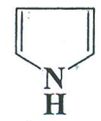
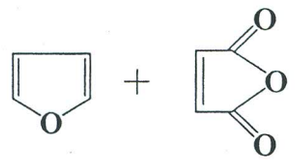
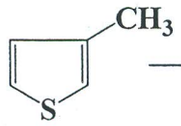
Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Org.Chem.337		1st Term 3rd Level Students Date: 31 / 12 / 2015 Time Allowed: **2** Hours Full Mark: **80** Marks

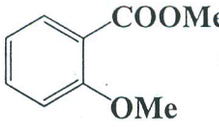
Answer All Questions

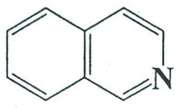
1- Suggest the organic product(s), indicating the reaction mechanism of it is possible: [27 Marks]

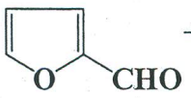
i)  + $CHCl_3$ —NaOH→ .....

ii)  —heat→ .....

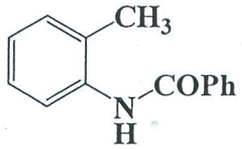
iii)  —DMF / $POCl_3$→ ..... —Wolf-Kischner reduction→ .....

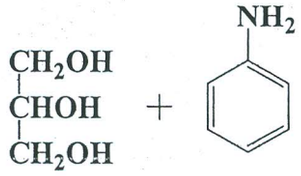
iv)  + $PhCOCH_3$ —CH_3O^-→ ..... —HI→ ..... —$-H_2O$→ .....

v)  + $NaNH_2$ ⟶ .....

vi)  —alc. KCN→ ..... —[O]→ .....

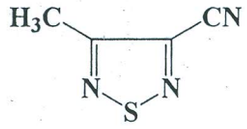
vii) $Cl-CH_2-CH_2-NH-CHO$ —$\bar{O}H$→ ..... —$-H_2O$→ .....

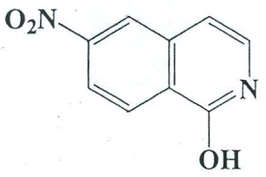
viii)  —Me_3CO^-→ ..... —H^+→ .....

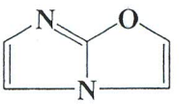
ix)  + conc. H_2SO_4 ⟶ ..... —$PhNO_2$→ .....

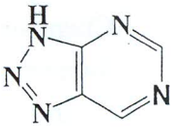
P. T. O.

2- a) Give acceptable name of each of these heterocycles: [8 Marks]

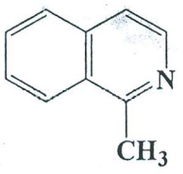
i) 

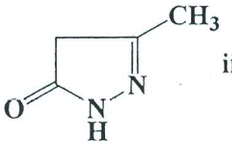
ii) 

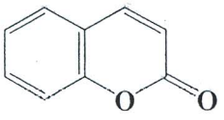
iii) 

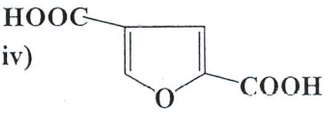
iv) 

b) Design one synthesis for each of the molecules below: [18 Marks]

i) 

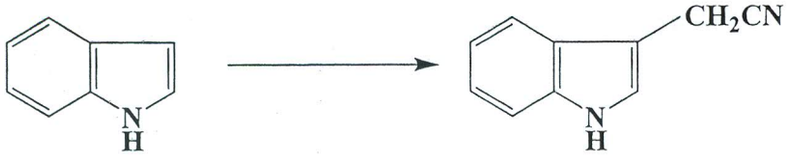
ii) 

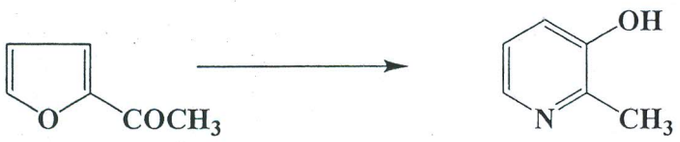
iii) 

iv) 

3- a) Diagram these conversions: [9 Marks]

i) 

ii) 

iii) 

b) Show the following: [18 Marks]

i) Knorr synthesis of 2,4-dimethylpyrrole

ii) Preparation of saccharine

iii) Conversion of pyridine to penta-1,3-diene

iv) Fischer synthesis of 2-methylindole

Best Wishes and Good luck

Examiners: Prof. Dr. Ez Kandil, Prof. Dr. Evelin Boshra, A.Prof. Dr. Eman Kishk

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Biology & Biochemistry** **Course(s) : Transition Elemts. & Complexes Chem.(323)**	كلية العلوم جامعة المنصورة	**First Term** **3rd Level Students** **Date : Jan., 2016** **Time Allowed : 2 hours** **Full Mark : 80 Marks**

Answer the Following Questions

1. a) Complete the following equations : **[20 Marks]**

i) V_2O_5 + oxalic acid $\xrightarrow{\Delta}$

ii) $2\ VCl_4 \rightarrow$

iii) $La_2O_3 + Al \rightarrow$

iv) $Zr\ Cl_4 + H_2O \rightarrow$

v) $Cr + F_2 \rightarrow$

vi) TiO_2 + conc.$H_2SO_4 \rightarrow$

b) Give reason(s) for the following :

i) ScC_2 is paramagnetic and electrically conductor

ii) The hydrated forms of $TiCl_3$ have different colors

iii) The colour of $[Mn(H_2O)_6]^{2+}$ is pale whereas of $[Mn(CN)_6]^{4-}$ is intense

iv) The hydrolysis of $TiCl_4$ is complete whereas $ZrCl_4$ is incomplete

2. a) How to extract the Cr and Ti from their main ores. **[20 Marks]**

b) Write briefly on the catalytic properties and oxidation states of transition elements.

3. a) Write the name, type of isomerism and the isomers of the following complexes : **[20 Marks]**

i) $[Co\ Cl_2(NH_3)_4]\ NO_2$ **ii)** $[TiOCl_4]^{2-}$ **iii)** $[Fe\ (ac.ac)_3]$

b) Write the formulae of the following :

i) Potassium penta cyano nitrosyl ferrate (III)

ii) μ- dihydroxy tetrakis ethylene diamine dichromium (III) chloride

4. a) Give one example for each type of monodentate and bidentate ligands **[20 Marks]**

b) How to prepare the following complexes :

i) $(Pt\ (py)_2\ Cl_2]$ **ii)** $[Fe(ac.ac.)_3]$

c) Explain two methods for the detection of complex formation

---

مع أطيب التمنيات بالنجاح

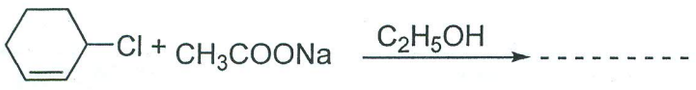
أ.د جابر أبو الريش

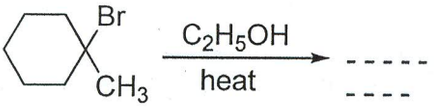
Mansoura University Faculty of Science Chemistry Department Subject: Chemistry		First Term Time Allowed: 2 Hours Date: Jan. 2016 Full Marks: 80

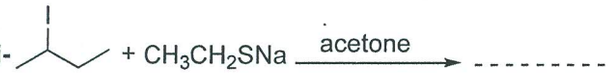
Course(s): Chem.336 Physical Organic Chemistry for 3rd Level Biochemistry, Chem. Zool. and Chem. Bot. students

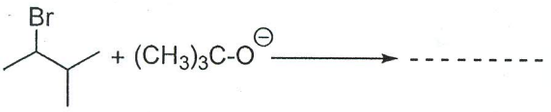
Answer All Questions

Q1: A) Draw the expected organic product(s) in each of the following equations, please remember to ***discuss reaction mechanisms*** in each reaction **(28 Marks)**

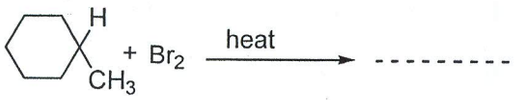
i- 

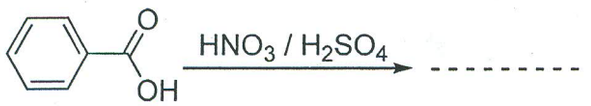
ii- 

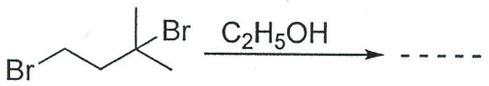
iii- 

iv- 

v- 

vi- 

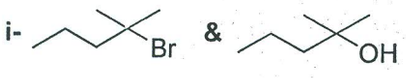
vii- 

viii- 

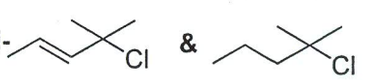
Q2: A) Show each of the steps used in the mechanism of chlorination of ethane. Calculate heat of reaction in propagation step knowing that hemolytic bond dissociation energy (DH^o) are shown below **(8 Marks)**

DH^o value	Cl_2	58 Kcal/mole	DH^o value	C-H	100 Kcal/mole
	HCl	103 Kcal/mole		C-Cl	84 Kcal/mole

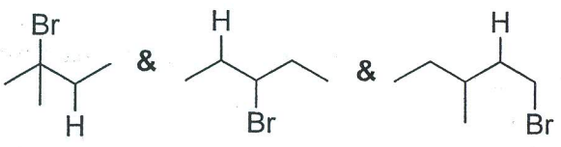
B) Which compound of each pair of the following would you expect to be more rapid toward nucleophilic substitution reaction? ***Explain*** **(9 Marks)**

i- 

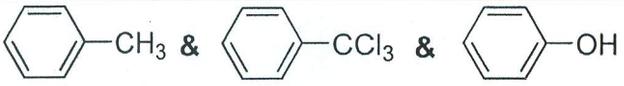
ii- 

iii- 

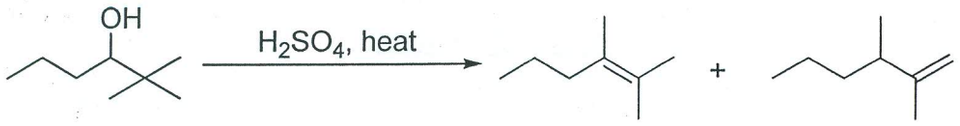
C) Arrange the following alkyl substrates in a decreasing order toward **(8 Marks)**

i - E^2 reaction with strong base 

Please Turn to Next Page

ii - mononitration reaction  &

Q3: A) Provide a mechanism for the following reactions indicating the major and minor products **(8 Marks)**

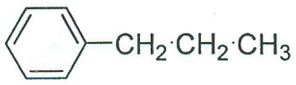
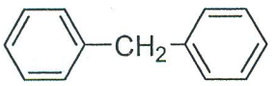
ii - 

ii - 

B) For each of the following pairs determine the ***stronger nucleophile***, ***why*** **(6 Marks)**

i - CH_3ONa & CH_3COONa **ii** – NH_3 & PH_3 **iii** – H_2O & HO^-

C) Show by equations how you would synthesis the following compounds starting from ***benzene*** any other needed reagents **(8 Marks)**

i -  **ii-** 

D) Using 2-methylbutane with Br_2 in presence of light, draw all the expected products and indicate the relative amounts of products you expect to be formed **(5 Marks)**

With our Best Wishes

Examiners: Dr. Ebrahim Abdel-Galil, Dr. Soha M. Abdelmageed, Dr. Saad Shaaban

Mansoura University
Faculty of Science
Chemistry Department
Subject: Biochemistry
Course: Enzymes,
Biochemistry 371

First Term Examination
3rd Level Students
Date Jan 14, 2015
Time Allowed: Two hours
Full Marks: 60 Marks

Answer the following questions

I. Give an account on each of the following: (15 Marks, 5 for each)

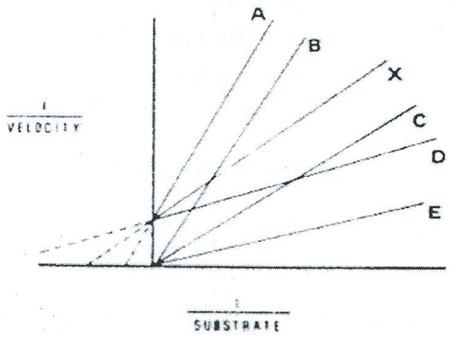
a. Mechanism of digestion of protein with serine proteases enzymes.
b. Restriction endonucleases enzymes.
c. Sequential order model in multi substrate reactions.

II. The enzyme carboxypeptidase A catalyzes the hydrolysis of the peptide A-G-W in 10 mM phosphate buffer at pH 7.0. The enzyme is known to obey the Michaelis-Menten kinetics under the conditions of this experiment where Vmax = 15.0 mmol/min/mg and the initial velocity = 8.6 mmol/min/mg. Suppose the substrate concentration is 0.80 mM. **(15 Marks)**

a. Give the Michaelis-Menten equation and define each term in it. Does this equation apply to all enzymes? If not, to which kind does it not apply and kinetic data suitable for this enzyme?

b. Calculate the Km of the enzyme for this substrate. Show units.

c. Of the six curves labeled in the Lineweaver-Burk graph below, three represent the effects of 0 mM, 5 mM, and 15 mM of a competitive inhibitor on a hypothetical enzyme. Which of the curves most likely represents the 15-mM concentration of the competitive inhibitor?



III (*10 Marks)*

a. You eat much red meat and when measure uric acid level it appeared to be higher than normal value. First mention how your body regulate high rich protein meal then mention how enzyme inhibitor used to treatment uricemia **(5 Marks)**

b. Give an account on enzymes used in diagnosis of acute myocardial infarction and enzyme used in treatment blood clotting. **(5 Marks)**

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

1. If the degree of inhibition of an enzyme is unaffected by the concentration of substrate we say that
   a. competitive inhibition exists.
   b. anti-competitive inhibition exists.
   c. pure noncompetitive inhibition exists.
   d. uncompetitive inhibition exists.

أنظر خلفه

2. The induced fit model is best described by which of the following statements?
   a. As a substrate begins to bind to an enzyme, the enzyme induces a conformational change in the structure of the substrate allowing it to tightly bind to the enzyme.
   b. The presence of a substrate in solution causes a conformational change in the shape of an enzyme.
   c. Enzymes are rigid structures, so the induced fi t model has been discredited.
   d. The binding of a substrate to an enzyme causes the enzyme to change shape, tightly binding the substrate.

3. One way that enzymes can act to catalyze a reaction is by
   a. lowering the activation energy for the reaction.
   b. lowering the standard reduction potential for a reaction.
   c. raising the standard reduction potential for a reaction.
   d. raising the activation energy for a reaction.
   e. lowering the binding energy for a reaction.

4. A cofactor can be best described as
   a. an inorganic compound that inhibits substrate binding.
   b. an inorganic compound that promotes substrate binding.
   c. an inorganic or organic compound that activates an enzyme.
   d. an organic substrate that promotes the binding of an additional substrate.

5. An apoenzyme is
   a. an enzyme that does not require a cofactor.
   b. an enzyme that requires a bound cofactor.
   c. an enzyme that requires a cofactor, which is not bound.
   d. an enzyme that requires an organic cofactor.

6. In competitive inhibition
   a. a chemical called an inhibitor competes with the substrate for a binding site on the enzyme.
   b. a chemical called an inhibitor can bind to a substrate preventing the enzyme from doing so.
   c. a chemical called an inhibitor binds to the enzyme-substrate complex, preventing the reaction from going forward.
   d. a chemical called an inhibitor binds to a product molecule after an enzyme mediates reaction, and reverses it.

7. All of the following statements about allosteric enzymes are true except:
   a. allosteric enzymes usually contain more than one subunit
   b. allosteric enzymes display Michaelis-Menten kinetics
   c. allosteric enzymes are often subject to feedback inhibition
   d. allosteric enzymes are often regulated by ligands binding to sites different than the active sites
   e. allosteric effectors can act to either increase or decrease affinity for substrate at the active sites

8. Which of the following statements describes most accurately enzyme behavior?
   a. Enzymes do not participate in biochemical reactions.
   b. Enzymes are not consumed in the reactions they catalyze.
   c. Enzymes are required at concentrations higher than those of reactants.
   d. Enzymes modify the equilibrium constants of chemical reactions.

9. Which of the following are true of enzyme catalysts:
    a. They change the equilibrium constant of a reaction to favor the formation of products.
    b. To be effective, the enzyme concentration must exceed the substrate concentration.
    c. Enzymes decrease the activation energy for conversion of substrate to product.
    d. Enzymes increase the rate of a reaction by adding energy to the substrates.
    e. Enzymes may be made of protein or RNA.

10. Which one of the following statements correctly describes allosteric enzymes?
    a. Effectors may enhance or inhibit substrate binding
    b. They are not usually controlled by feedback inhibition
    c. The regulatory site may be the catalytic site
    d. Michaelis-Menten kinetics describe their activity
    e. Positive cooperativity occurs in all allosteric molecules except hemoglobin

Good luck

Examiner: Prof Dr: Ibrahim Helmy

Mansoura university
Faculty of science
Chemistry Department
Subject : Biochem.374
Course : Water & Minerals Metabolism

First Term Exam 2015 / 2016
Third Level Biochem Students
Date : 18 Jan, 2016
Time Allowed : 2 hours
Total Mark : 60 Marks

Answer the following questions
Provide your answer with formula, equations, pathways, figures or tables wherever possible

Q1: Write briefly on the following: **[20 Marks]**

1) Etiology of metabolic alkalosis and respiratory acidosis.
2) How you can correct calcium level?
3) Function of magnesium.
4) Phosphate binder.
5) Role of hormonal effect on Ca-Metabolism.

Q2: Give an account on the following: **[20 Marks]**

1. Etiology of hypo/hypernatremia.
2. Hypo/hypermagnesaemia.
3. Iron-sulfur clusters.
4. Iron transport, storage and cellular uptake.
5. Lactic acidosis.

Q3- Put (√) for right sentence and put (X) for wrong sentence: [20 marks]

1- Respiratory acidosis is due to decreased ventilation of the pulmonary alveoli, leading to elevated arterial carbon dioxide concentration ($PaCO_2$).
2- Hypercapnia and respiratory acidosis occur when impairment in ventilation occurs and the removal of CO_2 by the lungs is less than the production of CO_2 in the tissues.
3- Aldosterone inhibits both reabsorption of Na+ and excretion of K+ in the late distal tubule.
4- Hyperirritability, means that increased neuromuscular exactability because Mg competitively initiates the entry of Ca into neuron.
5- Mg deficiency should suspected to patients with hyperkalaemia and hypercalcaemia.
6- The ADH acts on the kidneys to increase renal water reabsorption.
7- K+ depletion is a common in metabolic acidosis.
8- Hypercapnia leads to respiratory acidosis while hypocapnia is related to respiratory alkalosis.
9- Primary hypophosphatemia is the most common causes of nonnuritional rickets.
10- Copper deficiency can sometimes be leads to iron-deficiency anaemia.
11- During acidosis, leads to decreases the oxygen affinity of Hb in the blood.
12- During acidosis, causes partial lipid breakdown and destructive oxidative cascades, accelerating free radicals damage of the cell walls and intracellular membrane.
13- Acidosis is the first step towards premature aging, interfering with eyesight and memory.
14- Deep breathing decreases H^+ concentration by elimination of acidic CO_2.
15- During shallow breathing, increases H^+ concentration by in the blood because of retention of acidic CO_2.
16- With prolonged acid loads and long standing academia, bone releases calcium carbonate ($CaCO_3$) and calcium phosphate ($CaPO_4$) can contributes and leads to bone demineralization and osteoporosis.
17- A normal anion gap with low HCO_3 and high serum Cl^- indicates metabolic acidosis.
18- The delta gap is the difference between the patient anion gap and the normal anion gap.
19- High serum retinal concentration are more likely to be iron-deficiency and anemia,
20- Hypermagnesemia is caused by excessive Mg intake.

Good Luck **Prof. A.F. Abdel-Aziz**

Mansoura University

Faculty of Science- Chemistry Department
Subject: Physical Chemistry. Chem. 341

Course (s): Electrochemistry

Program: Chemistry-Biochemistry

Third Level

Date : January 2016

Time Allowed : 2 hours

Full Mark : 60 Mark

Answer All Questions الأسئله على الوجهين

First Question : **(20 Mark)**

[A] Give reason : **(12 Mark)**

(1) Amalgam electrode sometimes is preferred than the metal electrode.

(2) Glass electrode is preferred than other electrodes for measuring solution pH.

(3) Le Clanche cell is irreversible.

(4) Selecting Pt electrode as the best choice for the standard hydrogen electrode.

(5) Deposition of transition metals (Ti, Zr, Ta) from their aqueous baths is impossible.

(6) Concentration polarization η_c decreases with raising temperature and stirring.

[B] Discuss in Detail: Activation overpotential for polarized electrode and the Tafel equation. **(8Mark)**

Second Question : **(20 Mark)**

[A] Complete : **(8 Mark)**

(1) Overvoltage η is the difference between ..... and .....

2) Ohmic overpotential originate as a result of .....

3) In the le Clanche' cell, the anode is .....and the cathode is.....and its reaction is.....

4) Maxwell distribution law is.....

5) In lead accumulator sulphation means.....

6) Reversible processes are characterized with..... i_o and .....overpotential, while irreversible processes are characterized with..... i_o and .....overpotential.

[B] Discuss the following : **(12 Mark)**

1) Liquid junction potential.

2) Metal insoluble oxide electrode.

3) Gas electrodes.

4) Oxygen overpotential.

Third Question : **(20 Mark)**

[A] **Taking :** $E^{o}_{Cu^{2+}/Cu} = 0.337$ V ; $E^{o}_{Zn^{++}/Zn} = -0.76$ V ; $\partial E/\partial T = 4.18$ V/ deg

construct a cell of the electrode pair, write electrode and cell reactions and calculate at 25°C:

E^{o}_{cell} , ΔG^{o}, equilibrium constant K ; Δ H ; Δ S **(6 Mark)**

[B] Tick (√) or (X) **(6 Mark)**

1) The rate of diffusion is directly proportional to concentration difference ($c_b - c_e$) and thickness of the diffusion layer δ. ( )

2) The number of electron transfer in an electrochemical process (n) is almost different from the oxidation number (z). ( )

3) The effective concentration (thermodynamic concentration) is molality. ( )

4) The exchange current i_o is the net current during polarization. ( )

5) Activity coefficient (γ) can be determined by using chemical cell without transference. ( )

6) For KCl solution the anion transport and cation transport number each equal. ( )

[C] Write on electrolyte concentration cells with transference. **(8 Mark)**

Good Luck

Prof.Dr. Abdel-Aziz E. Fouda **Prof.Dr. Ahlam M. Helmy**

Mansoura University
Faculty of Science
Chemistry Department
Subject: Chemistry
Course(s): Hormones
Biochem 372

3rd Level Biochemistry Students
Date : Jan. 2016
Time Allowed : 2 hours
Full Mark: 60 Marks

ANSWER THE FOLLOWING QUESTIONS

I. Do as shown between the brackets: [25 Marks]

a) Hyposecretion of growth hormone causes ....., while the deficiency of vasopressin leads to .....which it's secretion is influenced by ..... , ..., ... (complete)
b) Chemical Diversity of Hormones (Discuss with structures)
c) Hormone Response Element (Describe)
d) Proopiomelanocortin (describe with a schematic diagram it's cleavage products)
e) JAK-STAT signaling pathway (Define)

II. [25 Marks]

a) Describe the mechanism of hormonal action of the Steroid and Non-steroid Hormones.

b) State the factors affect the concentration of the hormone at the target cell as well as the factors that affect the actual response of the target cell.

III. *State whether the following statements are TRUE or FALSE and correct the false one(s)* [10 Marks]

1. Growth hormone is a lipophobic hormone and requires kinase or phosphatase cascade as a second messenger. ( )
2. Pitutary gland is the bridge between nervous system and endocrine system. ( )
3. Thyroid stimulating Hormone is a tri peptide formed of the following amino acid sequence (pyro)Glu-Pro-His-NH2. ( )
4. In males, luteinizing hormone stimulates the Leydig cells of the testes to synthesize the male sex hormone, testosterone. ( )
5. Insulin has a heterodimeric structure with two interchain and one intrachain disulfide bridges ( )
6. Aldosterone stimulates K+ and water reabsorption from the gut, salivary and sweat glands. ( )
7. Somatostatin acts on the posterior lobe of the pituitary to stimulate the release of growth hormone (GH) and inhibit the release of thyroid-stimulating hormone (TSH) ( )
8. Parathyroid hormone enhances the absorption of sodium in the intestine by increasing the production of activated vitamin D. ( )
9. Follicle-Stimulating Hormone is a heterodimeric glycoprotein consisting of an alpha chain of 118 amino acids and a beta chain of 92 amino acids. ( )
10. Amylin inhibits the secretion of glucagon and reduces the level of blood glucose ( )

Best wishes for our dear students,

Dr. Amr Negm