

Mansoura University
Faculty of Science
Chemistry Department
Subject: Analytical Chemistry
Course: Environmental Chemistry
Course code: Chem. 413



4th level (Zoology, Botany,
Chemistry and Biochemistry)
Date: 16/5/ 2015
Time allowed: 2 hours
Full Mark: 60 Marks

Answer the Following Questions:

Q1) Explain, what do you meant by (choose 5 only): (15 marks)

- a) Essential Limit and Toxic Limit for metal ions in water.
- b) BOD and COD.
- c) Types of organic pollutants.
- d) Chemical speciation.
- e) Heavy metals and trace element.
- f) Applications of water reuse.

Q2) Characterize the biochemical effect of each of the following and suggest antidotes for each: (10 marks)

- a) Carbon monoxide.
- b) Cyanide.

Q3) a) Discuss the mechanism of toxic chemicals on enzymes. (10 marks)

b) Write a note on methyl isocyanate (MIC). (10 marks)

Q4) Write short notes on each of the following: (15 marks)

- a) Incineration method of waste disposal.
- b) Sanitary landfill method for waste disposal.
- c) Main steps for anaerobic treatments for organic waste and biogas generation.

Best wishes for success,

Prof. Dr. I. Kinawy, Prof. Dr. M. El-Defrawy, Dr. W. Abo El-Maaty and Dr. H. Moustafa



Answer the following questions:

I. (20 Marks)

1. Adipose is required a high level of NADPH for fatty acid biosynthesis and glucose 6-phosphate is completely oxidized to CO₂. Discusses how these cells regenerate glucose 6-phosphate from the pentose phosphate pathway and gluconeogenesis. **(10 Marks)**
2. **Consider the following examples of metabolic regulation: (10 Marks)**
 - i. The synthesis of enzymes in gluconeogenesis under the response of insulin
 - ii. Glucose 6-phosphatase is present in the liver and kidneys but not in muscle.
 - iii. Pyruvate Carboxylase is stimulated by acetyl CoA and inhibited by ADP.
 - iv. The enzyme that catalyzes the synthesis and degradation of fructose 2, 6-bisphosphate is phosphorylated and dephosphorylated in response to hormonal signals.
 - v. The synthesis of fatty acids by fatty acid synthase.

Indicate which of these examples apply to each of the following modes of metabolic regulation:

- | | |
|----------------------------|---------------------------------------|
| a) allosteric interactions | d) compartmentation |
| b) covalent modifications | e) Metabolic specialization of organs |
| c) enzyme levels | |

II. (20 Marks)

- a) Enumerate the metabolic relationships between the major tissues in the starvation state. **(10 Marks)**
- b) What is the difference between: **(10 Marks)**
 - i. Fructose and Lactose intolerance
 - ii. Hexokinase and glucokinase

III. Choose the best answer :(20 Marks, 2 for each)

1. Which one of the following is a correct statement about the regulation and sequence of reactions in metabolic pathways?
 - a. The initial step in many pathways is a major determinant of control
 - b. The sequence of steps in catabolic pathways is usually the exact reverse of the biosynthetic sequence
 - c. Enzymes found in an anabolic pathway are rarely found in the corresponding catabolic pathway
 - d. A small set of large precursors serves as the starting point for most biosynthetic processes in energy metabolism
 - e. Steps in both anabolic and catabolic pathways are usually irreversible
2. During an overnight fast, the major source of blood glucose is
 - a. Dietary glucose from the intestine
 - b. Hepatic glycogenolysis
 - c. Gluconeogenesis
 - d. Muscle glycogenolysis
 - e. Glycerol from lipolysis
3. Metabolic adaptations to prolonged starvation include which of the following change relative to the metabolic picture after three days of starvation?
 - a. The rate of lipolysis (mobilization of triacylglycerols) in the adipose tissue increases.
 - b. The glucose output by the liver decreases.
 - c. The ketone body output by the liver decreases.

- d. The utilization of glucose by the brain decreases as the utilization of ketone bodies increases.
e. The rate of degradation of muscle protein decreases.
4. Which one of the following statements is correct regarding the well fed state?
a. NADPH production by the hexose monophosphate shunt is decreased
b. Acetoacetate is the major fuel for muscle
c. Glucose transport into adipose tissue is decreased
d. The major fuel used by the brain is glucose
e. Amino acids are utilized for glucose production
5. Which of the following enzymes is active in adipocytes following a heavy meal?
a. Glycogen phosphorylase
b. Glycerol kinase
c. Hormone-sensitive lipase
d. Glucose-6-phosphatase
e. Phosphatidate phosphatase
6. A Nigerian medical student studying in the Mansoura University develops hemolytic anemia after taking the oxidizing antimalarial drug pamaquine. This severe reaction is most likely due to:
a. G-6-P dehydrogenase deficiency
b. Concomitant scurvy
c. Vitamin C deficiency
d. Diabetes
e. Glycogen phosphorylase deficiency
7. Which of the following statements correctly describes ketone bodies?
a. They accumulate in children with fatty acid oxidation disorders
b. They accumulate in diabetes mellitus after insulin therapy
c. They are produced by muscle but not by liver
d. They include β -hydroxybutyrate and acetone
e. They are found in blood but not in urine
8. A child presents with low blood glucose (hypoglycemia), enlarged liver (hepatomegaly), A liver biopsy reveals excess glycogen in hepatocytes. Deficiency of which of the following enzymes might explain this phenotype?
a. α -1,1-glucosidase
b. α -1,1-galactosidase
c. α -1,4-glucosidase
d. α -1,4-galactosidase
e. α -1,6-galactosidase
9. Which of the following statements about the metabolism of the brain are INCORRECT?
a. It uses fatty acids as fuel in the fasting state.
b. It uses about 60% of the glucose consumed by the whole body in the resting state.
c. It lacks fuel reserves.
d. It can use acetoacetate and 3-hydroxybutyrate under starvation conditions.
e. It releases lactate during periods of intense activity.
10. In the coordinated control of phosphofructokinase (PFK) and fructose 1,6-bisphosphatase (F-1,6-BPase),
a. citrate inhibits PFK and stimulates F-1,6-BPase.
b. fructose 2,6-bisphosphate inhibits PFK and stimulates F-1,6-BPase.
c. acetyl-CoA inhibits PFK and stimulates F-1,6-BPase.
d. AMP inhibits PFK and stimulates F-1,6-BPase.
e. NADPH inhibits PFK and stimulates F-1,6-BPase.

Good luck



Answer the following questions:

Q1. Illustrate your answer with graph (20 Marks)

- Explain the role of APC tumor suppressor gene codes for a protein that inhibits the Wnt signaling pathway.
- Someone eat storage peanuts for long times and after 15 year have hepatic cancer? what is the mechanism of development of this cancer.

Q2. Compare between each of the following: (20 Marks)

- Oncogene and tumor suppressor gene.
- Grade and Stage of tumor.
- Apoptosis and necrosis.
- Retroviruses and Adeno-associated viruses vectors for gene therapy

Q3. (20 Marks)

- Illustrate how can over expression of c-myc oncogene by chromosomal translocation or by retrovirus integration causes cancer. (10 Marks)
- Discuss the behavior of receptor of tyrosine kinase receptor under the normal and abnormal conditions. (5 Marks)
- Illustrate diagrammatically Ras-MAPK pathway.(5 Marks)

Q4. (20 Marks)

- Mention two strategies to kill cancer cell by gene therapy.
- Radiation generates free radicals and causes cancer and otherwise some chemotherapeutic drugs generate free radicals to kill cancer cell. Discuss

Good luck

Mansoura University
Faculty of Science
Chemistry Department
El- Mansoura, Egypt



جامعة المنصورة
كلية العلوم
قسم الكيمياء
المنصورة- مصر

4th level Biochemistry (Credit hrs)

Course: Fermentation

(Bio 476)

Time: 2 hrs

Date: 26 / 5 / 2015

Full mark: 60

Question mark: 20

Section: 1

1- Complete the following sentences (2 marks for each point)

- 1- The cells of yeast are surrounded by....., which helps to prevent them from.....by.....in human body.
- 2- Homolactic fermentation is.....while heterolactic fermentation is.....
- 3- AAB is.....oxidize ethanol to....., they are characterized by.....,.....and rod shaped bacteria.
- 4- Biogas can be produced from.....such as.....,.....,.....,.....
- 5- Food fermentation has been said serve five main purposes as.....,.....,.....,.....
- 6- Yogurt produced through lactic acid fermentation of milk by..... and.....bacteria.
- 7- Yeasts are..... microorganisms. By fermentation it converts To andYeast reproduces asexually by.....and.....
- 8- Bioremediation is..... and phyto remediation is.....
- 9- Biochemical oxygen demand is a
- 10- Fermentation in food processing is.....

Section: 2

Answer two questions only from the following three questions

2- Write short notes on the following:-

1. Fermentation in yeast and muscles (5 marks).
2. Biogas problems (5 marks).
3. Pathogenic yeasts (5 marks).
4. Factors affecting enzyme activity (5 marks).

من فضلك باقي الأسئلة في ظهر الورقة

3- Choose the correct answer from the following (2 marks for each point)

- 1- Fermentation in muscle produced
 - a- Lactic acid
 - b- Butyric acid
 - c- Ethyl alcohol
- 2- Benefits of Biotechnology in medicine
 - a- Environment
 - b- Agriculture
 - c- Veterinary
- 3- Oxidoreductases are
 - a- Catalyzing isomerization
 - b- Catalyzing hydrolysis reactions
 - c- Catalyzing oxidation reduction reactions
- 4- Catabolism
 - a- Building reactions
 - b- Breaking down compounds
 - c- Synthesizes large molecules
- 5- Alcoholic fermentation converts one mole of sucrose into
 - a- Four moles of ethanol only
 - b- Two moles of carbon dioxide only
 - c- Three moles of ATP

4- Write short notes on the following:-

- b- Food spoilage (5 marks).
- c- Hydrogen gas production in fermentation (5 marks).
- d- Biochemical process of sucrose fermentation (5 marks).
- e- Impede factors to convert lactic acid into anything else other ethanol (5 marks).

"Best of Luck"

Examiners:

Prof. Dr. AbdelGlial Khalel
Prof. Dr. Hanefy Hassen
Prof. Dr. Gamal M. Abdel-Fattah
Dr. Mona El-kasby

Mansoura University
Faculty of Science
Chemistry Department
Course: Physical Chemistry
Date: 30/ 05/ 2015



Second term examination
Subject: Surface and catalysis (Chem444)
Fourth level, Biochemistry students
Full Mark: 60 Marks
Time Allowed: 2hours

Answer the Following Questions

Question I

- 1-Why do physisorption and chemisorption behave differently with rise in temperature?(2marks)
- 2- Describe Freundlich adsorption isotherm.(5marks)
- 3-An unknown liquid forms a convex meniscus when poured into a test tube. Does the liquid wet the test tube?(3marks)
- 4-Determine the surface tension of ethyl alcohol if the density of ethyl alcohol is 0.789 g/cm^3 and values of atomic parachor are of $O=19.8, C=9.0, H=15.5$.(5marks)
- 5-The adsorption of a gas on a solid surface was found to follow a Langmuir isotherm with $b = 3.76 \text{ kPa}^{-1}$ at a temperature of 25°C . Determine the pressure of gas required to achieve a fractional surface coverage of 10%.(5marks)

Question II:

- 1-Observations show that often acids or bases can act as catalysts. In some cases the rate depends on the nature of the acid or base (specific acid-base catalysis) and in other cases it does not depend on the nature of the acid or base. Discuss this statement considering different diagrams.(5marks)
- 2-Explain in a few sentences, referring to your sketch, how a catalyst affects the rate of the chemical reaction.(3marks)
- 3- Drive the rate equation of the enzyme catalysis.(6marks)
- 4-Write on the catalyst selectivity and activity.(6marks)

P.T.O.

Question III

(A) Choose the response that best complete each statement:(5marks)

1-When catalysts and reactants are in more than one phase it is

- a. Homogeneous catalysis b. Heterogeneous catalysis
c. Catalysis d. E_a

2- The substances that reduces the effectiveness of a catalyst are called

- a. Promoters b. Poisoning catalysts c. Inhibitors d. Autocatalysts

3-Each catalyst has

- a. Specificity b. Its own E_a c. Special structure d. all of above

4- A catalyst cannot effect

- a. Products b. Chemical equilibrium c. Reactants d. both a & b

5- An enzyme has its specificity due to

- a. Substrate b. Structure c. Temperature d. Pressure

(B) Drive the rate equation of unimolecular surface reaction.(6marks)

(C) Write on the types of adsorption isotherms.(6marks)

(D)Why is desorption important for a substance to act as good catalyst? (3marks)

GOOD LUCK

Prof. Awad I. Ahmed, Prof S. A. El-Hakam



Answer ALL the Following Questions; Each Question [20] Marks

[1] A- Choose the most suitable answer:

- 1- Changes may occur in blood samples prior to the separation of plasma or serum from the cells include:
(A) conversion of glucose into lactate (B) decreased plasma[phosphate]
(C) low plasma[K⁺] (D) none of these
- 2- Biochemical tests on serum may be affected by
(A) exercise (B) time of the day (C) diet (D) all of these
- 3- The distribution pattern of each of the following blood constituents is skewed except for:
(A) sodium (B) iron (C) urea (D) bilirubin
- 4- False positive results
(A) occur with the less sensitive tests
(B) occur with the more sensitive methods of detection
(C) give the doctor and the patient a false sense of security
(D) (A) and (C)
- 5- Large loss of ECF will stimulate the release of
(A) Na (B) ADH (C) Cortisol (D) Ca
- 6- Hypernatraemia may occur in
(A) diuretic therapy (B) carcinoma of bronchus
(C) hypoglycaemia (D) nephrogenic diabetes insipidus
- 7- Non-respiratory acidosis may be caused by
(A) carbonic anhydrase inhibitors (B) motor neuron disease
(C) voluntary overbreathing (D) none of these
- 8- The biochemical feature(s) of metabolic alkalosis is (are)
(A) high pH (B) high [HCO₃⁻] (C) low [H⁺] (D) all of these
- 9- Overflow type amino aciduria occurs in
(A) Hartnup disease (B) cystinuria
(C) acute hepatic necrosis (D) all of these
- 10- Wilson's disease
(A) shows autosomal recessive inheritance
(B) typically has raised serum levels of ceruloplasmin
(C) is accompanied by decreased excretion of urine copper
(D) displays low levels of serum free copper

[15] Marks

B- Give one pathological case related to each of the following:

- i- Gastrointestinal bleeding.
- ii- Glucose-mediated osmotic diuresis.
- ii- low alveolar P_{CO₂} due to drug overdose.
- iv- Increased plasma [urea] due to renal cause.