

Water + Acid and Base + PH and buffers Past Paper

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- Water acquires its high specific heat,boiling point, melting point and other physicalproperties because:
- a.It is an amphipathic molecule
- b.It has a high ion product of water
- c.It can form hydrogen bonds with each other
- d.It can dissociate to protons and hydroxyl ions
- e.It acts as an amphoteric molecule
- Ans : C

- The pK_b of a base is 3.0. What is the pH of a 1 mM solution of the base?
- a. 10
- b. 9
- c. 13
- d. 12
- e. 11
- Ans: E

- Calculate the normality of a solution that contains 4.5 g of H_3A acid in 3000 mL of solution? (molecular weight is 30)
- a. 1.5 N
- b. 0.15 N
- c. 0.45 N
- d. 4.5 N
- e. 0.00015 N
- Ans: B

- The following is a description of water molecule:
- a. Hydrophobic
- b. Amphipathic
- c. Ionic compound
- d. Amphoteric
- e. Micelle
- Answer : D

- The pK_b of a base is 5.0. What is the pH of a 100 mM solution of the base?
- a.13
- b.12
- C.11
- d.9
- e.10
- Ans: C

- You want to turn a solution containing X moles of Ca(OH)_2 into a **buffer** solution. Which of the following should you add?
- a. 2X moles of acetic acid
- b. X/2 moles of acetic acid
- c. X moles of H_2SO_4
- d. 3X moles of acetic acid
- e. 2X moles of HCL
- Ans:D

- Between inflection and equivalence points of an acid (HA) titration:
- a. The solution cannot act as a buffer
- b. Less than 50% of the equivalents were added
- c. pH is necessarily 7
- d. pH is less than pKa
- e. $[A^-]$ is less than $[HA]$
- Answer : A

- Laboratory tests on the urine of a patient identified the presence of methylmalonate($-\text{OOC}-\text{CH}(\text{CH}_3)-\text{COO}-$). Which of the following statement describes methylmalonate best?
- a.It cannot be used to make a buffer solution
- b.It is 100% dissociated at its pKa
- c.It is a major intracellular buffer
- d.It is the conjugate base of a weak acid
- e.It is a strong acid
- Answer : D

- Calculate the pH of a solution prepared by dissolving 600 mg of monoprotic acid in 10 ml of 0.5 M solution of NaOH. pKa of the acid is 7.0 (M.W of the acid is 100).
- a. 7.0
- b. 6.5
- c. 6.7
- d. 8.0
- e. 7.7
- Ans : E

- An acid was completely titrated with 3 equivalents of a strong base. The following statement describes this acid:
- a. The pH at the end of titration is lower than that at the beginning of the process
- b. pK_{a1} is the largest
- c. The titration of the last proton produces a relatively more basic buffer than that of other protons
- d. The acid has to be strong
- e. The acid releases its last proton at the lowest pH during titration
- Answer: C

- The following statement is CORRECT regarding the inflection point:
- a.pH equals 7
- b.70% of titration is finished
- c.pH equals pKa
- d.The solution cannot act as a buffer
- e.The curve is steep
- Answer: C

- The buffer system that can act both intracellularly and extracellularly is:
- a.Album.
- B.Bicarbonate carbonic acid
- c.Protein
- d.Hemoglobin
- e.Phosphate
- Answer :C

- Increasing reabsorption of HCO_3^- can be the mechanism of compensation for:
 - a. A starved individual
 - b. An asthmatic patient
 - c. An uncontrolled diabetic patient
 - d. A mountain climber
 - e. A controlled diabetic patient
- Answer : B

- An asthmatic patient can be compensated by:
- a. Increasing reabsorption of HCO_3^-
- b. Increasing exhalation of CO_2
- c. Increasing secretion of HCO_3^-
- d. Decreasing exhalation of CO_2
- e. Increasing H_2CO_3 production
- Answer : A

- More CO₂ is exhaled when:
- a. The pH of the blood increases
- b. The cytosolic pH decreases
- c. The cytosolic pH increases
- d. The pH of the blood decreases
- e. Protein buffer system is activated
- Answer : D

- The buffer system that provides the highest extracellular capacity is:
- a. Albumin
- b. Protein
- c. Hemoglobin
- d. Bicarbonate carbonic acid
- e. Phosphate
- Answer : D

- Saliva -> 6, slightly acid
- 19His vs 9 His -> 19 His highest capacity
- true about curve> point = pka
- true about equivalent point -> cant act as buffer
- Increase HCO_3^- excretion-> highest altitude(mountain)
- Major molecule in bicarbonate buffer □ bicarbonate

Carbohydrates past paper

- The storage form of sugars in animal cells is:
- a. Pectin
- b. Amylose
- c. Cellulose
- d. Glycogen
- e. Chitin
- Answer : D

- The residues of the following disaccharide are connected by a beta linkage:
- a. Lactose
- b. Maltose
- c. Pectin
- d. Sucrose
- e. Raffinose
- Answer : A

- The sugar that does NOT produce a mirror in Tollen's test is:
- a. Maltose
- b. Lactose
- c. Maltose
- d. Galactose
- e. Sucrose
- Answer : E

- Which of the following is an oxidized sugar?
- a. Glucuronate
- b. Sorbitol
- c. Sucrose
- d. Fructose
- e. Ribose
- Answer : A

- Galactose and mannose are:
- a. Epimers and diastereomers
- b. Epimers
- c. Constitutional isomers
- d. Enantiomers
- e. Diastereomers
- Answer : E

- The following statement describes glucuronic acid:
- a. It is less polar than glucose
- b. It has a bonded anomeric carbon
- c. It has two carbons outside the ring structure
- d. It is oxidized on carbon 6
- Answer : D

- Bacterial cell wall is made of --- that is cross-linked by ---
- a.cholesterol molecules, proteins
- b.a hetero-polysaccharide, peptides
- c.a hetero-polysaccharide, polypeptides
- d.glycoproteins, oligosaccharides
- e.a homo-polysaccharide, peptidase.
- Answer : B

- How many chiral center (s) is/are present in the open chain structure of 2-deoxyribose?
- a.1
- b.2
- c.0
- d.4
- e.3
- Answer : B

- Amylopectin is composed of — — — that are connected by — — — and branched — — — at — — —
- a. Galactose residues, alpha-1,4 linkage, carbon number 1
- b. Glucose residues, alpha-1,4 linkage, carbon number 6
- c. Galactose residues, alpha-1,4 linkage, carbon number 6
- d. Ribose residues, alpha-1,4 linkage, carbon number 6
- e. Glucose residues, beta-1,4 linkage, carbon number 1
- Answer : B

- Beta-glucose can be distinguished from alpha glucose by:
- a.The orientation of carbon number 6 relative to the ring
- b.The orientation of the hydroxyl group on carbon number 4
- c.The orientation of the hydroxyl group on carbon number 2
- d.The orientation of the hydroxyl group on carbon number 1
- e.The orientation of the carbonyl carbon in the linear structure
- Answer : D

- Cellulose fibers share the following characteristic with amylose:
- a.They have alpha linkages
- b.They are made of galactose residues
- C.They cannot be digested
- d.They are unbranched
- e.They have many non-reducing ends
- Answer : D

- How many chiral center(s) is/are present in the ring structure of ribose?
- a.3
- B.0
- C.2
- d.4
- e.1
- Answer : d

- The disaccharide that can produce galactose when digested is:
- a.Sucrose
- b.Lactose
- C.Maltose
- d.Cellobiose
- e.Amylose
- Answer : B

- The hetero-polysaccharides with sulfated sugars, amino sugars and/or oxidized sugars that are mainly derived of glucose and galactose and are found in extracellular matrix are:
- a. Pectin
- b. Dextran
- c. Chitin
- d. Glycosaminoglycans
- e. Cellulose
- Answer : D

- D glucose, L Glucose-> orientation OH at C5
- Oligosaccharide is present in beans and vegetables like cabbage, Brussel, sprouts, broccoli, asparagus □ Raffinose

- Lipid Past Paper

- All of the following eicosanoids containring structure EXCEPT:
- A.Prostaglandin H2
- b.Prostacyclin
- c.Leukotriene
- d.Thromboxane
- e.Prostaglandin E2
- Answer : C

- Which of the following does NOT contain sphingosine:
- a. Globoside
- b. Ceramide
- c. Phosphatidyl choline
- d. Sphingomyelin
- e. Galacto-cerebroside
- Answer : C

- Cholesterol CANNOT be used to synthesize:
- a. Vitamin D
- b. Cardiolipin
- c. Progesterone
- d. Estrogen
- e. Bile acids
- Answer : B

- The bond between fatty acids and glycerol in triacylglycerol is a/an:
- a. Glycosidic bond
- b. Amide bond
- c. Ester bond
- d. Peptide bond
- e. Alpha-1,4 bond
- Answer :C

- Ether bond is found in
- .A.plasmalogen
- b.lecithin
- c.phosphatidyl serine
- d.cerebroside
- e.sphingomyelin
- Answer : A

- The following lipid can be used as an emulsifier:
- a. Phosphatidylcholine
- b. Phosphatidic acid
- c. Phosphatidylinositol
- d. Ceramide
- e. Phosphatidylethanolamine
- Answer : A (lecithin)

- Cholesterol molecule affects:
- a.The ability to anchor proteins
- b.Kink formation in phospholipid tails
- c.Membrane permeability
- d.Trans-fat formation
- e.Membrane fluidity
- Answer : E

- The lipoprotein that has the highest lipidcontent and the lowest protein content is:
- a.HDL
- b.VLDL
- C.IDL
- d.LDL
- e.Chylomicron
- Answer : E

- The following eicosanoid has cyclic ethers in its structure:
- a. Leukotrienes
- b. Prostaglandins
- c. Arachidonic acid
- d. Prostacyclins
- e. Thromboxanes
- Answer : E

- Which of the following membrane lipids does NOT contain a phosphate group?
- a. Ceramide
- b. Sphingomyelin
- c. Lecithin
- d. Plasmalogen
- e. Cardiolipin
- Answer : A

- On of the following is not a property of glycerol:
- A. yellowish
- B. sweet taste
- c. positive acrolien test
- D. synthesized by glucose
- E. can be converted to glucose
- Answer : A

- Which of the following is not considered a nitrogenous base in the structure of lipids :
- A.glycerol
- B.ethanolamine
- C.serine
- D.threonine
- E.sphingosine
- Answer : A

- Which of the following fatty acids has the highest melting point :
- A. palmitic acid
- B. palmitoleic acid
- C. stearic acid
- D. oleic acid
- E. linoleic acid
- Answer : C

- The most abundant type of lipids in nature are :
- A.TAG
- B.phospholipid
- C.cardiolipin
- D.lecithin
- E.waxes
- Answer : A

- Snake venom attacks :
- A.Lecithin
- B.cardiolipin
- C.cephalin
- D. sphingomyelin
- E.gangliosides
- Answe: A

- All of the following are derivatives of the steroid ring EXCEPT :
- A.vit-D
- B.cholic acid
- C.cholestertol
- D.testosterone
- E.chylomicrons
- Answer : E

- **NSAIDS** drugs inhibit the conversion of ----- into different types of eicosanoids . The blank space refers to :
 - A.arachidonic acid
 - B.palmitic acid
 - C.linoleic acid
 - D.oleic acid
 - E. linolenic acid
 - Answer : A

- One of the following is correctly matched with its structure.
- a. palmitic acid 18:2 Δ 9,12
- b. linolenic acid 18:3 Δ 9,12,15.
- c. arachidonic 20:2 Δ 9,12.
- d. palmitoleic 16:2 Δ 9,12.
- e. oleic acid 18:2 Δ 9,12
- Answer : B

- Cholesterol molecule affects:
- a.The ability to anchor proteins
- b.Kink.formation in phospholipid tails
- C.Membrane permeability
- D.Trans-fat formation
- E.Membrane fluidity
- Answer: E

Amino Acids and protein structure Past Paper

- This amino acid is a precursor of a methyl donor
- A.Alanine
- B.Valine
- C.Threonine
- D.Methionine
- E.Tyrosine
- Answer : D

- This amino acid has a non-reactive group
- A. Cysteine
- B. Glutamine
- C. Leucine
- D. Serine
- E. Tyrosine
- Answer : C

- This is NOT a derivative of tyrosine :
- A.melatonin
- B.Thyroxine
- C.melanin
- D.Dopamine
- E.Tyramine
- Answer: A

- What is the isoelectric point of cystine:
- A. 3
- B. 4
- C. 5
- D. 6
- E. 7
- Answer : C

- Which of the following Does NOT represent a peptide that might be present in your body?
- a. Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe-Arg
- b. Glu-Cys-Gly
- c. Asp-Arg-Val-Tyr-Ile-His-Pro-Phe
- d. Mor-His-Pro
- e. Glu-His-Pro
- Ans: D

- The amino acid that provides proteins with the greatest buffering capacity at physiological pH is:
- a. Arginine
- b. Aspartate
- c. Asparagine
- d. Histidine
- e. Glutamate
- Ans: D

- The chemical formula $\text{NH}_2\text{-CH}_2\text{-COOH}$ refers to:
- a. A fatty acid
- b. No answer refers to that formula
- c. An amino acid
- d. A ketoacid
- e. A monoamine
- Ans: C

- One of the following is TRUE in regards to prion disease
- a.The disease can be inherited
- b.The disease is caused by defective chaperones
- c.The defective prion protein disrupts proteinsynthesis
- d.It is a human-specific disease
- e.The prion protein does not have a tertiarystructure
- Ans:A

- Cysteines play an important role in the formation of the quaternary structure of this protein
- a. Myoglobin
- B. Immunoglobulin
- c. Collagen
- D. Carbonic anhydrase
- e. Hemoglobin
- Ans: B

- This type of amino acids preferentially
- exists in beta-sheets but not alpha helices
- a.Aromatic amino acids
- b.Non-polar, aliphatic amino acids
- c.Polar amino acids
- d.Proline and glycine
- E.Amino acids with branching at the beta-carbon
- Ans: E

- Beta-alanine is part of this molecule
- a.Oxytocin
- b.Aspartame
- c.Carnosine
- d.Glutathione
- e.Elastin
- Ans: C

- The secondary structures that make up domains are stabilized by
 - a. Proline residues
 - b. Disulfide bonds
 - c. Hydrogen bonds
 - d. R groups
 - e. Prosthetic groups
- Ans: C

- Amphipathic alpha-helices exist in
 - a. Membrane receptor with a single transmembrane domain
 - b. Cysteine-rich proteins with disulfide bonds
 - c. Conjugated, multimeric proteins
 - d. Ion channels
 - E. Extracellular proteins
- Ans: D

- Patients with phenylketonuria are advised to ingest an aspartame-like sweetener with phenylalanine replaced by
 - a. Alanine
 - b. Tryptophan
 - c. An amino acid analog
 - d. Valine
 - e. Tyrosine
- Ans : A

- A defect in chaperones will result in abnormal
- a. Enzymatic function
- b. Protein localization in cells
- c. Protein folding
- d. Protein denaturation
- e. Protein modification
- Ans: C

- Alatame is used as an alternative sweetener to aspartame because it does NOT contain this amino acid
- a. D-alanine instead of L-alanine
- b. Aspartate
- c. Asparagine
- d. Tyrosine
- e. Phenylalanine
- Ans: E

- All of the following bonding forces are important in maintaining the tertiary structure of a protein EXCEPT
- a. Peptide bonds
- B. Hydrophobic interactions
- C. Electrostatic interactions
- d. Van der Waals bonds
- e. Disulfide bond
- Ans: A

- The oxygen binding site in myoglobin or hemoglobin is a type of
- a. secondary structural element
- b. quaternary structure
- c. tertiary structural element or domain
- d. motif
- e. supersecondary structure

Ans: C

- Which amino acid would you expect to find in the middle of an integral protein embedded in the phospholipid bilayer?
- a.Leu
- b.Arg
- c.Tyr
- d.Glu
- e.Ser
- Ans: A

- What is the net charge of "Ile-His-Ser-Glu-His-Tyr-His" peptide at pH=12?
- a.-2
- b.+2
- C.-1
- d.0
- e.+1
- Answer : A (it maybe -3)

- What is the net charge of "Ile-His-Ser-Glu-Arg-Ala-His" peptide at pH 6?
- a-1
- b+2
- C.+1
- D.0
- e-2
- Ans: C

- Which of the following is a correct match between product and precursor amino acid
- a) Epinephrine, Tyr
- b) Dopa, Thr
- c) Serotonin, Arg
- d) GABA, Gin
- e) NO, Gly
- Answer : A

- Proline can present within -> Turn
- Not favorable within B-sheet -> Glutamate
- N-linked -> ASN
- Not true about disulfide bond -> denatured by detergents
- True about tertiary structure -> single polypeptide
- Spanning integral membrane -> hydrophobic + non polar amino acids

