CHU3139- BIO CHEMISTRY 1, LEVEL 5- CONTINUOUS ASSESSMENT TEST 1(NBT) ANSWER SCRIPT

1.(a) I

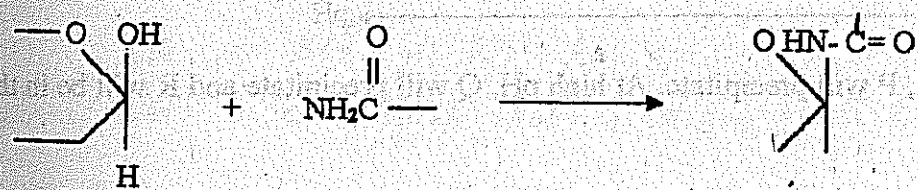
1. Molish test – Carbohydrate is present.
2. With Morgon – Elson reagent – Hexos amins is present.
3. No change for Biuret test – Protein is absent/ free amino acids are present/ no peptide bonds.
4. Rgls values – 0.7- glucosamine, 0.95- galactose and 1.0- glucose are present in the sample.

II. Glupose, Galactose and Glucoseamine. They are hexose.

(b) I. A long chain carbohydrate is covalently linked to small peptide.
Can be found in bacterial cell wall

II. Glucose, galactose, mannose, N- acetyl glucosamine & N acetyl neurominate

III. Glucose linkage – amino acids such as serine, theonine, has free OH group in their side chain.
This forms a glycosidic linkage with Carbon 1 of the sugar unit. N – glycosyl linkage –Asparagines and glutamine have an amide in the side chain. It forms a linkage with carbon 1 of sugar units.



) I. The overall folding of the polypeptide chain is described by the tertiary structure.

II 1. Hydrophobic interaction.
2. Hydrogen bonding.
3. Ionic interactions.
4. Covalent bond.

(a)I Immunoglobulins are antibodies produced by an organism to fight foreign invasive molecules (antigens).

II. All has a basic structure of 4 polypeptide chains. Two are heavy chains and two are light chains.
Each chain has a variable N- terminal portion.
These four polypeptide chains are held together by disulphide bonds.
IgG, IgD and IgE exists as monomers, IgA- dimmer and IgM- pentamer.

III. Function

IV. IgA, IgD, IgE, IgG and IgM

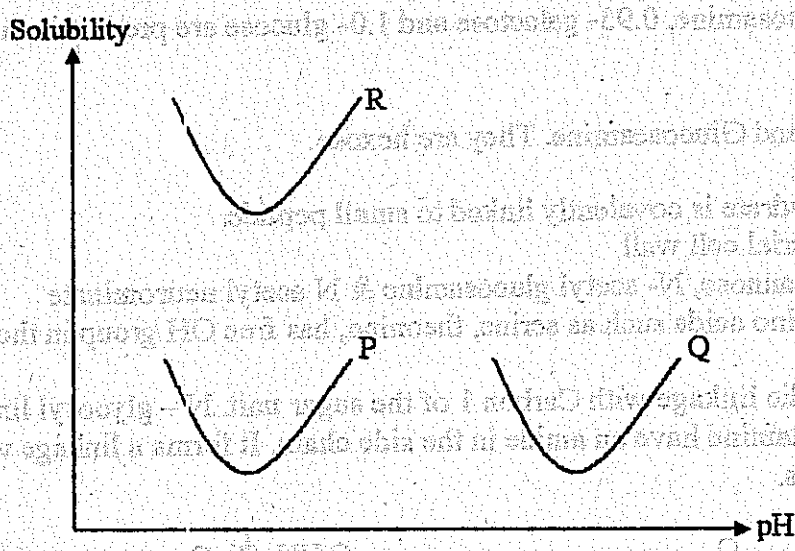
(b) I. This is the process where proteins regain their native structure and biological activity.

II. 1. Slow cooling.

2. By bringing the pH to the normal value

3. Using strong solutions of urea.

(c)



By increasing pH, P will precipitate. At high pH, Q will precipitate and R will be in the solution.

(d) I. Side chains are important,

1. To determine pK of proteins.
2. In ion exchange chromatography.
3. 3D shape of the protein is determined by the nature of side chain.

II. Depends on the migration of the amino acids in an electric field. Amino acids are spotted in the center of a strip of paper and a current is applied across it. Paper is immersed in a buffer solution. Charge on amino acid depends on the pH of the buffer. Amino acid with pI lower than the buffer pH, will be negatively charged and move towards the anode. Those with high pI will move towards the cathode, and those have pH equal to buffer remain at the point of application.

The Open University of Sri Lanka

B.Sc. Programme 2009/2010

Level-5 - CAT II (OBT)

CHU 3139 - Biochemistry I

- Answer Guide -

i. Pyruate + Glutamate ⟶ α-Ketoglutarate + alanine $\quad \Delta G_1^\circ = -0.24$ kcal mol^{-1}

α-Ketoglutarate + Aspartate ⟶ Glutamate + Oxaloacetate $\quad \Delta G_2^\circ = +1.15$ kcal mol^{-1}

Pyruate + Aspartate ⟶ alanine + Oxaloacetate

$$\Delta G^\circ = \Delta G_1^\circ + \Delta G_2^\circ$$

$$\Delta G^\circ = [(-0.24) + (+1.15)] \text{ kcal mol}^{-1}$$

$$\Delta G^\circ = +0.91 \text{ kcal mol}^{-1}$$

ΔG° is positive, so, formation is <u>not</u> favourable.

$$\Delta G = \Delta G^\circ + RT \ln K$$

$$\Delta G = 0.91 \text{ kcal mol}^{-1} + 8.314 \text{ J mol}^{-1} \text{K}^{-1} \times 298 \text{ K} \ln \frac{[10^{-4}]\text{M}[10^{-5}]\text{M}}{[10^{-3}]\text{M}[10^{-3}]\text{M}}$$

$$\Delta G = 0.91 \times 10^3 \times 4.184 \text{ J mol}^{-1} + 8.314 \text{ J mol}^{-1} \text{K}^{-1} \times 298 \text{ K} \ln 10^{-5}$$

$$\Delta G = +3807.44 + (-28524.10) \text{ J mol}^{-1}$$

$$\Delta G = -24716.66 \text{ J mol}^{-1}$$

ΔG Value is negative so, the reaction is favourable.

2) a)

Cyclic	Non-cyclic
1. Involves only PSI	1. Involves both PSI & PSII
2. ATP is Produced	2. ATP is Produced.
3. No NADP Produced.	3. NADP is Produced.
4. No O_2 Produced.	4. O_2 is Produced.

02 b). i). Cpx I - NADH - UQ dehydrogenase Cpx

Cpx II - Succinate dehydrogenase

Cpx III - Ubiquinone cytochrome C oxido reductase or cytochrome bc, or cytochrome reducta

Cpx IV - Cytochrome oxidase.

ii). Cpx I → Conversion of NADH to NAD^+ by reduction of ubiquinone (UQ) to ubiquinol (UQH_2)

Cpx II → Succinate + FAD ⟶ Fumarate + $FADH_2$

Cpx III → Reduction of Cytochrome c by UQH_2.

Cpx IV → Reduction of cytochrome C

c). * Through citric acid cycle, when glucose ix oxidi to CO_2 & water.

* By Oxidation to pyruvic acid during glycolytic Pathway.

* By Oxidation to pentoses via the pentose phospha pathway.

d) i). Transamination

Oxidative deamination.

ii). Transamination → Remove the α-amino group of an amino acid by enzyme and transfer the NH_2 group to α-C of α-keto glutarate.

Oxidative deamination → Remove the N atom from L-glutamate and forms an ammonium ion & α-ketoglutar

e). * Cane Sugar consists of Sucrose.

* It can be hydrolysed to glucose & fructose.
* Glucose provides energy when it undergoes glycolytic and products are oxidized in the citric acid cycle
* Fructose cannot enter glycolytic pathway as it is.
* Two ways in which Fructose undergoes glycolysis.

1. Fructose + ATP → F-6-P + ADP

Can enter at step 3.

2. fructose + ATP → F-1-P + ADP