

## MCB102 Fall 2014 Exam 2 Answers

- 30 kJ/mol (Missing or wrong units: -1, Wrong sign: -1)
  - Electrons flow toward pyruvate. -27 kJ/mol (Missing or wrong units: -1, Wrong sign: -1)
  - Glyceraldehyde 3-phosphate. Triose phosphate isomerase.
  - acetaldehyde and carbon dioxide. Pyruvate decarboxylase.  
Thiamine pyrophosphate
  - hexokinase, fructose 6-phosphate, fructokinase, fructose 1-phosphate
  - glucose 6-phosphate and NADP<sup>+</sup>. (NAD<sup>+</sup>/NADP/NADH no credit) Glucose 6-phosphate dehydrogenase.
  - 6-phosphogluconolactone and NADPH + H<sup>+</sup>. (NADH no credit)
  - Pyruvate carboxylase  
PEP carboxykinase,  
fructose biphosphatase-1 (FBPase-1)  
glucose 6-phosphatase.
    - FBPase-1
    - glucagon
    - fructose 2,6-bisphosphate
  - glycogenin
    - UDP-glucose
    - Tyrosine
    - G<sub>m</sub> and PP1 inhibitor (Inhibitor 1 or I protein)
    - glucose 6-phosphatase, liver
  - aconitase
    - an iron-sulfur cluster
    - GTP (or ATP)
    - FADH<sub>2</sub>
    - reaction number 4, isocitrate dehydrogenase
    - ATP
    - phosphofructokinase-1 (PFK-1)
  - triacylglycerols
    - lipases
    - perilipin
    - medium chain acyl dehydrogenase
  - glutamine synthetase  
(not glutamine synthase)
- $\text{Glutamate} + \text{NH}_4^+ + \text{ATP} \rightarrow \text{ADP} + \text{P}_i + \text{glutamine}$
- bicarbonate + ammonia + 2 ATP → carbamoyl phosphate + 2 ADP + 2 P<sub>i</sub>
  - methionine synthase (not synthetase)  
malonyl-CoA mutase
  - succinate dehydrogenase, 2, coenzyme Q (or ubiquinone)

15. a. The subscript o indicates that  $F_o$  is inhibited by oligomycin.  
 b. The C subunits of F-ATP synthase differ in number between different classes of organisms.
16. superoxide dismutase, glutathione peroxidase, and glutathione reductase (in that order).
17. X = p680 Y = p700 Z = ferredoxin
18. Antimycin A probably inhibits the Cytb<sub>6</sub>f complex, since it is similar to Complex III of oxidative phosphorylation, which is inhibited by antimycin A.
19. No, DCMU does not affect cyclic photophosphorylation, because DCMU only blocks the transfer of electrons from photosystem II (from plastoquinone B) to the Cytb<sub>6</sub>f complex or Fd to Cytb<sub>6</sub>f transfer of electrons. Cyclic photophosphorylation only requires photosystem I.
20. a. RUBISCO  
 b. ribulose 1,5-bisphosphate  
 c. Condition = light; Enzyme = RUBISCO activase
21. a. transketolase  
 b. erythrose 4-phosphate and xylulose 5-phosphate
22. Acetyl-CoA carboxylase, biotin, citrate, palmitoyl-CoA
23. a. 3-phospho-5-pyrophosphomevalonate  
 b. isopentenyl pyrophosphate,  $P_i$  and  $CO_2$
24. a. A = uric acid (urate is OK) B = allantoin  
 b. urate oxidase  
 c. allantoin is more soluble than urate, which can precipitate as sodium urate and cause gout. It is adequate to say that allantoin is more soluble than uric acid or urate or buildup of A causes gout.
25. a. dUMP and  $N^5, N^{10}$ -Methylene tetrahydrofolate  
 b. 5-fluorodeoxyUMP  
 c. a mechanism-based or suicide inhibitor