Dr. Nafez material

Q1: most of the ATP made during catabolism is generated during :

A) 1st stage of catabolism

B) 2nd stage of catabolism

C) 3rd stage of catabolism

C

Q2-One of the protein complexes of electron transport chain does not span the inner mitochondrial membrane:

a- NADH dehydrogenase

b- Cytochrome C reductase

c- Coq-Cytochrome C dehydrogenase

d- Succinate dehydrogenase

D

Q3- Dinitrophenol was a drug used for weight loss, which of the following molecules does it resemble the most?

a-Thermogenin

b-Rotenone

c-Antimycin

d-CO

A

Q4- Calculate standard ΔG for phosphoglucomutase reaction that is involved in glycogen synthesis .

Reaction	ΔG° (kcal)
Glucose → Glucose-6-p	3.3
Glucose → Glucose-1-p	5

a-8.3 kcal

b-1.7 kcal

c-(-2.3) kcal

d-2.3 kcal

B

Q5-Calculate standard ΔG for the ethanol metabolism reaction that is catalysed by alcohol Dehydrogenase: (F = 23 kcal/volt)

Reaction	ΔE°
acetaldehyde→ Ethanol	-0.2
$NAD^+ \rightarrow NADH$	-0.32

a-(-5.5 kcal)

b-11 kcal

c-(-2.25) kcal

d-2.25 kcal

A

Q6- A scientist made an experiment on mitochondria, he added antimycin, and then added an acid that lowered the PH. What is expected to happen?

a-ATP synthesis will be observed

b-Electrons from FADH2 will reach oxygen

c-Cytochrome a3 will be in the reduced form

d-Oxidation of NADH will continue

A

Q7-Which of the following can be used to reduce the loss of hemoglobin in degradation of RBCs?

a-Complexing it with α2- macroglobulin

b-Binding to Albumin

c-Complexing it with Haptoglobin

d-Removing copper from diet

C

Q8- Which of the following is correct regarding Oligomysin:

a-It permits H+ transport through mitochondrial membrane

b-It binds to complex 2 of the electron transport chain

c-It binds to the catalytic subunit of ATP synthase without inhibiting the transfer of electrons

d-It inhibits ATP synthesis and the oxidation of NADH

D

Q9-Which of the following is true about CoQ:

a-It is highly hydrophilic

b-It can accept one or two electrons

c-It can move freely in the cytosol

d-All statements are true

B

Q10- Decrease in Which of the following may cause lung disease?

a-Albumin

b-α1 fetoprotein

c-Haptoglobin

d-α1 antitrypsin

D

Q11- A patient has low levels of plasma proteins. Tests showed that his liver isn't damaged, and his parathyroid gland is working well. Which of the following regarding the patient's condition could be true?

a-The total plasma calcium level is normal

b-There is a prolonged period of blood clotting

c-Albumin is found in the urine

d-Skin is abnormally red and hot

C

Q12- A glucose molecule ends up as X acetyl CoA. They produce after entering TCA Y NADH, Z GTP and P FADH2.

a-X = 2. Y= 3. Z= 1. P=1.

b-X = 3. Y= 6. Z= 3. P=3

c-X = 1. Y= 6. Z= 2. P=2

d-X = 2. Y= 6. Z= 2. P=2

D

Q13 -GTP in citric acid cycle is produced by :

a-Oxidative phosphorylation

b-Substrate level phosphorylation

c-Active phosphorylation

d-Transfer of phosphate from ATP

B

Q14 -What determines the rate of oxidative phosphorylation?

a-Availability of NADH

b-The type of tissue

c-Availability of ADP

d-None of the above

C

Q15- Which of the following is considered an inhibitor for both isocitrate dehydrogenase and α-ketoglutarate dehydrogenase?

a-ATP

b-NADH

c-ADP

d-A+B

D

Q16-Which of the following is true about albumin?

a-Its concentration in the blood is 25

b-It is made of 3 subunits

c-It has oligosaccharide chains

d-Low albumin/globulin indicates chronic liver disease

D

Q17- Which of the following is found mainly during inflammation?

a-Albumin

b-C-reactive protein

c-Prealbumin

d-Transferrin

B

Q18- If a reaction has negative ΔG then it has to be:

a-Exergonic

b-Exothermic

c-Endothermic

d-Endergonic

A

1-What is the standard free energy of the reaction if

delta E°=-10 mvolt, 2 electron transported, Faraday

constant=23 Kcal/volt??

Answer:

delta G°= -nf E°

-2*23*-10/1000

=0.46Kcal

2-ATP is the energy molecule of the cell because:

Answer: it has an intermediate energy value

من أسئلة د.نافذ السؤال اللي معطيك إنه في تفاعل صار بين مواد متفاعلة وناتجة بالأول تركيزهن

كان متساوي وعند الاتزان كان تركيز وحدة 6مرات قد الثانية وسألك كم دلتا G

عند نهاية التفاعل

من دون حساب لأنه نهاية التفاعل بكون متزن بتطلع صفر

3-Measure the change in the disorder of reactants and products is?

A-Delta G

B-Delta H

C-Delta S

D-Delta T

Answer: C

4-Which of the following that predict whether reactions is spontaneous or not:

A-Delta G•

B-Delta G

C-Delta H

D-Delta E

E-Delta E•

Answer: B

5-Delta G represents energy changes at constant temperature ,pressure and proton concentration:

A-True

B-False

Answer: B

6-Delta G=DeltaG• ,when:

A-R=0

B-[reactant]=0

C-[B]/[A]=0

D-In [B]/[A]=1

E-[B]/[A]=1

Answer: E

7-Which of the following pair is NOT true:

A-positive delta G—>endergonic

B-negative delta G—>exergonic

C-Delta G=Zero—>equilibrium and concentration ([A]=[B]) are equals

D-Delta G=don’t measure fast of reaction

Answer: C

8-In experiment electrons transferred =4 and ΔE°=10 mv calculate

ΔG°=?

Answer:0.92

Important note:

General rule: phosphorylation of an enzyme that increases the level of glucose will convert it into an active enzyme, while the phosphorylation of an enzyme which utilizes glucose will inhibit it.

(والعكس صحيح active بصير phosphorylation اي انزيم بيصنع غلوكوز اعمله)

9-True about ATP synthase :

1)Fo domain composed of 1 subunit.

2)F1 domain composed of 1 subunit.

3)H+ passes through fo to the mitochondrial

matrix.

Answer: H+ passes through Fo to the mitochondrial matrix.

10-What inhibits complex IV in electron transport chain?

1)Oligomycin.

2) Antimycin A

3) Cyanide

4) Rotenone

Answer: Cyanide

11-Wrong about ATP / ADP translocase:

A-contain single nucleotide binding site

B- exergonic process

C- inhibition of it lead to inhibition of cellular respiration

D- similar affinity to ADP and ATP

Answer: exergonic process

12-Which of these structures is oxidized by FAD?

1)succinate

2)succinyl coA

3)malate

4)alpha-ketoglutarate

Answer: succinate

13-Which of the following structures is activated by ADP?

1)phosphofructokinase

2)isocitrate dehydrogenase

3)pyruvate dehydrogenase

Answer: isocitrate dehydrogenase

14-What inhibits complex IV in electron transport chain?

Answer: CO,CN,N3-

15-What is the true if glutamate undergo transamination then by the enzyme glutamatendehydrogenase?

A-This require ATP

B- require NADH

C- net product is alpha ketoglutarate

D- Net product is ammonia

E- all of the above

Answer: C

16-What is the method that is discovered to decrease the obesity?

Answer: uncoupling of oxidation and phosphorylation in oxidative phosphorylation.

17-Which of these structures uses thiamine as a cofactor

Answer: alpha ketoglutarate dehydrogenase

18-What enzymes do decarboxylic reaction in TCA?

Answer: Alpha keto dehydrogenase and Iso-cetrate dehydrogenase

19-The converting sequence from succinate to oxaloacetate is?

Answer: Oxidation, hydration, oxidation

20-NADH energy is always?

Answer: 53 kjol

21-True about lactic acid fermentation?

Answer: it oxidizes NADH to NAD+

22-Delta G can be calculated for glycolysis by:

A)difference in potential energy between Glucose and pyruvate.

C)sum of Delta G for all reactions.

Answer: A+C are true

23- Cyanide inhibits which complex in TCA?

Answer: complex IV

24- Uncoupling in electron transport chain increases the following:

Answer: body thermogenesis.

25-Doesn’t produce NADH?

Answer: Succinate dehydrogenase.

26-Main purpose of TCA cycle?

Answer: Extraction of electrons

27-Wrong about H2O2?

Answer: produced by catalase

28-The enzyme that does not produce reactive oxygen species?

Answer: Catalase.

29-Krebs cycle graph and asks about rate limiting step:

Answer: Step 3

30-Inhibit ATP synthase directly:

Answer: Oligo-Mycin

31-Determines Respiratory rate:

Answer: level of ADP

32-An enzyme that doesn't produce NADH:

Answer:Succinate dehydrogenase

33-ATP yield if fumarase was inhibited (1 acetyl CoA enters the cycle):

Answer:7.5 moles

34-During oxidative phosphorylation ATP is synthesized by ADP and organic phosphate

A-true

B-false

Answer:B (maybe the correct is “synthesized from”)

37-Which of the following doesn’t contain iron sulfur center:

A-complex 1

B-complex 2

C-complex 3

D-complex 4

Answer:D

38-Which of the following will cause the highest loss of energy at ATP production.

A-CN

B-CO

C-N3-

D-Amytal

E-Antimycin A

Answer:D

هاي معلومات الي تحت رح يجي عليها اسئلة فركزوا عليهـــــا

The inhibitors:

1. Amytal and Retonone: inhibit complex I and therefore inhibiting CoQ but they don't affect complex II. (الأكثر تأثيراً)

2. Antimycin A : inhibits complex III

3. CN- , CO ,H2S , NaN3: inhibits electron transportation from complex 4 to the formation of oxygen , these inhibitors have **less** effect than the others .

39-Efficiency of krebs cycle :

Answer-90%

40-.A question about converting succinate to fumarate :

Answer: Utilize enzyme bounded to inner MM

-(ATPase synthase works due to conformational change of beta.)

42-Loss of co2 in TCA cycle >>

Answer:Isocitrate dehydrogenase + alpha-ketoglutarate

43-TCA cycle >>

Answer:3 NADH , 1 FADH2

44-which one of the following conditions decrease the oxidation of acetyl coA by the citric acid cycle:

A-a high availability of calcium

B-a high acetyl coA/ coA ratio

C-a low ATP/ADP ratio

D-a low NAD+/NADH ratio

Answer :D

45-which of the following does not included in TCA cycle:

A-alpha ketoglutarate to succinyl coA

B-pyruvate to acetyl coA

C-succinate to fumarate

D-malate to oxaloacetate

Answer:B

46-intermediate at TCA contain 4 carbon:

A-isocitrate

B-citrate

C-fumarate

D-alpha ketoglutarate

Answer:C

47-one of these reaction needs H2O:

A-fumarate to malate

B-malate to OAA

C-citrate to isocitrate

Answer:A

48-How many ATP is produced by TCA:

Answer: 2

49-.Iso citrate and alpha keto glutarate and citrate and succinyl coA structures and asks which statement is right:

Answer: Reaction making alpha ketoglutarate "رقمه كان ٢" from isocitrate "رقمه ٣"is rate limiting

50-a reaction with ATP yield in mitochondria = ATP yield in cytosol:

Answer:Oxaloacetate to malate

51-.Uncoupling oxidative phosphorylation:

Answer:Decrease body mass

52-NADH:

Answer:Source of electrons

53-it is an acute phase protein:

A) fibrinogen

B) transferrin

C) albumin

D) transthyretin

Answer: fibrinogen

54-NFKB functions:

A) while being in the cytosol

B) after translocated to the cytosol

C) stimulates Interleukin 1

D) activates gene transcription

Answer:activates gene transcription

55-Concentration of albumin =

Answer: 3.4-5 g/100 ml

103-doesn't cause emphysema:

A) SZ

B) MZ

C) FS

D) smoking

E) presence of methionine-sulfoxide at residue no. 358

Answer:MZ

56-prevents loss of hemoglobin in urine:

A) ceruloplasmin

B) haptoglobin

C) alpha1- antitrypsin

D) alpha1- fetoprotein

Answer:haptoglobin

57-Which of the following plasma protein has the higher molecular weight ?

a) Haptoglobin.

b) α1-antitrypsin.

c) α2-macroglobulin.

d) Albumin.

Answer:α2-macroglobulin.

58- The correct order of the amount (abundance) of the globulin plasma proteins is :

a) Albumin > α1 > α2 > ß > ɣ

b) ɣ > ß > α2 > α1 > albumin

c) Albumin > ɣ > ß > α2 > α1

d) ɣ > ß > α2 > α1

e) α1 > α2 > ß > ɣ

Answer:ɣ > ß > α2 > α1

59-if you have the following rxns and their delta G values at standard conditions

A + B --> C + Pi……Δ G^o = -43.0

ATP --> ADP + Pi…… Δ G^o = -30.5

The value of Δ G at standard conditions for the following RXN equals:

A + B + ADP ---> C + ATP

A) -73.5

B) +73.5

C) -12.5

D) +12.5

E) we can't find it out unless we have Keq

Answer: (-12.5)

60-If enthalpy change for a reaction is zero, then ΔG° equals to

a) -TΔS°

b) TΔS°

c) -ΔH°

d) lnkeq

Answer:-TΔS°

61-ΔG° is defined as the :

a) Residual energy present in the reactants at equilibrium

b) Residual energy present in the products at equilibrium

c) Difference in the residual energy of reactants and products at equilibrium

d) Energy required or released to reach equilibrium when]products[= [reactants]=1

Answer:D

62-For a reaction if ΔG° is positive, then

a) The products will be favored

b) The reactants will be favored

c) The concentration of the reactants and products will be equal

d) All of the reactant will be converted to products

Answer:The reactants will be favored

63-If ΔG‘° of the reaction A → B is -40kJ/mol under standard conditions then the reaction

a) Will never reach equilibrium

b) Will not occur spontaneously

c) Will proceed at a rapid rate

d) Will proceed from left to right spontaneously

Answer: Will proceed from left to right spontaneously

64-Which of the following statements is true ?

a) The reaction tends to go in the forward direction if ΔG is large and positive

b) The reaction tends to move in the backward direction if ΔG is large and negative

c) The system is at equilibrium if ΔG = 0

d) The reaction tends to move in the backward direction if ΔGo is large and positive

Answer:The system is at equilibrium if ΔG = 0

65-Putting an inhibitor of succinate dehydrogenase will cause a decrease in the concentration of:

A) citrate

B) pyruvate

C) isocitrate

D) fumarate

E) acetyl Co-A

Answer: D

66-During electron transport, protons are pumped out of the mitochondrion at

each of the major sites except for:

a) Complex I.

b) Complex II.

c) Complex III.

d) Complex IV.

e) Complex MIM (a.k.a. MCMXCIX).

Answer:Complex II.

67-Coenzyme Q is involved in electron transport

a) as a lipid-soluble electron carrier.

b) as a water-soluble electron donor.

c) as a covalently attached cytochrome cofactor.

d) as a water-soluble electron acceptor.

e) directly to O2.

Answer:as a lipid-soluble electron carrier.

68-The cytochrome c oxidase complex

a) accepts electrons from cyt c.

b) donates four electrons to O2.

c) produces 2 H2O per O2 reduced.

d) pumps 2 protons out of the matrix space.

e) All of the above are correct.

Answer:All of the above are correct.

69-Oxidative decarboxylations

a) do not occur in the TCA cycle.

b) involve loss of CO2 and the production of NAD.

c) involve loss of CO2 and the production of NADH.

d) involve loss of CO2 and the production of FADH2.

e) occur three times in the TCA cycle.

Answer:involve loss of CO2 and the production of NADH

70-The following is the sum of three steps in the citric acid cycle.

A + B + FAD + H2O → C + FADH2 + NADH

Choose the lettered answer that corresponds to the

missing “A”, “B”, and “C” in the equation.

Reactant A Reactant B Reactant C

A. Succinyl CoA GDP Succinate

B. Succinate NAD+ Oxaloacetate

C. Fumarate NAD+ Oxaloacetate

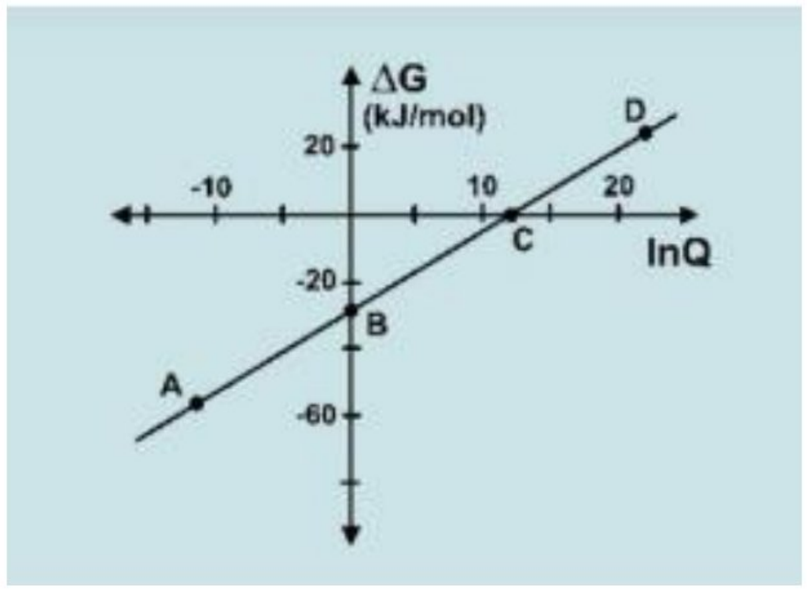
D. Succinate NAD+ Malate

E. Fumarate GTP Malate

Answer:Succinate NAD+ Oxaloacetate

71-Assuming Q is the ratio of product to reactant concentrations; which of the following graph points

represents accurately the equilibrium point?



a. Point A

b. Point C

c. Point D

d. Cannot be known from the information given, so

can be any of the above points

e. Point B

B

72-A patient presents with blood in the urine (hematuria). You wish to assess whether this patient has a

hemoglobinuria or a myoglobinuria (hemoglobin or myoglobin in urine). A blood test for one of these

proteins should help you to arrive at the correct conclusion.

a. Hemoglobin

b. Transferrin

c. CRP

d. α1-antitryptsin

e. Haptoglobin

E

73-For a redox reaction experimented in the lab and involves the movement of four electrons, ΔEo was

measured to be - 0.10 V. Accordingly, the reaction at standard conditions would have a free energy

difference of:

a. 4.7 kCal/mol

b. 0 kCal/mol

c. 94.4 kCal/mol

d. -9.4 kCal/mol

e. 9.4 kCal/mol

D

74-The complex in electron transport chain that DOES NOT have a direct link to coenzyme Q in

some form is:

a. Cytochrome c oxidase

b. Complex III

c. Complex II

d. Succinate dehydrogenase complex

e. Complex I

A

75-After a traffic accident, a 34-year-old lady was admitted to the intensive care unit (ICU) for

monitoring. On the second day of admission a blood sample was taken and sent to the laboratory for biochemical analyses. He liver function and renal function test were normal. The following findings would be consistent with: Albumin 30 g/L (reference 35-45 g/L), C-reactive protein 68mg/L (reference < 10 mg/L), plasma immunoglobulin levels normal.

a. Chronic infection

b. Acute nutritional deficiency

c. Liver cirrhosis

d. Acute phase response to injury

e. Nephrotic syndrome

D

76-Which of the following is TRUE considering TCA cycle?

a. If citrate is very high in concentration, TCA cycle will run less effectively

b. When oxidation occurs, an accompanying decarboxylation takes place

c. The overall ΔG is considered zero at physiological conditions

d. ADP is an allosteric activator for 2 of the three dehydrogenases included

e. All enzymes are allocated within the mitochondrial matrix

A

77-Consider the TCA cycle reaction that produces oxaloacetate has a ΔGo = 0.1 kCal/mol. (0.001) M

of each compound is mixed & the reaction is allowed to come to equilibrium. Accordingly, which

statement is CORRECT about the resulting concentration of niacins at equilibrium?

a. [NAD+] ≥ [NADH]

b. [NAD+] > [NADH]

c. [NAD+] < [NADH]

d. [NAD+] = [NADH]

e. Cannot be determined from the information provided

B

78-Which one of the following reaction would you expect to be exergonic?

a. Decarboxylation

b. Condensation

c. Transamination

d. Carboxylation

e. Phosphorylation

A

79-Which statement is CORRECT considering ATP generation in the electron transport chain?

a. Entry of protons occurs through the F0 piece into the mitochondrial matrix.

b. The FO piece of the ATP synthase is composed of one subunit.

c. The Fl piece of the ATP synthase is composed of one subunit.

d. The FO piece of the ATP synthase binds ADP and Pi tightly before ATP synthesis occurs.

e. Conformational changes are minimal in the FO piece compared to the Fl piece.

A

80-During oxidative decarboxylation of a- ketogluterate, the following happens:

a. Oxidation of an acetate group

b. Addition of Coenzyme A to a 2-carbon fragment

c. Oxidation of NADH

d. Removal of 2 CO2 molecules

e. Oxidation of 2 thiol groups by FAD

E

81-Uncoupling in mitochondria refers to:

a. Stopping ATP synthesis but not stopping electron flow

b. Increasing the pH value inside the mitochondrial matrix

c. Blocking NADH electrons from entering the electron transport system

d. Interruption of electron flow

e. Stopping electron flow but not stopping ATP synthesis

A

82-After performing a serum electrophoresis, you noticed a dramatic decrease in all bands on the gel.

This would indicate:

a. Multiple myeloma

b. Analbuminemia

c. Kidney failure

d. Liver cirrhosis

e. Inflammation

C

83-Which of the following proteins you would expect to run faster (compared to others) in gel

electrophoresis?

a. Hemoglobin

b. Prealbumin

c. al-antitryptsin

d. Haptoglobin

e. Albumin

B