**Biochemistry Midterm Exam**

1. **Regarding Glycolysis, the number of dehydration reactions is ?**
2. 1
3. 2
4. 3
5. 4
6. 5

**Answer : A**

1. **The net formation of high-energy phosphate from glucose oxidation when the glycerol- phosphate shuttle is used :**
2. 30
3. 32
4. 36
5. 38
6. 39

**Answer : C**

1. **Type III glycogen disease is called ?**
2. Von Gierke
3. Pompe
4. Cori
5. Andersen
6. McArdle

**Answer : C**

1. **Glycogen storage disease type-1 has all the following features EXCEPT :**

A- It is caused by a deficiency of glucose 6-phosphatase activity in the liver,kidney and intestinal mucosa .

B- It leads to hepatomegaly

C- It leads to hyperglycemia

D-It causes lactic academia

E-It leads to hyperuricemia.

**Answer : C**

1. **In malate-aspartate shuttle mechanism**
2. It occurs in kidney ,liver and heart
3. Malate crosses the mitochondrial membrane while aspartate can’t
4. With the malate-aspartate shuttle , 3 mitochondrial ATP are produced for each cytosolic NADH
5. The total amount of glucose using this shuttle is 36 ATP
6. It is involved in in transamination reactions

**The best answer is :**

1. 3,4and5
2. 1,2and 5
3. 2,3 and 4
4. 1,2,3 and 4
5. 1,3 and 5

**Answer : E**

1. **After a careful reading of the following statements , choose the correct answer :**
2. Enzymes are much larger than their substrates .
3. Enzymes can accelerate reactions in several ways, some may increase and others may decrease the activation energy (ΔG+)
4. The catalytic site and binding site together comprise the enzyme’s active site. The remaining majority of the enzyme structure serves to maintain the precise orientation and dynamics of the active site.
5. Enzymes are permanently altered by the reactions they catalyze.
6. Enzymes do not alter the position of the chemical equilibrium of the reaction. In the presence of an enzyme , the reaction run in the same direction as it would without the enzyme , just more quickly.

**The answer would be:**

1. 1,2,4 and 5
2. 1,2,3 and 5
3. 1,3,and 4
4. 1,3 and 5

**Answer : D**

1. **According to the international classification of enzymes , choose the statement which describes the correct order of enzymes’ classes:**
2. Oxidoreductases –Transferases –Hydrolases-Lyases-Isomerases- Ligases
3. Oxidoreductases- Transferases- Hydrolases- Isomerases- Lyases- Ligases
4. Ligases- Lyases- Hydrolases- Transferases- Oxidoreductases- Isomerases
5. Oxidoreductases- Transferases-Hydroxylases-Lyases- Isomerases- Ligases

**Answer : A**

1. **If an enzyme is added to a solution where its substrates and products are in equilibrium , which of the following most likely to occur :**
2. The reaction would change from endergonic to exergonic .
3. Additional product would be formed.
4. Additional substrate would be formed
5. The free energy of the system would change
6. The equilibrium state will not be changed .

**Answer: E**

1. **The class to which the enzyme that catalyzes the conversion of pyruvate to lactate :**
2. Oxidoreductases.
3. Lyase.
4. Hydrolase.
5. Isomerase.

**Answer : A**

1. **Urea is converted to ammonia and carbon dioxide by the action of urease. What will be the effect on the rate if the temperature of the reaction is lowered from 37 °C ( the optimum temperature) to 27 °C?**

(NH2)2CO + H2O → CO2 + 2NH3

1. The rate will slow down
2. There will be no affect
3. The rate will triple
4. The rate will double
5. The rate will slow down , the speed up again .

**Answer : A**

1. **A noncompetitive inhibitor of an enzyme-catalyzed reaction :**
2. Increases Km and reduces Vmax
3. Reduces Km and Increases Vmax
4. Increases Km and increases Vmax
5. Reduces Vmax and has no influence on Km.

**Answer : D**

1. **One of the following is included in the structure of Cytochrome Oxidase .**
2. Iron
3. Copper
4. Sfur
5. Magnesium

**Answer : B**

1. **Which of the following compounds is used as a cofactor in carboxylation reaction ?**
2. Biotin
3. Thiamin pyrophosphate
4. Coenzyme A
5. Flavin
6. Pyridoxal phosphate

**Answer : A**

1. **How many ATP molecules are released from Glycogen degradation .**
2. 38
3. 39
4. 40
5. 36

**Answer : B**

1. **Which of the following compound/s is (are) common between galactose and glycogen metabolism ?**
2. UDP-galactose
3. UDP-glucose
4. Glucose-6-phosphate
5. Glucose-1-phosphate

**The best answer is :**

1. 3 and 4
2. 1,2 and 3
3. 2,3 and 4
4. 1,2,3 and 4
5. 2 only

**Answer : C**

1. **Beads on a string is a correct description to which membrane**
2. Endoplasmic reticulum
3. Mitochondrial matrix
4. Outer mitochondrial membrane
5. Inner mitochondrial membrane
6. Golgi complex membrane

**Answer: D**

1. **Which of the following inhibitors of respiratory transport chain will not lead to complete energy shut down of ATP synthesis**
2. Cyanide
3. Sodium azide
4. Carbon monoxide
5. Antimycin A

**Answer: D**

1. **If your friend is depressed because he cannot pass this year , you advised him not to kill himself as one year in medicine will not make that difference . Unfortunately he didn’t listen to your advise and kill himself before biochemistry exam by using a highly toxic substance which can’t be detected in blood because it is volatile . That substance is :**
2. Amytal
3. Rotenone
4. Azide
5. Antimycin A
6. Cyanide

**Answer: E**

1. **The following statements are about glycogen loading :**
2. During intense , continuous endurance exercise , your muscles will become depleted of glycogen after about about 90 minutes
3. Carbohydrate loading is not useful for events like a 5k or 10K since the running effort will not be long enough to completely deplete muscle glycogen stores
4. Normally your body can store glycogen at a capacity of 80-120 mmol/day
5. When practiced perfectly , this method of carbohydrate loading should allow you to almost double that storage capacity

The best answer is :

1. 3 and 4
2. 1,2 and 3
3. 2,3 and 4
4. 1,2 and 4
5. 2 and 4

**Answer: D**

1. **In enzyme –substrate reaction , when excess substrate is present, increasing the concentration of the enzyme will:**
2. Increase the number of substrate molecule available.
3. Inhibit the formation of products .
4. Increase the decomposition rate of the enzyme-substrate complex.
5. Decrease the turnover rate for the substrate .
6. Increase the amount of reaction occurring.

**Answer: E**

1. **When an end product from an enzyme-mediated sequence is an activator for an advanced step in the reaction sequence . The process is described correctly as :**
2. Competitive activation
3. Concentration control
4. Negative catalysis
5. Feedback control
6. Feed forward activation

**Answer: E**

1. **When varying the substrate concentration at a fixed enzyme concentration of enzyme ,It is observed that at low concentration of substrate the reaction is \_\_\_\_\_\_\_\_\_\_ , while at high concentration of substrate the reaction is \_\_\_\_\_\_\_ ,**
2. Maximal ; initial
3. Initial ; maximal
4. Second order ; first order
5. First order ; second order
6. First order ;Zero order

**Answer : E**

1. **What is the shape of a typical plot of initial rate vs. substrate concentration for an enzyme catalyzed reaction that follows Michaelis-Menton kinetics ?**
2. Sigmoidal
3. Parabolic
4. Sinusoidal
5. Bell curve
6. Hyperbolic

**Answer : E**

1. **Enzymes that join two substrates and require energy of a nucleoside triphosphate ( such as ATP) to do so are called ;**
2. Isomerases.
3. Lyases.
4. Ligases .
5. Hydrolases .
6. Oxidoreductases.

**Answer : C**

1. **Which is an appropriate experiment to analyze an enzyme-catalyzed reaction ?**
2. Substrate concentration is constant and the initial rate is measured at different concentrations of enzyme .
3. Enzyme concentration is constant and the initial rate is measured at different substrate concentrations.
4. Substrate concentration is constant and the half-maximal rate is measured at different concentrations of enzyme.
5. Enzyme concentration is constant and the half-maximal rate is measured at different substrate concentrations.

**Answer : B**

1. **One of the following statements is not correct :**
2. Km is a property with binding of S to E , not a property of turnover
3. Vmax is the initial reaction velocity when substrate concentration is high compared to Km
4. Kcat is a property we often want is the maximum velocity independent of how much enzyme we originally dumped in
5. If we influence an enzyme’s substrate affinity without altering its ability to convert substrate to product , we won’t change Vmax or Km

**Answer: D**

1. **The following are high-energy compounds EXCEPT :**
2. Phosphophenolpyruvate
3. Acetyl phosphate
4. Carbamoylphosphate
5. Fructose 1,6 bisphosphate
6. 1,3-bisphosphoglycerate

**Answer : E**

1. **Which of the following statements are correct :**
2. The total quantity of ATP in the body is limited to approximately 100 g
3. A resting human being consumes about 40 kg of ATP in 24 hours .
4. The highest daily use of ATP is consumed by the heart .
5. For a 2-hour run , 60 Kg of ATP is utilized.
6. In the fast and furious , the primary energy source is fat.

The best answer is :

1. 1,2 and 5
2. 1,3 and 4
3. 3,4 and 5
4. 1,2 and 4
5. 1,3 and 5

**Answer : D**

1. **Identify a correct statement about glycolysis**
2. Where as the pyruvate kinase-catalyzed reaction is irreversible in liver cells , the reaction is reversible in muscle cells.
3. If a working muscle under anaerobic metabolism of glucose is switched to aerobic conditions , the rate of glycogen metabolism in that muscle will fall.
4. The only dehydrogenation present in the glycolytic pathway is similar to succinate dehydrogenase in having FAD as the hydrogen acceptor.
5. Phosphofructokinase and hexokinase each catalyze reactions in which high energy phosphate ( ATP) is formed.
6. The Km for hepatic glucokinase is lower than the fasting blood glucose concentration in normal fasting subjects

**Answer: D**

1. **Identify the INCOREECT statement about the control of glycogen phosphorylase**
2. 5’-AMP promotes the formation of the R form of the enzyme.
3. The phosphorylated enzyme is in the R state unless there is a high concentration of glucose.
4. Phosphoprotein phosphatase action is a guaranteed way for the enzyme to be activated
5. When muscle begins to exercise this will facilitate the formation of an active form of the enzyme.
6. The enzyme has low activity in muscle and liver in the fed state .

**Answer : C**

1. **Which of the following statements are correct about gluconeogenesis**
2. It is the synthesis from none carbohydrate sources like lactate, glycerol and amino acids.
3. Gluconeogenesis is the exact reversal of glycolysis , that is , pyruvate to glucose.
4. Gluconeogenesis occurs in the cytosol & Mitochondria.
5. Gluconeogenesis takes place in the liver 70% ,intestine 20% and in kidneys 10% .
6. It is the main source of energy in fasting

**The best answer is :**

1. 1,5 and 3
2. 3 and 4
3. 2 and 4
4. 2,4 and 5

**Answer: A**

1. **Which of the following conversions would yield the greatest amount of ATP?**
2. 2 pyruvate → 6 CO2 + ? ATP
3. 2 acetyl-CoA → 4 CO2 + ? ATP
4. Lactate → 6 CO2 +?ATP
5. (glucose)n i.e “glycogen” → (glucose)n-2 +4 lactate +?ATP
6. 2 glucose → 4 pyruvate + ? ATP

**Answer :C**

1. **The rate limiting step in fructose metabolism is the reaction which is catalyzed by ?**
2. Aldolase A
3. Aldolase B
4. Aldolase C
5. Fructokinase
6. Triose-Kinase

**Answer: B**

1. **How many ATP required to form glucose from glycerol ?**
2. 0
3. 1
4. 2
5. 4
6. 6

**Answer: A**

1. **Why fructose disappears from blood more rapidly than glucose in diabetic subjects?**
2. Because it is absorbed by facilitated diffusion which is faster than simple diffusion .
3. Fructose is a ketose which is absorbed faster than glucose which is aldose.
4. Fructose is changes to fructose-1-phosphate by fructokinase which does not need insulin.
5. Because fructose is more sweet than glucose and absorbed with water

**Answer : C**

1. **The following statements are correct about fructose metabolism :**
2. Essential fructosuria caused by deficiency of fructokinase enzyme.
3. Fructose 1,6 bisphosphatase deficiency leads to accumulation of fructose 1,6 bisphosphate which inhibits phosphorylase enzyme.
4. Hereditary fructose intolerance caused by deficiency of aldolase B.
5. Excessive fructose consumption leads to inadequate regeneration of ATP.

**The best answer is**

1. 1,4 and 3
2. 1,2 and 3
3. 2,3 and 4
4. 1,2,3 and 4

**Answer : D**

1. **Fructose 1,6 bisphosphatase is stimulated by :**
2. Citrate
3. Acetyl-CoA
4. AMP
5. Fructose 1,6 bisphosphate
6. Fructose 2,6 bisphosphate

**Answer : A**

1. **Fructose- 2,6- bisphosphate is an allosteric activator for :**
2. Hexokinase
3. Phosphofructokinase
4. Fructokinase
5. Fructose 1,6 bisphosphatase
6. Glucose-6-phosphate

**Answer : B**

1. **In galactosemia , the most common enzyme defect is :**
2. Galactokinase
3. Hexokinase
4. Uridyltrasnferase
5. Aldose reductase
6. 4-Epimerase

**Answer : C**

1. **The function of mutase enzyme :**
2. Phosphorylate a compound
3. Change the postion of OH group
4. Add aldehyde group
5. Oxidize the compound
6. Shift the phosphate group

**Answer : E**

1. **Fetal alcohol syndrome can be detected by :**
2. Measuring the level of acetaldehyde in the blood stream.
3. Measuring the level of Ethanol in the blood
4. Measuring the level of alcohol dehydrogenase
5. Measuring the level of pyruvate in the blood

**Answer : A**

1. **Control of carbohydrate metabolism can be done by :**
2. Allosteric control
3. Covalent modification
4. Substrate cycles
5. The amount of enzyme
6. All of the above

**Answer : E**

1. **Why is phosphofructokinase a rate limiting enzyme for glycolysis ?**
2. Because It is found only in glycolysis
3. Because glucose-6-phosphate is an intermediate found only in glycolysis
4. Because it is a reversible step
5. None of the above

**Answer : A
 Good Luck
 *Done by : Aseel Qandeel***