Biochemistry
Mid Test Bank

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DR. Mamoun's material (molecular techniques)

1) In DNA microarray , clustering of patient samples by Bio informatics is based on :

A. molecular fingerprinting
B. the clinical characteristics of samples
C. treatment response
D. gene expression profiling
E. mutations

Answer: D

2) you suspect that the hormone binds to large number of proteins. How can you identifythe interacting protein :

A. Yeast-Two hybrid system
B. Next -generation sequencing
C. CRISPR-Cas9 system
D. Reporter gene assay
E. Protein tagging

Answer: A

3) the following is needed for next generation sequencing :

A. DNA adapters
B. Taq polymerase
C. Dideoxynucleotide
D. Multiple pairs of gene-specific primers

Answer: A

4) the variation of the annealing temprature of PCR allows for :

A. better selectivity of amplified regions of DNA
B. amplifying GC- rich or AT- rich DNA sequences
C. synthesis of amplicons of certain lengths
D. activation of the taq polymerase
E. controlling speed of PCR reaction

Answer: A

5) you want to purify the hormone , but you you do not have an antibody that can help you purify it , you can do this :

A. Protein expression in bacteria
B. Reporter gene assay
C. CRISPR-Cas9 system
D. immunoprecipitation
E. protein tagging

Answer: E

6) you want to see a protein move from steam to leaves. How can you do this ?

A. Attach SYBR green to the hormone
B. Create a recombinant protein with His tag
C. perform a reporter gene assay
D. create a recombinant protein with green fluorescent protein
E. Create a recombinant protein with LacZ gene product (beta-galacosidase)

Answer : D

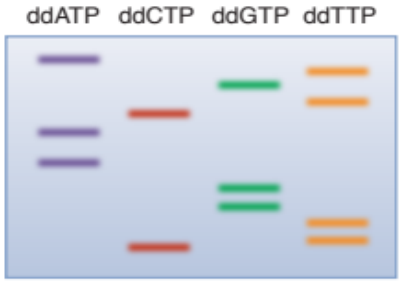
7) This technique allows you to identify the change of expression of hundreds to thousands of genes, known and unkown ones , with their alternatively spliced variants:

A. Real -time PCR of cDNA
B. Reporter gene assay
C. Next generation DNA sequencing
D. DNA microarray
E. RNA sequencing

Answer: E

8) Te sequence of the original DNA strand is :

5'TACAGTTCCAAG 3'



9) This technique allows you to investigate the change of expression several thousands of known genes , all at the same time , among plants that express the hormone versus those that do not ?

A. Quantitative real-time PCR of CDNA
B. Reporter gene assay
C. DNA microarray
D. Yeast-two hybrid system
E. Quantitative PCR

Answer: C

10)One of the following is not true in regards to the CRISPR-Cas9 system :

A. It contains DNA fragments of bacteriophage DNA
B. It is part of bacterial genome
C. It encodes Cas9 protein
D. It contains repeated palindromic sequence

Ansewr: C

11) The following is a sequence you expect NOT to be recognized by a restriction endonuclease

A. CTTAAG
B. AGCT
C. GCAGCA
D. ATATAT
E. GGATCC

Answer : C

12) In order to express a human gene in bacteria , you need one of the followig :

A. The human gene to be controlled by an efficient human promoter
B. Co-expression of a human chaperone protein
C. The whole transcribed region of the human gene after RNA processing
D. The original transcription termination sequence of human gene
E. A human gene that produces a protein without cysteines

Answer: C

13) Why cannot we detect any signal in the first few cycles of quantitative PCR ?

A. SYBR green is not yet activated
B. The taq polymerase is not active
C. Limitation in the sensitivity of the instrument
D. There is no amplification taking place
E. The proper size of the amplicon has not been reached

Answer: C

14) you expressed the hormone in every plant cell, but the hormone does not function You want to identify the gene that has a mutation , but their plant genome is composed of 5000 genes . you don't know what the gene is . you can perform this technique and compare the results to the database of the normal genome

A. Quantitative PCR
B. real time PCR
C. RNA sequencing
D. next generation sequencing
E. fluorescent based sequencing

Answer: C

15) you want to study the regulatory sequence of the hormone gene including the promoter, promoter proximal element and silencer. you perform a reporter gene essay. one of the following is true:

A. you need to make cDNA from the hormone mRNA
B. you need the coding region of the hormone without introns
C. you need to use the LacZ as a reporter gene
D. you need to create an expression victor that contains different regions of regulatory sequence
E. you need to create a recombinant hormone with luciferase

Answer : D

16) your performed fluorescence based DNA sequencing of the coding region of the hormone gene in two plants ; one has a functioning hormone and other does not. you found identical homology except for one position where the peak totally changed colors . This indicates :

A. one heterozygous single point to mutation
B. Polymorphism
C. Bese insertion
D. two homozygous single point mutation
E. frameshift mutation due to the deletion

Answer : D

17) you aim to create mutations in the hormone gene. you can do this by:

A. activation of non-homologous end joining following introduction of CRISPER-Cas9 system
B. Target the gene with specific primers
C. Activation of homologous recombination following introduction of CRISPER-Cas9 system
D. Allow cells to express specific restriction endonucleases
E. Create a recombinant DNA with glutathione -S-transferase gene conjugated to the hormone gene

Answer : A

18) Proteins are tagged in order to :

A. purify them
B. retain their function
C. detect them
D. all of the above
E. A and C only

Answer : E

19) What is SYBR green ?

A. It is a molecule that terminate DNA synthesis in sequencing reaction
B. It is a molecule that activates and stabilize DNA polymerase
C. it is a molecule that binds to double-stranded DNA and fluoreces
D. it is a molecule that activates and stabilize DNA
E. it is a molecule that tags proteins

Answer : C

20) All of the following are advantages of using fluorescence-based sequencing over radioactivity-based sequencing except :

A. It detects heterozygosity
B. It is automated
C. It is safe and cheap
D. It is fast

Answer : A

21) A blue colony generated in yeast two-hybrid system indicates

A. The enzyme beta-glactosidase is inactive
B. The recombinant plasmid are successfully inserted into yeast
C. No expression of LacZ gene
D. A confirmation of protein -protein interaction
E. Lactose is metabolized

Answer : D

(you may be confused with B but the recombinant plasmid has to be inserted successfully either the colony converted to blue or not)

22) The luciferase reporter assay is used to

A. Identify transcription start sites
B. Identify introns and exons within eukaryotic genes
C. Identify termination sequences of genes
D. Identify genes
E. Identify regulatory sequences within promoters

Answer : E

23) The CRISPR part of CRISPR -Cas9 system is :

A. The gene that encodes the nuclease that cleaves viral DNA
B. A RNA molecule representing viral genome
C. The enzyme responsible for replacing a gene by another
D. A genetic component that contains parts of viral genome
E. The RNA that guides the nuclease into the host genome

Answer : D

24) Taq polymerase is specifically used in PCR due to its

A. accuracy
B. High efficiency
C. Low price
D. Availability
E. Stability at high temperature

Answer : E

25) A cloning expression vector contains all of the following exept ;

A. A promoter
B. A transcription termination sequence
C. An enhancer
D. A shine-Dalgarno sequence
E. A cloning site

Answer: C

26) Each spot in DNA microarray represents ;

A. A known DNA sequence
B. a protein with high affinity to a DNA sequence
C. A known RNA sequence
D. A heterogeneous population of DNA fragments
E. An unkown DNA fragment

Answer : A

27) The purpose of GFP conjugated to protein is:

A. Protein detection
B. Protein purification
C. Protein folding
D. Protein solubility
E. Protein secretion

Answer : A

28) 2-Why we use DNA adapters in next generation sequencing?

A. To anneal with primers
B. To stabilize the DNA strands

Answer: A

29) Taq DNA polymerase is utilized in PCR since it is?

A. Cheap
B. Available in high amounts
C. Stable at high temperatures

Answer : C

30) Which of the following is not required in expression vectors ?

A. Cloning site.
B. Promoter region.
C. Ribosome binding region.
D. Tagging sequence.
E. A selectable marker

Answer : D

31) Which of the following is not true about the CRISPR/CAS9 system?

A. Cas9 is guided by an RNA molecule
B. Breaking double stranded DNA can be repaired by the system
C. Breaking double stranded DNA can cause a mutation
D. CRISPR is a bacterial genetic that constitutes the immune system of
E. bacteria against phages

Answer : B

32) Which of the following can't be detected by the RNA-seq mechanism?

A. RNA Stability
B. Amount of transcripts
C. Significant transcripts

Answer: A

33) Which of the following is true about the LacZ system?

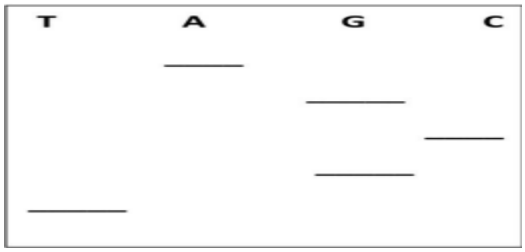
A. It gives a white colour when activated
B. It tests the binding of two proteins together
C. It tests the binding of a protein with a DNA molecule

Answer: B

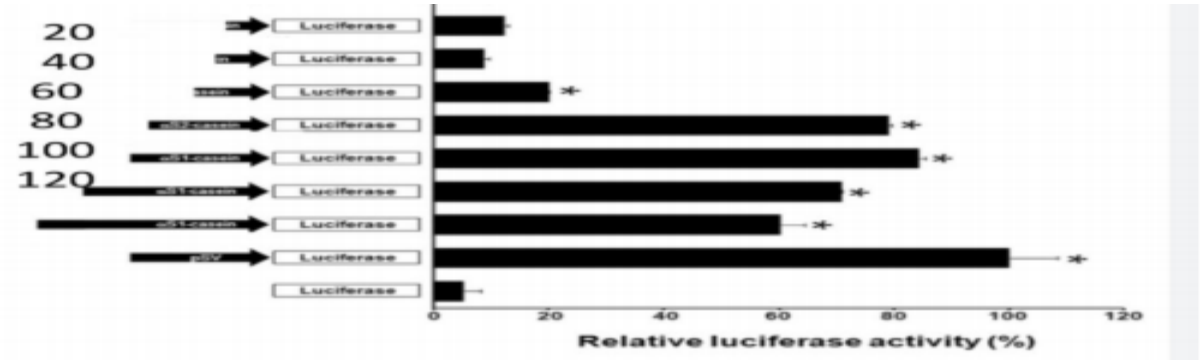
34)What is the DNA sequence when we perform premature termination of DNA synthesis by dideoxynucleotide shown here?

A. 5' – AGCGT – 3'
B. 5' – TGCGA – 3'
C. 3' – TGCGA – 5'

Answer: B



35) The promoter of a specific gene only is placed upstream of a "reporter gene" luciferase gene in a plasmid, the plasmid is transfected (inserted) into the cells, and the expression level of luciferase is measured, what can you tell?



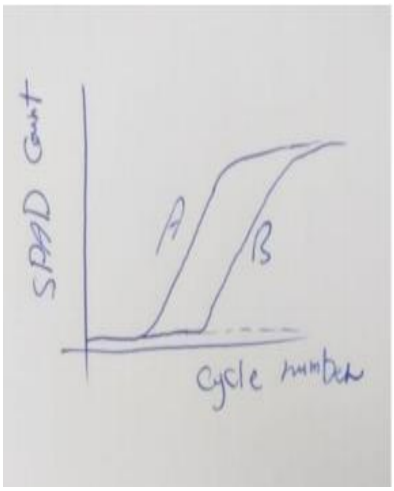
A. There is inhibitor region within 80 and 100.
B. There is repressor region within 100 and 120.
C. Gene transcripted at best when there is no promoter.
D. Promoter does NOT affect the transcription.

Answer: B

36) A quantitative, error free, SYBR green real-time PCR assay is performed for two flu patients as shown in the chart, you can tell:

A. a-patient A has more viral content in his body than patient B
B. b-patient B has more viral content in his body than content A

Answer: A



37) DNA sequencing refers to the

A. technique used to determine the sugar sequence and DNA
B. technique used to determine the phosphate sequence in DNA molecule
C. technique used to determine the base sequence in DNA molecule
D. All of these

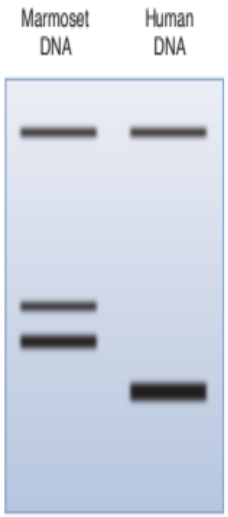
Answer: C

38) the principal of sangars method relies on

A. use of dNTPs for change termination
B. use of ddNTPs for change termination
C. use of ^{32}p for chain termination

Answer : B

39) mRNA encoding glucose 6-phosphatase was isolated from baboon liver and used to make a 32P-cDNA probe. DNA was then isolated from marmoset and from human tissue, digested with a restriction endonuclease, Southern blotted, and probed with the 32P-cDNA. Which of the following conclusions can be drawn from the results of this analysis shown below?



A. The glucose 6-phosphatase gene is present in baboon, marmoset and human liver.
B. Both marmoset and human liver express the glucose 6-phosphatase gene.
C. There are two glucose 6-phosphatase genes in the human liver.
D. The glucose 6-phosphatase gene is on different chromosomes in the marmoset and in the human.
E. The human and marmoset tissue used in this experiment is from liver

Answer: A

All 3 tissues contain the gene (the probe was produced from baboon mRNA, implying the gene is also there)

40) Restriction fragment length polymorphisms may be produced by mutations in the sites for restriction endonucleases. For instance, a single base change in the site for the nuclear SalI produces the sequence GTGGAC, which can no longer be recognized by the enzyme. What was the original sequence recognized by SalI?

A. GTAGAC
B. GCGGAC
C. CTGGAC
D. GTCGAC
E. GTGTAC

Answer : D

(All options represent single-base changes in the mutant sequence in the stem, but only choice D reestablishes a palindrome)

DR. Diala's material (acids, bases, PH and buffers)

1) Water molecules have _____ than molecules of similar size, such as ammonia and methane, reflecting its capacity to absorb large amounts of heat.

A. less surface tensions
B. a higher boiling point
C. a lower capacity for forming hydrogen bonds
D. a lower melting point

Answer: B

2) Although van der Waals forces are small, hydrophobic substances form cohesive droplets in aqueous solutions due to:

A. Ionic bonding between water molecules
B. Hydrogen bonding between water molecules, forming cages around the nonpolar droplets
C. Stabilization of the hydrophobic phase by van der Waals interactions between water molecules
D. The strong van der Waals forces between the nonpolar molecule
E. Formation of insoluble lipid droplets

Answer: B

3) Sweating has a cooling effect because of water's high?

A. surface tension
B. density
C. heat of vaporization
D. buffering capacity
E. specific heat

Answer: C

4) The ability of water to form hydrogen bonds is attributed to: -

A. the oxygen atom in a water molecule has a weak positive charge.
B. each of the hydrogen atoms in a water molecule is weakly negative in charge
C. the bonds that hold together the atoms in a water molecule are polar covalent bonds

Answer: C

5) Water can form the following noncovalent interactions except:

A. Hydrophobic interactions
B. Van der waals interactions
C. electrostatic interactions
D. hydrogen bonding

Answer : A

6) The PKb of base is 2 , what is the PH of a .01 M solution of the base?

A. 12
B. 8
C. 10
D. 11
E. 9

Answer : A

7) Which of the following statements best describes what is meant by ion product of water:

A. Product of concentrations of hydrogen ions and hydroxyl ions in water or an aqueous solution of an electrolytes
B. The sum of concentrations of hydrogen ions and hydroxyl ions in water or solution of electrolytes
C. The product of concentrations of hydrogen ion and hydroxyl ions that are derived only from water molecules in aqueous solution of electrolytes
D. The number of ionized molecules of H2O in one mole of a pure water
E. The total number of negatively and positively charged ions in one liter of an aqueous solution of electrolytes

Answer : C

8) Membrane formation occurs in part due to the lipid solubility in water because of which of the following?

A. Hydrogen bond formation between lipids and water
B. hydrophobic interaction between lipid molecules
C. hydrophobic interactions between lipids and water
D. vander waals forces between lipids and water
E. covalent bond formation between lipids and water

Answer : B

9) the two most important buffer systems in blood are:

A. Albumin and hemoglobin
B. Bicarbonate and hemoglobin
C. inorganic phosphates and hemoglobin
D. phosphorelated organic metabolites and hemoglobin
E. phosphorelated organic metabolites and pyruvate

Answer: B

10) you prepare a sodium phosphate buffer by mixing 100ml of 0.1 M Na2HPO4 with 100ml of 0.1 M NaH2PO4 . The pH of the final solution is 7.8 what is the approximate PKa of the acid component of the buffer ?

A. 7.8
B. 10 to the power of - 5.8
C. 10 to the power of 7.8
D. 6.8
E. 5.8

Answer : A

11)A patient when an enteropathy (internal disease) produce large amounts of ammonia (NH3) from bacterial overgrowth in the intestine . the ammonia was absorbed through the intestine into the portal vein , and entered the circulation . which of the following is a likely consequence of his ammonia absorption :

A. increase expiration of Co2
B. hyperventilation
C. conversion of ammonia to ammonium ion in his blood
D. decreased concentration of bicarbonate in the blood
E. a decrease of blood pH

Answer : C

12)laboratory tests of the urine of a patient identified the presence of methylmalonate (-OOC-CH(CH3)-COO-) . Methylmalonate is best described as one which one of the following ?

A. A strong acid
B. it is a triprotic acid
C. The conjugate base of a weak acid
D. It is 100% dissociated at its pka
E. It's a major intracellular buffer

Answer : C

13)hydrogen bonds can form between electronegative atoms such as oxygen and nitrogen and a hydrogen atom bonded to:

A. oxygen only
B. hydrogen
C. nitrogen only
D. carbon
E. an electronegative atom

Answer : E

14)an individual wears a face mask for a long hours without removing it at all the condition that is expected to happen :

A. nothing would happen
B. metabollic acidosis
C. respiratory alkalosis
D. metabolic alkalosis
E. respiratory acidosis

Answer : E

15)a decrease blood pH from 7.5 to 7 would be accompanied by which of the following changes in ion concentration ?

A. A ten-fold decrease in hydrogen concentration
B. An increase in hydrogen ion concentration by a factor of 7.5 / 7
C. five fold increase in hydroxyl ion concentration
D. shift in concentration of buffer and ions with no change in hydrogen ion concentration
E. A 3 fold increase in hydrogen add concentration

Answer : E

16) during a short distance run, the muscles produce a large amount of lactic acid from their glucose stores. hyperventilation can be used for in this situation because:

A. Adds H+ lowering the pH of the blood
B. Increase the composition of bicarbonates
C. remove H+ raising the pH of the blood
D. Reduce the capacity of hemoglobin buffer system
E. decreases the production of carbonic acid

Answer : E

17) which of the following this physiologic/pathologic conditions is most likely to result in an alkalosis provided the body could not fully compensate?

A. repeated vomiting of stomach contents
B. production of ketone bodies by patients with diabetes mellitus
C. hyperventilation due to starvation
D. production of acids by the highly active liver cells
E. diarrhea with loss of bicarbonate anions secreated by the intestine

Answer : A

18) in a titration curve of a weak acid the point in the plateau region between that inflection point and the equivalence point has the following characteristics

A. it has a higher concentration of weak acid than the conjugate base
B. all the equivalents needed for the titration were used up
C. can act as a buffer
D. the pH of the solution is definitely above 7
E. repeat value equals the value of the acid PKa

Answer : C

19) you have been observing an insect that defends itself from enemies by secreting a liquid . Analysis of lipid shows it to have a concentration of formic acid (Ka= 1.8 * 10^{-4}) off 1.45M and a concentration of formate ion of 0.015M what is the pH of the secretion ?

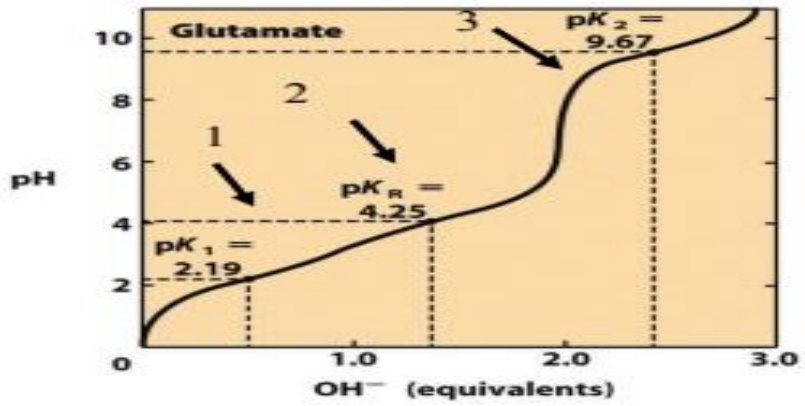
A. 5.73
B. 1.76
C. 7
D. 3.37
E. 1.91

Answer : B

20) the point that represents the Zwitterion (molecule that contains an equal number of positively- and negatively-charged functional groups) is ?

A. 1
B. 2
C. 3
D. 1 &2

Answer : B



21) What is the pH if the concentration of the conjugate base (A-) is 0.35M and the concentration of the weak acid (HA) is 0.25M after adding 0.05 M of NaOH ? (pKa = 7)

A. pH =7.3
B. pH=6.3
C. pH=8.6
D. others

Answer : A

22) We have a drug that has [HA] IONIZABLE ACID with pKa of 4.5, that enters the cell via the membrane , what is the best pH that enhances the entry of the drug ?

A. pH=1
B. Ph=4.8
C. PH=3.9

Answer : A

23) an Untreated diabetic patient will have?

A. Metabolic alkalosis
B. Metabolic acidosis
C. Respiratory alkalosis
D. Respiratory acidosis

Answer : B

24) Which of the following gives a good protein buffer system:

A. His
B. Arg
C. Asp
D. Asn
E. all of the above

Answer : A

25) A patient was found to have undetected diabetes mellitus for a while, in the urine sample taken [HCO3-] = 14.1 and [CO2] = 1.1, most likely pH of blood was ?

A. 7.1
B. 7.2
C. 7.4
D. 7.5
E. 7.6

Answer: B

26) If you have x moles of KOH how many moles of an acid must be added to make a buffer solution?

A. 2X HCl
B. X/2 acetic acid
C. 1.5 X acetic acid
D. X acetic acid

Answer: C

27) A patient with panic attacks and hyperventilation is in a respiratory alkalosis. The excess hydroxide ions were able to overcome by which one of the following buffers, which has the greatest buffering capacity in and near to normal blood pH (pKa of dihydrogen phosphate is 6.80. The pKa of carbonic acid is 3.80. pKa of ammonium ion is 9.25, pKa of acetoacetic acid (a ketone body) is 3.62) ?

A. Carbonic acid
B. Dihydrogen phosphate
C. Ammonium ion
D. Acetoacetic acid
E. Ascetic acid

Answer: B

28) Which one of the following works as a buffer?

A. KOH
B. NaOH
C. HCL
D. H2SO4
E. None of the above

Answer : E

29) What initial effects does hyperventilation have on the human's blood pH and H_2CO_3 concentration?

A. pH increases and [H_2CO_3] increases
B. pH increases and [H_2CO_3] decreases
C. pH decreases and [H_2CO_3] increases
D. pH decreases and [H_2CO_3] decreases

Answer : B

30) Gastric juice (pH= 1.4) compared to human's blood (pH= 7.4):

A. [H+] in gastric juice is 6 times higher than in blood
B. [H+] in gastric juice is 10^6 times higher than in blood
C. [H+] in blood is 10^6 times higher than in gastric juice
D. [H+] in gastric juice is 7 times higher than in blood

Answer : B

31) Below is the pKa for weak acids, which weak acid will be approximately 9% dissociated at ph 3.88?

A. Acetoacetic acid (pKa=3.6)
B. Lactic acid (pKa=3.9)
C. Beta-hydroxyl butyric acid (pKa=4.6)
D. Propionic acid (pKa=4.9)
E. E. Imidazolium (pKa=5.9)

Answer: D

32) The p H of the body fluids is stabilized by buffer systems. Which of the following compounds is the most effective buffer system at physiological pH ?

A. Bicarbonate buffer
B. Phosphate buffer
C. Protein buffer
D. all of the above

Answer: A

Note: the questions that are marked with yellow are **not** from past papers, but they have an important clinical value.

33) In a man undergoing surgery, it was necessary to aspirate the contents of the upper gastrointestinal tract. After surgery, the following values were obtained from an arterial blood sample: pH 7.55, PCO2 is within normal limits and HCO3 - 40 mmol/l. What is the underlying disorder?

A. Metabolic Acidosis
B. Metabolic Alkalosis
C. Respiratory Acidosis
D. Respiratory Alkalosis

Answer: B

31) You are asked to review a 63-year-old female who was admitted with shortness of breath. On your arrival, the patient appears drowsy and is on 10L of oxygen via a mask. You perform an ABG, which reveals the following results:

- pH: 7.29
- $PaCO_2$: 68.2 mmHg (NORMAL PaCO2 is 35-45 mmHg)
- HCO_3–: 23 mmol/L

The most accurate explanation for the lab results is:-

A. Compensated Respiratory acidosis
B. Uncompensated metabolic acidosis
C. Partially compensated metabolic acidosis
D. Uncompensated Respiratory acidosis

Answer: D

32) A 17-year-old patient presents to the clinic complaining of a tight feeling in their chest, shortness of. They have no significant past medical history and are not on any regular medication. An ABG-test is performed on the patient whilst they're breathing room air and the results are shown below:

- pH: 7.49 (7.35 – 7.45)
- $PaCO_2$: 22.5 mmHg with the normal range (35.2 – 45 mmHg)
- HCO_3–: 24 mmol/L

The most probable underlying disorder according to the ABG-test:-

A. Respiratory alkalosis
B. Lactic acid acidosis
C. Metabolic acidosis
D. Respiratory acidosis

Answer: A

33) 24-year-old medical student has just returned from his elective in Ghana. In the last few days, he has developed severe diarrhea and has now presented to A&E. On assessment, he is very dehydrated and tachypneic.

An ABG is performed and reveals the following:

- PaO_2: 109.5 mmHg with the normal range (82.5 – 97.5 mmHg)
- pH: 7.32
- $PaCO_2$: 30 mmHg with the normal range (35.2 – 45 mmHg)
- HCO_3-: 13 mmol/L

One of the following best describes the previous ABG readings: -

A. Metabolic acidosis
B. Partially compensated Metabolic alkalosis
C. Respiratory acidosis
D. Partially compensated metabolic acidosis
E. Partially compensated respiratory acidosis

Answer: D

34) Carl, an elementary student, was rushed to the hospital due to vomiting and a decreased level of consciousness. The patient displays slow and deep breathing, and he is tired and irritable in response to stimulation. Measurement of arterial blood gas shows pH 7.0, normal PaO2, decreased PaCO2, and [HCO3]=12 mmol/L; what is your assessment

A. Respiratory Acidosis, Uncompensated
B. Respiratory Acidosis, Partially Compensated
C. Metabolic Alkalosis, Uncompensated
D. Metabolic Acidosis, Partially, Compensated
E. Metabolic Acidosis, Completely Compensated

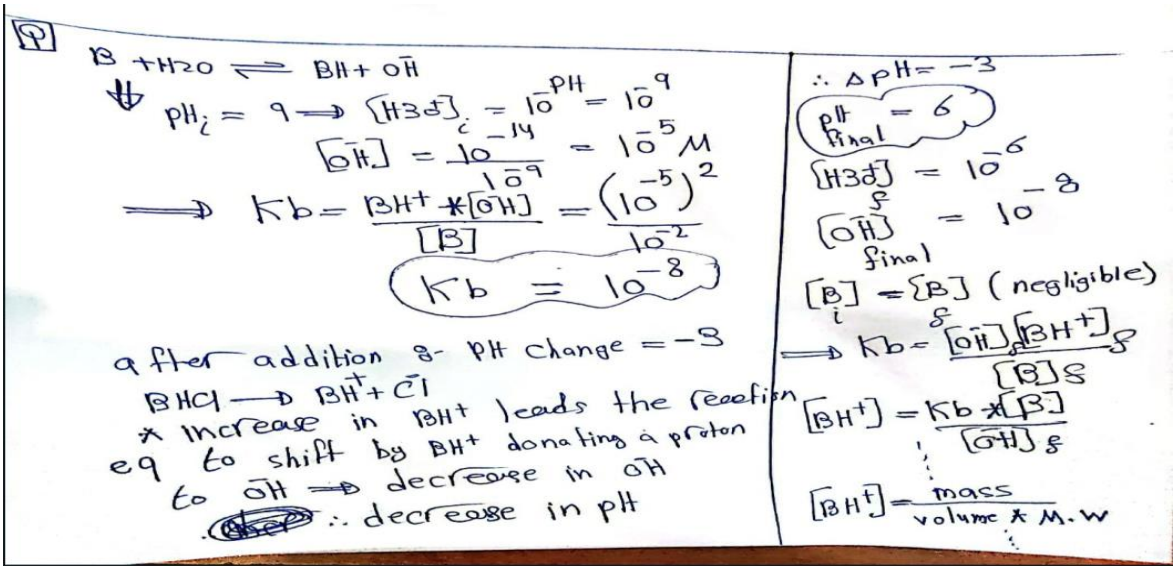
Answer: D

Explanation: The results show that he has metabolic acidosis (low HCO3 -) with respiratory compensation (low CO2) , Partial since the pH value is still far away from the normal 7.45 blood-pH.

35) A solution of a weak base (B) with a Volume of 2 L , Concentration = 0.01 M , pH =9 ,upon the addition of 0.685 g of its salt (BHCL) , the pH value changed by a 3 unit difference ,the M.W of the Salt BHCL (Hint: [B] remains the same) :-

A. 68.5
B. 34.25
C. 6.85
D. 137

Answer: B



36) The pH of 0.1M HCL is 1.0 ,Of O.1 M Acetic Acid is 2.8. What voulme of 0.1N NaOH would be required to titrate 10 mL of each acid solution to their respective End point respectively ?

A. 10 mL , 10 mL.
B. 16 mL , 10 mL
C. 10 mL , 16 mL
D. 100 ml , 16 mL

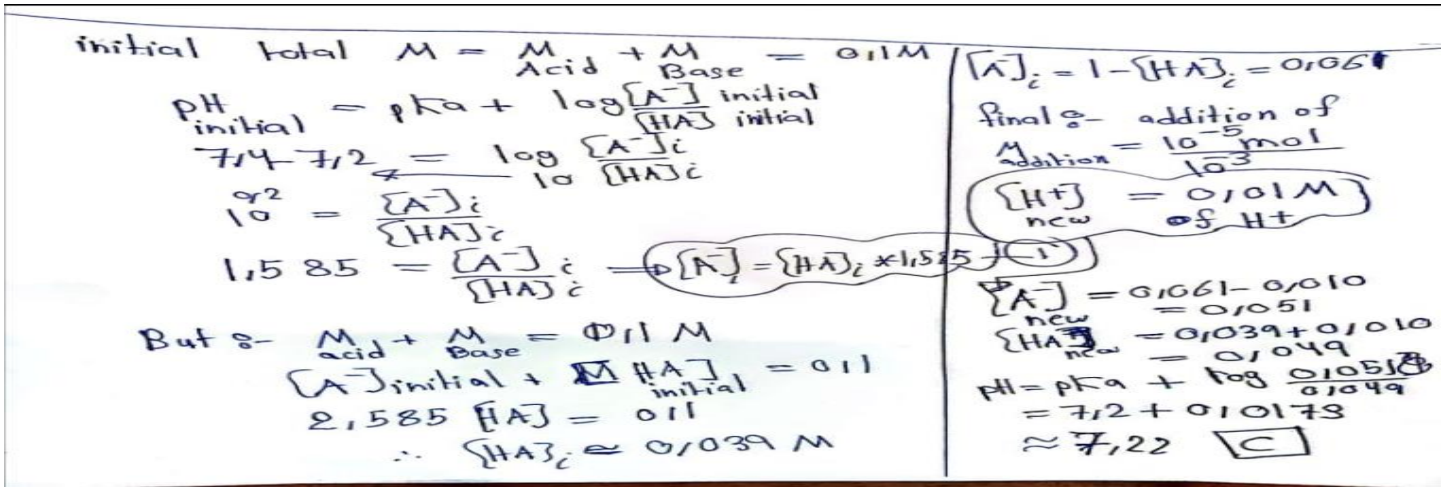
Answer : A

37) A medical student is attempting to understand the buffering system of the human body and has set up the following experiment in the lab to help with his understanding. Consider a biochemical reaction that is taking place in a Total 0.1 M buffer. The initial pH is 7.4, and the pKa of the buffer is 7.2. If, in a final reaction, a volume of 1.0 mL, 10 µmol of protons are generated, what would be the final pH of the solution?

A. 7.59
B. 7.25
C. 7.22
D. 7.00
E. 7.15

Answer: C

Solution: -



38) 4.13g OF NaC2H7O4 is added to 250 mL of a 0.150 M HC2H7O4 solution. With a Ka= 2.75*10^-5 , M.W of the salt 202.14 g/mol , What is the pH of the buffer system?

A. 6.54
B. 5.43
C. 4.28
D. 7.42

Answer: C

39) A buffer is made by adding 0.200 M HC2H3O2 and 0.150 M NaC2H3O2. If 0.005 mol of NaOH is added to 125 mL of this buffer,What is the pH? (Ka=1.8*10^-50 :-

A. 4.82
B. 4.18
C. 5.23
D. 6.47

Answer: A

40) Given that Ka for Pyruvate=3.1*10^-3 ,What is the pH of a buffer made by mixing 0.1 M Pyruvate with 0.12 M Sodium Pyruvate ?

A. 40.2
B. 2.45
C. 1.60
D. 2.59

Answer: D

41)Homeostasis maintains a blood plasma pH ranging between 7.35 and 7.45. The kidneys control the amount of bicarbonate ion, and the lungs control the amount of carbon dioxide in plasma. If a person suffered from acidosis (caused, perhaps, by drinking acid):

A. The respiratory system would hypoventilate, keeping more CO_2 in the plasma
B. The lungs would hyperventilate, keeping CO_2 levels high in plasma
C. The kidneys would remove HCO_3^- from blood plasma and excrete it into the urine
D. The lungs would hyperventilate, decreasing CO_2 in the plasma, and the kidneys would save HCO_3^- and excrete it into blood plasma
E. The kidneys would remove CO_2 and excrete it into blood plasma rather than into urine

Answer: D

42) Given a choice between acid A and acid B,:-

A. Acid A is stronger if its conjugate base is stronger than that of Acid B.
B. Acid A is stronger if its conjugate base is weaker than that of Acid B.
C. Acid A is stronger if its conjugate base is a more complex ion than that of Acid B.
D. Acid A is stronger if its conjugate base is a noble gas.
E. There is no way to compare acid strength based on any of these factors

Answer: B

43)Carbon dioxide reacts with water to form carbonic acid which then ionizes according to the following equilibrium reaction:

$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$

All the components of the reaction are water soluble, but carbon dioxide is a gas. If you dissolve some sodium bicarbonate in water and then add hydrochloric acid, one of the following should be seen: -

A. Carbon dioxide bubbling out.
B. Carbon dioxide dissolving.
C. Nothing, Carbon dioxide is an invisible gas
D. The solution should turn blue
E. The solution should turn red

Answer: A

Explanation: When adding HCL, it will interact with HCO3- producing more of H2CO3 which will dissociate according to the equation provided effectively produced H2O +CO2 and subsequently, bubbling of CO2 can be observed.

44) The concentration of an acid is 0.1 with a volume of 5 mL the MW is 10 the ka is $1*10^3$and it was titrated by NaOH that has a concentration of 0.5 M and volume of 12 mL How much the [H+] of the solution was?

A. 0.8
B. 1.4
C. 1.2

Answer: C

45) What is the concentration of H2PO4 if we have 0.5 eq in 500ml ?

A. 0.5 M
B. 0.25 M
C. 1M

Answer: A

46) We have 0.5 ml of HCl and it's titrated by 0.5 M of NaOH with a volume of 12 ml what is the pH of the acid :

A. 0.8
B. 0.08

Answer: B

47)What is the pH if the concentration of the conjugate base (A-) is 0.35M and the concentration of the weak acid (HA) is 0.25M after adding 0.05 M of NaOH ? (pKa = 7)

ANSWER: pH = 7.3

48) A patient has been diagnosed with enteropathy where intestinal bacteria secrete NH3 and it's transported to blood circulation through the portal vein. What happens to the body?

A. Metabolic alkalosis
B. Respiratory acidosis
C. Respiratory alkalosis
D. Metabolic acidosis
E. Does not have any effect as the bicarbonate buffer system is not affected.

Answer: A

49) Untreated diabetic patient will have?

A. Metabolic alkalosis
B. Metabolic acidosis
C. Respiratory alkalosis
D. Respiratory acidosis

Answer: B

50)Which of the following gives a good protein buffer system:

A. His
B. Arg
C. Asp
D. Asn
E. all of the above

Answer: A

51) If the pH of a solution decreased from 7.5 to 7.0 What change has occurred to the concentration of H3O+?

A. increased 3 times
B. Increased 5 times
C. Increased 500 times
D. Increased 10^5 times
E. Increased 10^ (1/5) times

Answer: A

52) THE following pairs can't make a buffer when mixed together(TRUE OR FALSE)?

NaOH / NaCH3COO & CH3CH3 / CH3CH2

ANSWER: TRUE

53) Given pka of different acids, which one will have the strongest conjugate base when being dissociated with water?

A. 3.5
B. 2.9
C. 4.76
D. 7.2
E. 12.4

Answer: E

54) - One of the following statements is not true about Carbonic acid/Bicarbonate buffer:

A. The most common extracellular buffer.
B. Under physiological conditions the ratio of [HCO3-]/ [H2CO3] = 20.
C. Its buffering range is less than the desirable pH and that's compensated by CO2 mobility.
D. When adding a strong acid, it will react with HCO3-
E. When adding a strong base, it will react with CO3-2

Answer: E

55) - All of the following will cause mild or severe acidosis except:

A. the presence of ketone bodies in untreated diabetic patient
B. The production of acids like lactic acid during metabolism
C. Excessive breathing
D. Repeated vomiting from the stomach containing HCL.

Answer: D

56)If you have X moles of KOH, how many moles of an acid must be added to have a buffer with equal concentrations of A- and HA?

A. X
B. X/2
C. 2X
D. 1.5 X
E. None of the above

Answer: C

57) Below is the pKa of some weak acids. Which weak acid will be 91 % undissociated at pH=4.86?

A. Acetoacetic acid pka = 3.6
B. Lactic acid pKa=3.9
C. C- beta-hydroxyl butyric acid pka=4.8
D. propionic acid pka=4.9
E. Imidazolium pka=5.9

Answer: E

58) Which of the following acids or bases can make a buffer with its conjugate acid or its conjugate base?

A. HCl
B. KOH
C. H2SO4
D. None of the above

Answer: D

59) 100 mmol of a triprotic acid were titrated with KOH. PKa values = 3, 6, 9. How many mmoles of KOH must be added to have pH=6?

A. 100
B. 150
C. 200
D. 250
E. 300

Answer: B

60) If you have x moles of KOH how many moles of an acid must be added to make a buffer solution?

A. 2X HCl
B. X/2 acetic acid
C. 1.5 X acetic acid
D. X acetic acid

ANSWER:C

61) The pKa of a base is 4. If you have a 0.01M solution of this base, what is the pH?

A. 8
B. 9
C. 10
D. 11
E. 12

Answer: D

62) Buffers work the best at all these conditions except :

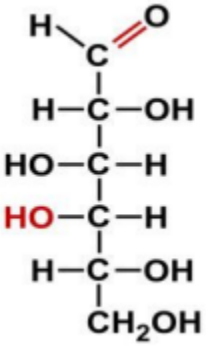
A. when the pH to be maintained using the buffer has a value close to the pKa of its acid component.
B. When the concentration of the acid component is equal to that of the base component.
C. When the acid component is completely dissociated

Answer: C

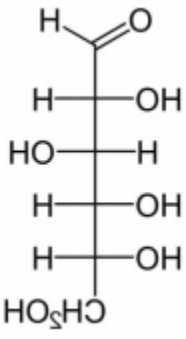
Dr. Diala's material 2 (carbohydrates & lipids)
Dr. Nafez (Amino acids)

1) which one of the Following is L-glucose?

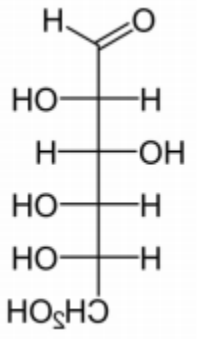
a.



b.



c.



Answer: C

2) The blood types differ in their:

A. sugar content
B. protein content
C. lipid content

Answer: A

3) Which of the following doesn't produce Cu precipitate in the Benedict's test ?!

A. lactose
B. Sucrose
C. galactose

Answer:B

4) The myelin sheath is composed of:

A. glycolipid
B. phospholipids
C. GAGs

Answer: B

5) The following statements are true or false

"EPA and DHA are omega 6 fatty acids."

A. true
B. false

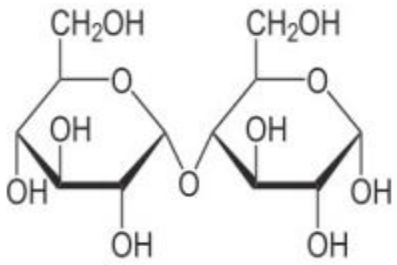
Answer: B

6) The protein can be integrated into the membrane because of:

Answer : The interactions between the hydrophobic amino acids and the hydrocarbon chains of the lipids

7) which statement is not true about the following structure?:

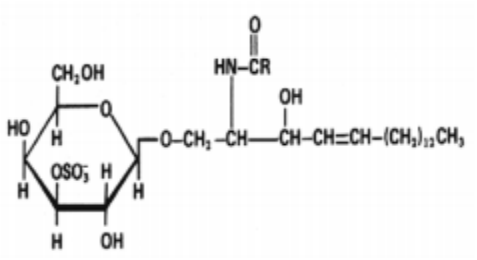
A. the glycosidic bond is ß(1-6)
B. it could be a part of dextran



Answer: A

8) One of the following is true about the following structure :

A. Phosphatide
B. Sulfatide
C. you can find it in the muscle cells
D. Glyceride



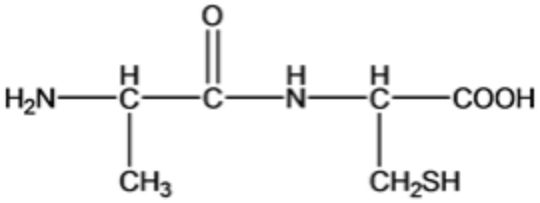
Answer: B

9) What is special about glycosaminoglycan ?

Answer: IT has glucosamine or galactosamine and their derivatives

10) This structure is called ;

A. AlanylCysteine
B. cycteinylalanine



Answer: A

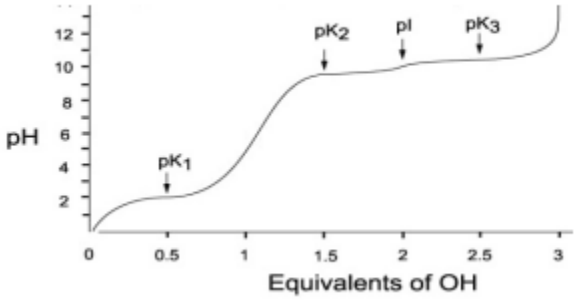
11)Which of the following has the least solubility in water?

A. palmitate
B. oleate
C. linoleate
D. myristate
E. arachidonate

Answer: A

12) The following titration curve is related to which amino acid?

A. Lysine
B. valine
C. arginine
D. alanine



Answer: A

13) One of the following cannot be hydrogenated?

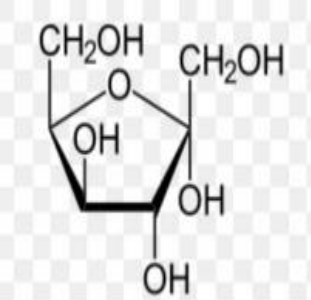
A. Arachidonic acid.
B. Palmitic acid.
C. Oleic acid.
D. Linoleic acid.
E. Linolenic acid.

Answer: B

Palmitic acid was mentioned in a table in sheet 14, and it is repeated many questions, so read more about it on google.

14) The following figure represents D- sorbose.. which of the following statements is wrong ?

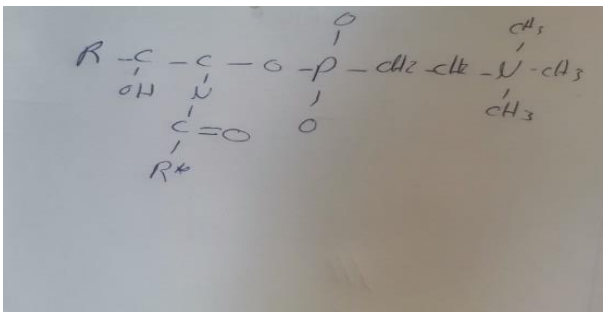
A. It is a furanose.
B. It is an alpha sugar.
C. Carbon no.1 is the anomeric carbon.
D. It is a ketose.
E. It can re-open up into the chain form.



Answer: C

15) What is this molecule?

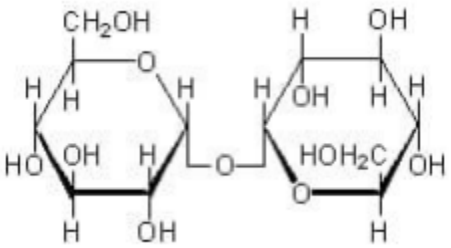
A. Bile acid.
B. Prostaglandin.
C. Monoacylglycerol
D. Glycerophospholipid.
E. Sphingophosphocholine.



Answer: E

16) IS THAT

A) REDUCING SUGAR OR B) NON REDUCING SUGAR



Answer: B

17) scurvy is a deficiency in

A. prolyl hydroxylase
B. proline hydroxylation
C. lysine residues

Answer: A+B

18) Which of the following is a reduced sugar?

A. glucose
B. Fucose
C. sucrose
D. galactose

Answer: B

19)) In a vegetarian jelly, the manufacturer used a gelling material which:

A. Is a polymer of glucuronic acid
B. Has animal cell organs
C. Has carboxyl on C6
D. Has a five membrane ring structure

Answer: C

20) Glycosaminoglycans are characterised by all of the following features EXCEPT:

A. The basic unit is a repeated disaccharide
B. At least, one sugar has an amino group
C. At least, one sugar is negatively charged with acidic group
D. The sugars are derived from glucose or **fructose**
E. It is attached to proteins forming proteoglycans

Answer: D

21) Which one of the following common in all sphingolipid?

A. Glycerol
B. Phosphate
C. N-acytlgalactoamine
D. Ceramide

Answer: D

22) Glycoside formation results in:

A. reaction of cyclic acetal with alcohol
B. reaction of cyclic acetal with another cyclic acetal
C. reaction of cyclic hemiacetal with alcohol

Answer: C

23) Which of the following sugars has a beta glycosidic linkage

A. chitin
B. sucrose
C. lactose
D. none of the above

Answer: C

24) What is the wrong about D and L configuration:

A. D sugars Exist in abundance in nature
B. all of the amino acid in protein is L configuration
C. they don't deferent in anomeric carbon
D. they are deferent in only last chiral center
E. more than one of the above

Answer: B

25) A patient walks into your clinic, after you test her it turns out that the material surrounding her nerves is destroyed. This material is:

A. Phosphatidylinositol
B. Cerebdrosides
C. sphingomyelins
D. glycoproteins
E. Cephalin

Answer: C

26)How many chiral carbons are there in deoxyribose

A. 1
B. 2
C. 3
D. 4
E. none

Answer: B

27) Which amino acid cannot be found in human proteins?

A. histidine
B. Ornithine
C. serine
D. glycine
E. glutamic acid

Answer: B

28) Which one is derived from aliphatic amino acid

A. Dopa
B. epinephrine
C. aspartame
D. norepinephrine
E. histamine

Answer: C

30) The following membrane lipid is a major component of the inner mitochondrial membrane:

A. Lecithin
B. Cephalin
C. Cardiolipin
D. Glycolipids
E. Phsphatidyl-inositol

Answer: C

31) Gangliosides contain all the following EXCEPT:

A. Fatty acid
B. Phosphate
C. Ceramide
D. Hexose
E. E. N-acetyl neuraminic acid (sialic acid)

Answer: B

32) All sphingolipids have in common:

A. Ceramide
B. Phosphorylcholine
C. N-acetylneuraminie acid
D. Glycerol
E. Phosphate

Answer: A

33) What charged groups Glutamine has at physiological PH in the blood?

A. Coo-, NH3+
B. COO-, COO-, NH3+
C. COOH, COOH, NH3+
D. COOH, COO-, NH3+
E. COOH, COO-, NH2

Answer: A

34) Which of the following amino acid(s) contain(s) sulphur atom in the side chain?

A. Serine
B. Tryptophan
C. Methionine
D. A & B
E. B & C

Answer: C

35) Phenylalanine can be used to synthesize the following amino acid:

A. Ser
B. Trp
C. Thr
D. Tyr
E. Orn

Answer: D

36) Which of the following is not a reducing sugar?

A. glucose
B. Fructose
C. sucrose
D. galactose

Answer: C

37) Arrange the following fatty acids according to their melting point starting from the largest to the smallest (oleic acid, linoleic acid, palmitic acid and palmitoleic acid)

A. palmitic acid, oleic acid, palmitoleic acid and linoleic acid
B. palmitic acid, palmitoleic acid, oleic acid and linoleic acid
C. linoleic acid, palmitoleic acid, palmitic acid and oleic acid
D. linoleic acid, palmitoleic acid, oleic acid and palmitic acid
E. oleic acid, linoleic acid, palmitoleic acid, and palmitic acid

Answer: A

38) All of the following are from cholesterol except:

A. Testosterone
B. Vitamin D
C. Thromboxane
D. Estradiol

Answer: C

39) Which is not correct about glucose?

A. It is an epimer of mannose
B. It is an epimer of galactose
C. Only D-isomer exist in mammalian cells
D. It mainly exists as open chain in solution

Answer: D

40) which of the following is the most found in nature ?

A. L-sugar
B. D-sugar
C. L-sugar and D-sugar in the same amount

Answer: B

41. D-glucose and D-galactose has all of the following except:

A. Hexoaldoses
B. They are Diastereoisomers
C. They are anomers
D. They are reducing sugars

Answer: C

42. they polysaccharide which glucose is stored as in animal cells:

A. is stored in the melanocytes and hepatocytes
B. it contains Beta-linkage
C. it extremely branched for more efficient energy supply
D. it is broken down to glucose and maltose

Answer: C

43.which of these is aldo-pentose ?

A. glucose
B. fructose
C. maltose
D. ribose

Answer: D

44. Choose the correct matching between the precursor amino acid and the product synthesized from it.

A. Tyrosine, melatonin
B. Histidine, norepinephrine
C. Tryptophan, serotonin
D. tyrosine, nitric oxide
E. Glycine GABA

Answer: C

45. which of these pairs of amino acid have phenol group , thiol group respectively ?

A. Cys & phe
B. Cys & tyr
C. tyr & cys

Answer: C

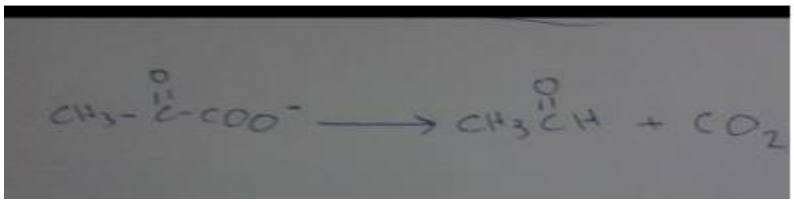
46. which is the largest amino acid ?

A. phe
B. trp
C. pro
D. lys

Answer: B

47. The process of this reaction is:

A. carboxylation
B. hydrolysis
C. oxidation
D. decarboxylation



Answer: D

****All of the following questions are from the last year's quiz:**

49) These amino acid stretches CANNOT exist on protein surface that is exposed to aqueous environment:

A. Lys. Glu Cys
B. Pro, Hs, Tyr
C. The Lesa, Asn
D. Met val Trp
E. Arg Asp Ser

Answer: D

50) An omega-3, 24-carbon fatty acid has

A. A double bond between carbon 23 and 22
B. 3 double bonds
C. Multiple double bonds separated by 3 carbons each
D. A double bond between carbon 21 and 22
E. A double bond between carbon 3 and 4

Answer: C

51) Deoxy sugars are produced via

A. Reduction of a monosaccharide
B. Engaging anomeric carbons in a glycosidic bond
C. Conversion of sugar chain into cyclic form
D. Oxidation of a sugar acid
E. Hydrolysis of a disaccharide

Answer: A

52) An omega-9 fatty can do the following

A. It can treat asthma
B. It reduces inflammation
C. It relieves gastric pain caused by aspirin
D. It reduces cholesterol
E. It blocks formation of eicosanoid

Answer: D

53) The following is a non-reducing sugar

A. L-glucose
B. Maltose
C. Fructose
D. Cellulose
E. Lactose

Answer: D

54)Omega-6 fatty acids are derivatives of

A. Linolenic acid
B. Stearate
C. Arachidonate
D. Linoleic acid
E. Palmitate

Answer: D

55)One of the following is true in regards to L-glucose and D-glucose

A. D-glucose is natural, but not L-glucose
B. They differ in the orientation of only the chiral carbon farther from the most oxidized group
C. D-glucose is cyclic, but L-glucose is a chain molecule
D. D-glucose has an anomeric carbon, but L-glucose does not
E. They are minor images of each other

Answer: B

56) Oxidation of carbon #6 of cyclic glucose results in

A. Conversion to fructose
B. Production of glucoronate
C. Stabilizing the anomeric carbon
D. Production of a deoxy sugar
E. Opening of the ring structure

Answer: B

57) Creating a cholesterol ester from cholesterol results in :

A. Facilitating of cholesterol transport via lipoproteins
B. Cholesterol being more hydrophobic
C. Increasing the density of lipoproteins
D. Cholesterol being amphipathic
E. Emulsification of cholesterol

Answer: B

58) Benedict's test is used to :

A. Confirm the presence of cyclic sugars
B. Confirm the presence of reducing sugars
C. Confirm the presence of sucrose
D. Confirm the presence of disaccharides
E. confirm the presence of sugar acids

Answer: B

59) Liposomes can deliver chemicals into cells because

A. They can Fuse with the plasma membrane
B. They have small structure that can make them diffuse through the plasma membrane
C. They modify chemicals making them free to pass though the plasma membrane
D. They have a flexible shape that can be squeezed though phospholipids
E. They facilitate chemical transport through the plasma membrane

Answer: A

60) The following is a sphingophospholipid :

A. Phosphatidylinositol
B. Plasmalogen
C. Cardiolipin
D. Myelin
E. Lecithin

Answer: D

61) Why are some people lactose- intolerant?

A. They lack the enzyme, lactase
B. They have unusual flora intestinal bacteria) in their digestive system
C. They metabolize lactose faster than normal
D. They cannot digest galactose
E. They did not drink milk when they were young

Answer: A

62)The feature of a polysaccharide with a beta-glycosidic bond is

A. It forms more hydrogen bonds
B. It can be branched
C. It is more water-soluble
D. It is rigid and straight
E. It can be looped taking less space

Answer: D
(not sure)

BEST OF LUCK <3