace the H on it with a OH and the OH with an H (you flip the two around). This will give:

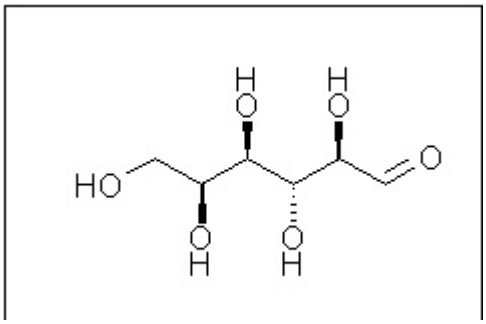
A) D-idose B) L-idose C) L-epimero-idose
D) a L-sugar with a different name E) a D-sugar with a different name

38. The compound on the right is a :



A) D-aldose B) L-aldose
C) D-hexose D) L-hexose
E) D-glucose

39. The molecule on the right is:



A) Glucose
B) Mannose
C) Galactose
D) A D-sugar but not one of the ones to know by heart
E) An L-sugar but not one of the ones to know by heart

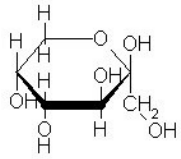
40. The amount of glucose in 5 ml of your blood is about :

A) 5 µg B) 100 µg C) 500 µg D) 1 mg E) 5 mg

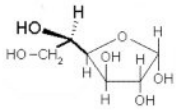
41. In a normal person glucose is ..... % of blood.

A) 0.5 % B) 0.1 % C) 0.05 % D) 0.01 % E) 0.005 %

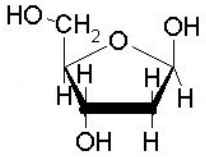
USE THESE STRUCTURES FOR THE FOLLOWING QUESTIONS



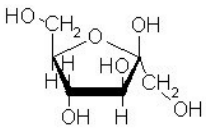
[I]



[II]



[III]



[IV]

42. A D-sugar :

A) [I], [II] B) [III] C) [III], [IV]
D) [I], [III], [IV] E) [I], [II], [III], [IV]

43. ..... is a β anomer

A) [I], [II] B) [III] C) [III], [IV]
D) [I], [III], [IV] E) [I], [II], [III], [IV]

44. Sugar [II] is :

A) Glucose B) Fructose C) Mannose
D) An L-sugar but not one to know by heart
E) A D-sugar but not one to know by heart

45. Sugar [I] is :

A) Glucose B) Fructose C) Mannose
D) An L-sugar but not one to know by heart
E) A D-sugar but not one to know by heart

46. The commercial name of [II] is baladose. To transform baladose to baladitol, you would :

A) reduce carbon 1 B) reduce carbon 2 C) reduce carbon 6
D) oxidize carbon 1 E) oxidize carbon 2

******** END OF QUESTIONS ON STRUCTURES **********

47. Thymine has a methyl group at position

A) 2 B) 3 C) 4 D) 5 E) it does not have a methyl group

48. In five tubes that have the same volume you dissolve 1g of each of the listed products. The UV absorbance will be the highest in the tube that contains:

A) a pyrimidine B) a purine C) galacturonic acid
D) gluconolactone E) a purine nucleotide

49. In a purine nucleotide, the bond between the base and sugar is a ..... bond.

A) C-C B) C-N C) C-O D) N-O E) P-O

50. In a nucleotide, the group on the sugar that is linked to the phosphate is :

A) a primary alcohol group B) the aldehyde C) the anti-carbon
D) the reference carbon E) the anomeric carbon

51. Which of the following is a nucleoside ?

A) Adenine B) Cytosine C) Guanine D) Thymidine E) Uracil

52. A .... makes a phosphodiester bond between two nucleotides.

A) oxidation B) reduction C) hydrolysis D) dehydration E) tautomerization

53. If your DNA had a gene at every 300,000 base pairs, then each cell in your body would have ..... different genes.

A) 3,000 B) 10,000 C) 30,000 D) 100,000 E) 130,000

54. In the Watson-Crick helix, the distance from the center to the surface (the distance from a hydrogen bond to a phosphate) is about :

A) 0.34 nm B) 0.7 nm C) 1 nm D) 2 nm E) 3 nm

55. If you took all the DNA in 10^7 of your cells and stretched it out as a Watson Crick helix it would stretch about :

A) 9 km (Height of Mont Everest) B) 300 km (Earth to orbit)
C) 20,000 km (North pole to South pole) D) 400,000 km (earth to moon distance)
E) 50,000,000 km (earth to Venus)

56. In a Watson-Crick base pair, the G is the ..... anomer and the C is the ..... anomer.

A) α, α B) α, β C) β , α D) β, β
E) Half of the G is the α anomer, half the β; same thing for C

57. A hydrogen bond that joins bases in the Watson-Crick helix :

A) OH···C B) NH···N C) NH···C D) A and B E) A, B and C

58. When one considers the diameter of possible DNA structures, going from the thinnest DNA to the thickest the order is:

A) A, B, Z B) A, Z, B C) B, A, Z D) Z, B, A E) Z, A, B

59. The amount of DNA in your average chromosome is about ..... base pairs.

A) $600\ 10^6$ B) $150\ 10^6$ C) $50\ 10^6$ D) $20\ 10^6$ E) $8\ 10^6$

60. A chromosome contains $1\ 10^5$ nucleosomes. This chromosome is ..... base pairs long.

A) $1\ 10^5$ B) $2\ 10^5$ C) $5\ 10^6$ D) $20\ 10^6$ E) $80\ 10^6$

Answer **only TWO** of the THREE following essay questions

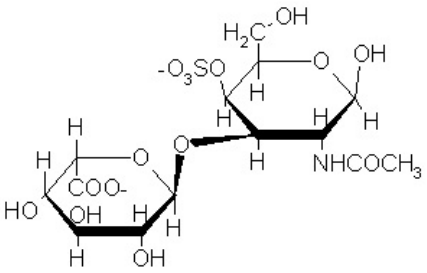
C1 Use words and the terminology that you learned in class to describe the structure below in an unambiguous manner. Take the sugar on the upper right of the structure, oxidize carbon 1 to the level of an acid and draw both the oxidized cycle and the linear form of the oxidized compound. Name both compounds.

C2) Draw the linear form of D-fructose and the four configurations that can be obtained when it cyclises. Name these ring systems and configurations and explain the principle of the sugar naming systems (reference carbon, anomeric carbon, sugar name).

C3) Draw the RNA sequence ACT. Your diagram should show the charges, the configuration at each position of the first sugar and ALL the atoms and double bonds of all the bases. What is strange about this sequence? What is the complementary DNA sequence (you do not need to draw it)? Use your figure to explain the effect of a base (such as NaOH) on DNA and RNA.

Answers for the other essays are not available. vm.

61. Use words and the terminology that you learned in class to describe the structure below in an unambiguous manner. Take the sugar on the upper right of the structure, oxidize carbon 1 to the level of an acid and draw both the oxidized cycle and the linear form of the oxidized compound. Name both compounds.



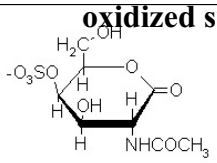
Correction scheme of **90423** practice structure of (pg S20), unknown first sugar
10= total

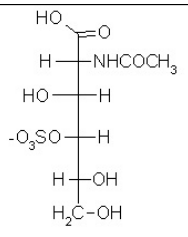
1 L hexose **sugar 1 = 3.5**
0.5 aldo pyranose
0.5 C6 oxidized to level of acid
1.5 Configurations: C2 opposite, C3 same, C4 opposite of reference atom
Some will say C2 =D, C3 = L, C4 = D Allow this
If they say configurations are **like** D-glucose with difference that C5 is the opposite, this is accepted. Anything about L-glucose is not! (fyi: the sugar shown is L-idose).
If some student decides to start with the carboxyl as carbon 1, we will have to accept (it is the unbiased IUPAC naming). Can the first person that gets this, work out an answer and send to all
1 linked α-1,3 (0.7 for α, 0.3 for 1,3) **link = 1**
to
0.5 β **sugar 2 = 2.5**
0.5 D
0.5 galactose
0.5 2 N acetyl
0.5 4 sulfo (accept sulfato, sulfate but give half for sulfhydryl, sulfide, etc...)
If they miss that this is galactose but give an ok description

0.5 for cyclic drawing

1.5 for linear drawing

oxidized sugar = 3

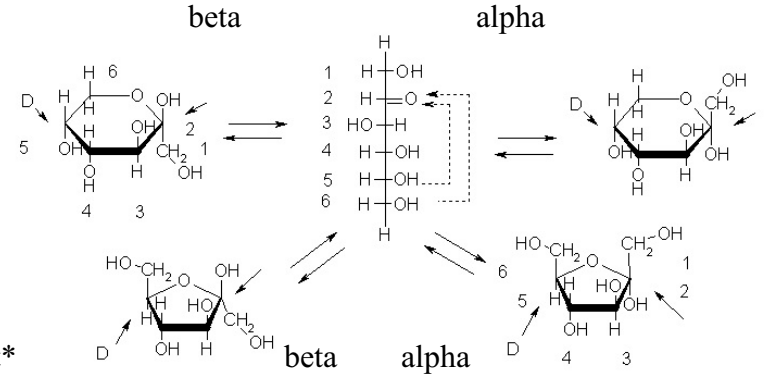




1 names 0.5 for lactone or galactolactone (0.3 for cyclic ester)
0.5 for Galactonic acid (0.2 if just suffix,
0.3 if states linear form with C1 as acid)

62. Draw the linear form of D-fructose and the four configurations that can be obtained when it cyclises. Name these ring systems and configurations and explain the principle of the sugar naming systems (reference carbon, anomeric carbon, sugar name).

NOTE **THERE IS A FIGURE ERROR BELOW** : EXTRA HYDROGEN ON C2 OF LINEAR form



. Fructose

α-D-fructopyranose β-D-fructopyranose

α-D-fructofuranose β-D-fructofuranose

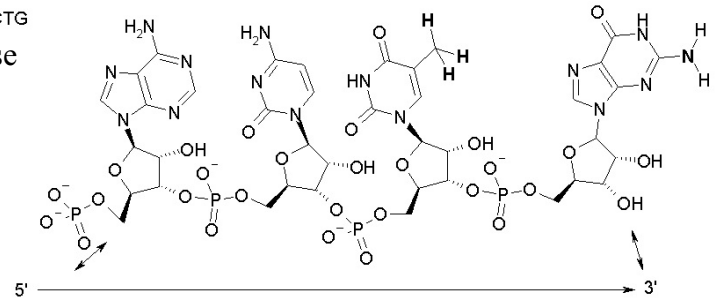
Correction scheme

option	grade	limits
linear form	1	0 if end wrong
pyranoses: ring	1	for drawing ring right*
configurations	1.	0.4 for reference C, 0.3 for anomer, 0.3 for other configs
-names	1	for name
furanoses:		
ring	1	for drawing ring right*
configurations	1.	0.4 for reference C, 0.3 for anomer, 0.3 for other configs
-names	1	for name
explain -reference C	1	must say is last chiral atom from **oxidized** end
-anomers	1	α if same orientation as ref C, β if opposite
-names	1	a name is the sum of specific configurations relative to the ref C

* -2 if cyclized to C1

Draw the RNA sequence ACT. Your diagram should show the charges, the configuration at each position of the first sugar and ALL the atoms and double bonds of all the bases. What is strange about this sequence? What is the complementary DNA sequence (you do not need to draw it)? Use your figure to explain the effect of a base (such as NaOH) on DNA and RNA.

Lecture notes show the **RNA** sequence ACTG (below) WITHOUT ALL Hs

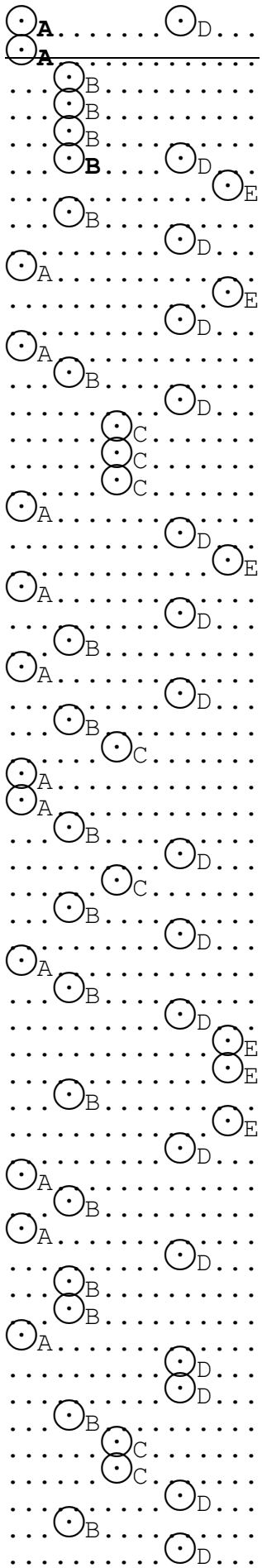


Correction scheme

1.5 A wrong dbl bonds-> 0.5 marks for base
1.5 C Hs missing -> -0.3/base
1.5 T
1.5 ribose -2 if deoxy!, -0.5 OH config
-1 for wrong 1' or 4' configurations
-1 if no configs
0.8 phosphate
0.8 is a strange RNA: contains T instead of U
0.8 cDNA= AGT -0.6^{+} if backwards -0.5 if RNA

if wrong backbone! give <5 for entire question

0.8 base effect: hydrolyses RNA, not DNA
0.8 base explanation: 2' OH attacks P; DNA does not have


1 A D
2 A
3 B
4 B
5 B
6 B D
7 E
8 B
9 D
10 A
11 E
12 D
13 A
14 B
15 D
16 C
17 C
18 C
19 A
20 D
21 E
22 A
23 D
24 B
25 A
26 D
27 B
28 C
29 A
30 A
31 B
32 D
33 C
34 B
35 D
36 A
37 B
38 D
39 E
40 E
41 B
42 E
43 D
44 A
45 B
46 A
47 D
48 B
49 B
50 A
51 D
52 D
53 B
54 C
55 C
56 D
57 B
58 D
59 B
60 D
61
Exam:Date:File:
00eAnsAll
90422
000eAnsAllmcqs
90510