

OLABISI ONABANJO UNIVERSITY

BIOCHEMISTRY DEPARTMENT

REMO CAMPUS, IKENNE

2016/2017 HARMITTAN SEMESTER EXAMINATION

Course Code: BCH 405 Course Title: Metabolic Regulation

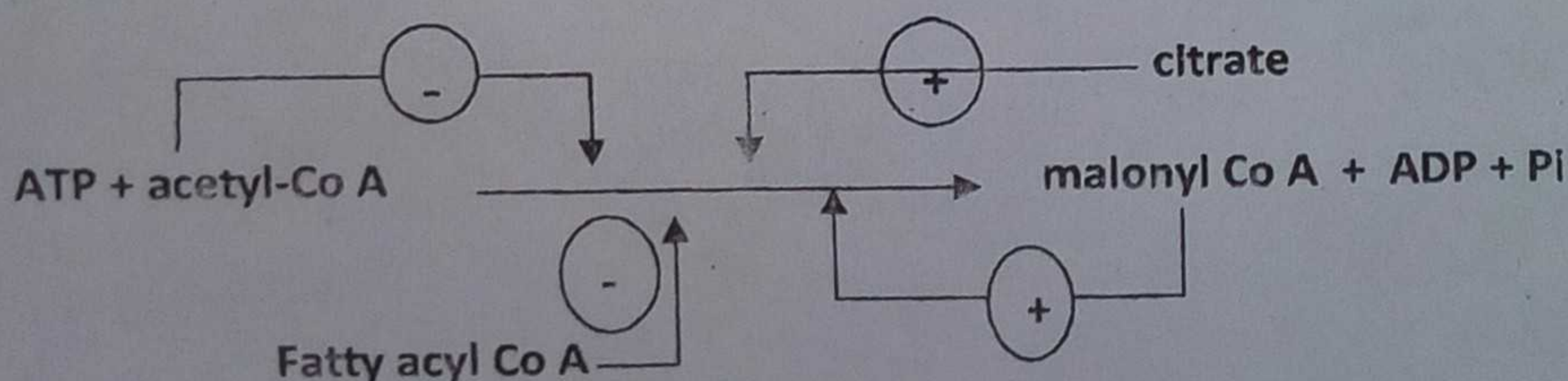
Time Allowed: 2 hours

Instruction: Answer question ONE and any other Two questions

Date: 01/03/2017

- (1) (a) List six general ways by which enzyme activity is controlled
- (b) In an enzyme assay experiment for the enzyme Michaela, it was observed that when the initial velocity measurements of an enzyme catalysed reaction was plotted against substrate concentration the slope ($dv/d[S]$) was small near the origin but rapidly increased when a particular low substrate concentration is reached such that a relatively small increase in substrate concentrations produced a large increase in velocity. However, at higher substrate concentrations, the velocity levels ought to approach asymptotically a maximum velocity.
- (i) sketch this curve described above for the enzyme michaelase
- (ii) What other properties do you expect michaelase to exhibit
- (iii) What do you understand by the term cooperativity hence distinguish between positive and negative cooperativity
- (iv) Give an example of an allosteric effector that acts via a (α) positive feedforward effect and (β) negative feedback effect

2 (a) The scheme below is showing the reaction catalysed by acetyl Co A carboxylase in de novo Fatty acid Synthesis.



Using the following terms (negative homotropic effector, negative heterotropic effect, positive heterotropic)

effector, negative feedforward control, positive feedback control) (i) select which ten appropriately describes

the role of citrate, ATP, ADP on the enzyme, acetyl Co A carboxylase

(b) Name any three proteins that are subject to control by mechanism of zymogen activation

(c) Show how chymotrypsinogen is activated to α -chymotrypsin. ✓

3. (a) HMG CoA reductase is the enzyme that catalyses the rate-limiting step in cholesterol biosynthesis. Give the different regulatory strategies that is utilised to regulate the body pool of cholesterol ✓

(b) The cAMP formed by adenylyl cyclase does not persist because 5'-phosphodiesterase activity prevalent in cells hydrolyzes cAMP to give 5'-AMP. However, caffeine inhibits 5'-phosphodiesterase activity. Discuss the effects on glycogen phosphorylase activity that may arise as a consequence of drinking lots of caffeinated coffee. ✓ Caffeine

(4) (a) What are isoenzymes? Give examples of isoenzymes that (i) are present in different parts of a cell (ii) occur in different cells (iii) are present in different proportions in different tissues

(b) Sketch the different tissue distribution pattern of a named isoenzymes you are familiar with and give the property of this isoforms that is employed in controlling metabolic regulation ✓

(5) Compare and contrast the Daniel Koshland and the Monod-Wyman-Changeux models of enzyme cooperativity

Concerted is one that is an oblique way of reasoning