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BY TANU MAM

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TOPIC

BIOLOGICAL OXIDATION & ENZYMES

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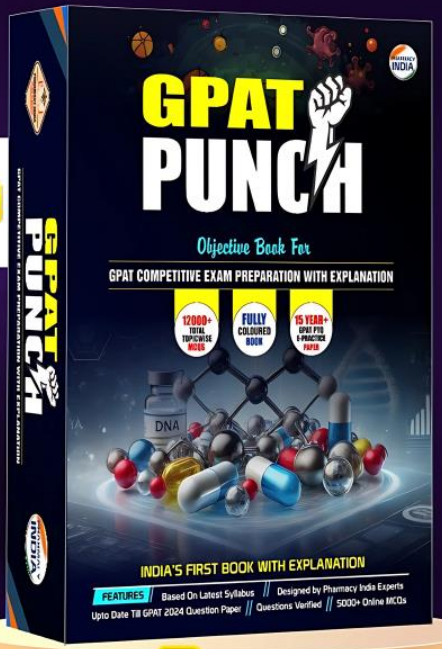
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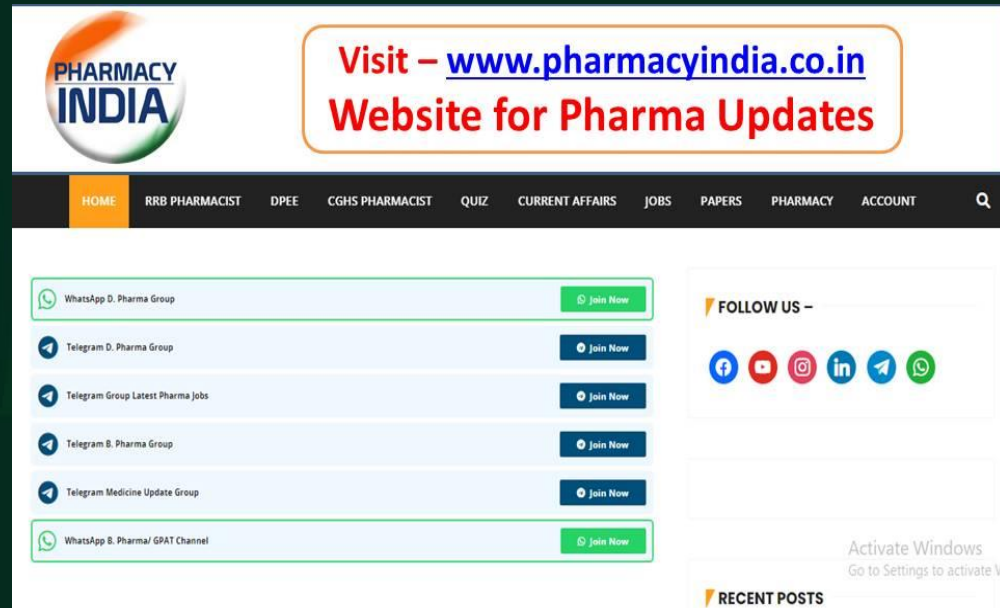
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1.

Which of the following is an example of a biological oxidation reaction?

- a) Reduction of NAD^+ to NADH
- b) Oxidation of glucose to pyruvate
- c) Reduction of oxygen to water
- d) Oxidation of NADH to NAD^+



1.

Which of the following is an example of a biological oxidation reaction?

- a) Reduction of NAD^+ to NADH
- b) Oxidation of glucose to pyruvate**
- c) Reduction of oxygen to water
- d) Oxidation of NADH to NAD^+



- a) **Reduction of NAD^+ to NADH :** This is a **reduction** reaction (NAD^+ gains electrons).
- c) **Reduction of oxygen to water:** This is a **reduction** reaction (oxygen gains electrons to form water).
- d) **Oxidation of NADH to NAD^+ :** This is an **oxidation** reaction, but it's not the one asked for in the question, as NADH is being oxidized to NAD^+ .

2.

In the electron transport chain, NADH is oxidized to form:

- a) ATP
- b) NAD^+
- c) Oxygen
- d) FADH_2



2.

In the electron transport chain, NADH is oxidized to form:

- a) ATP
- b) NAD^+**
- c) Oxygen
- d) FADH_2



- In the electron transport chain (ETC), NADH is oxidized to form NAD⁺ (nicotinamide adenine dinucleotide).
- During this process, NADH donates electrons to Complex I (NADH dehydrogenase), which is a key step in the ETC.
- The electrons are passed through various protein complexes, ultimately contributing to the generation of a proton gradient across the mitochondrial membrane, which drives ATP synthesis.

3.

Which of the following molecules acts as an electron donor in biological oxidation reactions?

- a) NADH
- b) Oxygen
- c) ATP
- d) NAD⁺



3.

Which of the following molecules acts as an electron donor in biological oxidation reactions?

- a) NADH
- b) Oxygen
- c) ATP
- d) NAD⁺



4.

The final electron acceptor in the mitochondrial electron transport chain is:

- a) Oxygen
- b) NADH
- c) FADH₂
- d) Cytochrome c



4.

The final electron acceptor in the mitochondrial electron transport chain is:

- a) Oxygen
- b) NADH
- c) FADH₂
- d) Cytochrome c



- The final electron acceptor in the mitochondrial electron transport chain is oxygen (O_2).
- Oxygen accepts electrons at the end of the chain and combines with protons (H^+) to form water (H_2O).
- This step is crucial because it prevents the backup of electrons in the chain and ensures the continuation of electron flow, allowing ATP production to proceed.

5.

What is the role of NAD^+ in biological oxidation reactions?

- a) Acts as a coenzyme in reduction reactions
- b) Acts as an electron carrier in oxidation reactions
- c) Donates electrons to the electron transport chain
- d) Acts as a substrate for ATP synthesis



5.

What is the role of NAD^+ in biological oxidation reactions?

- a) Acts as a coenzyme in reduction reactions
- b) Acts as an electron carrier in oxidation reactions**
- c) Donates electrons to the electron transport chain
- d) Acts as a substrate for ATP synthesis



6.

Which of the following is reduced during the glycolysis pathway?

- a) NADH
- b) FADH₂
- c) NAD⁺
- d) ATP



6.

Which of the following is reduced during the glycolysis pathway?

- a) NADH
- b) FADH₂
- c) NAD⁺
- d) ATP



- In the glycolysis pathway, NAD^+ is reduced to form NADH .
- This occurs during the oxidation of glucose, specifically in the step where glyceraldehyde-3-phosphate (G3P) is oxidized by the enzyme glyceraldehyde-3-phosphate dehydrogenase.
- NAD^+ accepts electrons and a proton to become NADH , which can later be used in the electron transport chain to produce ATP (if oxygen is present).

7.

In the Krebs cycle, which molecule is oxidized to produce CO₂ and ATP?

- a) Acetyl-CoA
- b) Glucose
- c) Pyruvate
- d) NADH



7.

In the Krebs cycle, which molecule is oxidized to produce CO₂ and ATP?

- a) Acetyl-CoA
- b) Glucose
- c) Pyruvate
- d) NADH



8.

Which of the following is a key enzyme involved in the reduction of NAD^+ to NADH ?

- a) Succinate dehydrogenase
- b) Lactate dehydrogenase
- c) Glyceraldehyde-3-phosphate dehydrogenase
- d) Cytochrome c oxidase



8.

Which of the following is a key enzyme involved in the reduction of NAD^+ to NADH ?

- a) Succinate dehydrogenase
- b) Lactate dehydrogenase
- c) Glyceraldehyde-3-phosphate dehydrogenase**
- d) Cytochrome c oxidase



9.

Which of the following is a product of the reduction of oxygen in the electron transport chain?

- a) Water
- b) Hydrogen peroxide
- c) Oxygen
- d) Carbon dioxide



9.

Which of the following is a product of the reduction of oxygen in the electron transport chain?

- a) Water
- b) Hydrogen peroxide
- c) Oxygen
- d) Carbon dioxide



10.

Which coenzyme is involved in the oxidation of fatty acids during cellular respiration?

- a) NAD^+
- b) FAD
- c) Coenzyme A
- d) ATP



10.


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- b) FAD**
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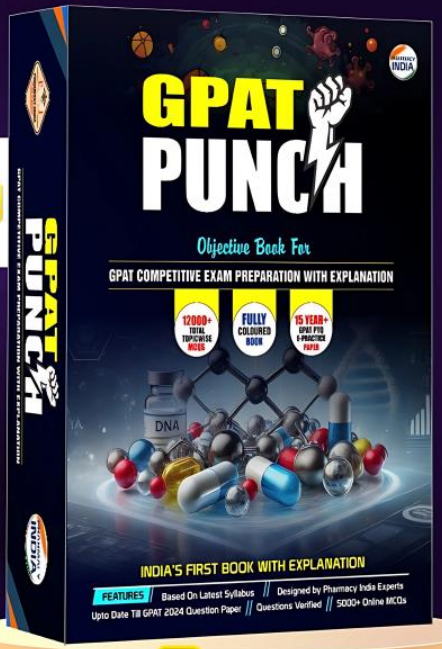
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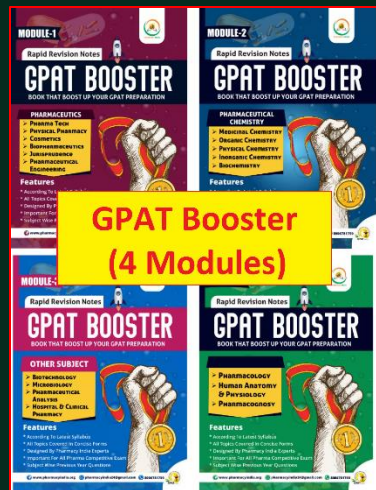
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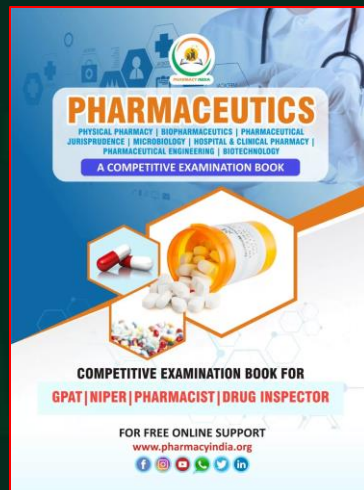
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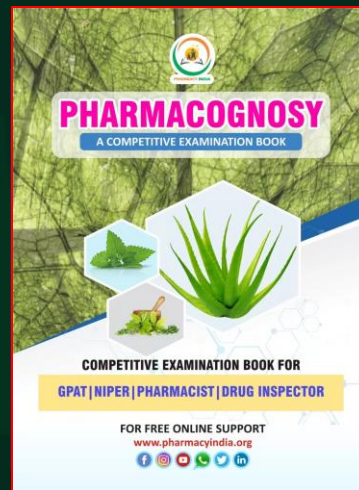


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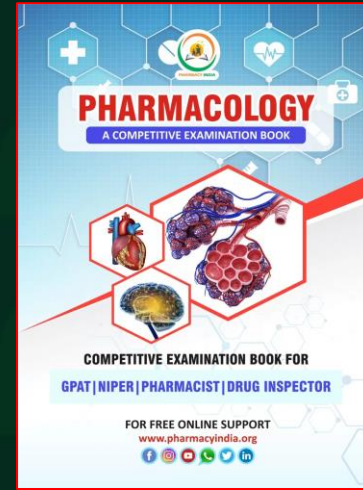
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11.

In the reduction of NAD^+ , NADH carries electrons from:

- a) The citric acid cycle
- b) Glycolysis
- c) The electron transport chain
- d) Both glycolysis and citric acid cycle



11.

In the reduction of NAD^+ , NADH carries electrons from:

- a) The citric acid cycle
- b) Glycolysis
- c) The electron transport chain
- d) Both glycolysis and citric acid cycle**



12.

Which of the following is a reduced form of flavin mononucleotide (FMN)?

- a) FMNH₂
- b) FMN
- c) NADH
- d) ATP



12.

Which of the following is a reduced form of flavin mononucleotide (FMN)?

- a) FMNH₂
- b) FMN
- c) NADH
- d) ATP



- FMN, which is a prosthetic group found in some enzymes, can accept electrons and be **reduced to FMNH₂** in various biochemical reactions, such as those in the electron transport chain where it acts as an electron carrier in Complex I.

13.

In the process of oxidative phosphorylation, what is directly produced by the proton gradient?

- a) ATP
- b) NADH
- c) FADH₂
- d) Oxygen



13.

In the process of oxidative phosphorylation, what is directly produced by the proton gradient?

- a) ATP
- b) NADH
- c) FADH₂
- d) Oxygen



14.

The reduction of NAD^+ to NADH involves:

- a) Gain of electrons
- b) Loss of electrons
- c) Gain of protons
- d) Loss of protons



14. The reduction of NAD^+ to NADH involves:

- a) Gain of electrons
- b) Loss of electrons
- c) Gain of protons
- d) Loss of protons



15.

Which of the following molecules is directly involved in the reduction of oxygen in the electron transport chain?

- a) Cytochrome c
- b) NADH
- c) Oxygen
- d) ATP



15.

Which of the following molecules is directly involved in the reduction of oxygen in the electron transport chain?

- a) Cytochrome c
- b) NADH
- c) Oxygen
- d) ATP



16.

Which of the following best describes the term "redox" in biochemistry?

- a) A process involving the transfer of electrons protons
- b) A process involving the addition of oxygen
- c) A process that generates ATP exclusively
- d) A process that produces only water



16.

Which of the following best describes the term "redox" in biochemistry?

- a) A process involving the transfer of electrons protons
- b) A process involving the addition of oxygen
- c) A process that generates ATP exclusively
- d) A process that produces only water



17.

The enzyme involved in the oxidation of ethanol to acetaldehyde is:

- a) Alcohol dehydrogenase
- b) Aldehyde dehydrogenase
- c) Cytochrome c oxidase
- d) Glutamate dehydrogenase



17.

The enzyme involved in the oxidation of ethanol to acetaldehyde is:

- a) Alcohol dehydrogenase
- b) Aldehyde dehydrogenase
- c) Cytochrome c oxidase
- d) Glutamate dehydrogenase



- The enzyme involved in the oxidation of ethanol to acetaldehyde is **alcohol dehydrogenase (ADH)**.
- This enzyme catalyzes the conversion of ethanol to acetaldehyde, with the reduction of NAD^+ to NADH .
- This reaction is the first step in the metabolism of alcohol in the liver.

18.

Which of the following complexes in the electron transport chain directly pumps protons (H^+) across the mitochondrial membrane?

- A) Complex I
- B) Complex II
- C) Complex III
- D) Complex IV



18.

Which of the following complexes in the electron transport chain directly pumps protons (H^+) across the mitochondrial membrane?

- A) Complex I
- B) Complex II
- C) Complex III
- D) Complex IV



19.

In the electron transport chain, which complex directly uses oxygen?

- a) Complex I
- b) Complex II
- c) Complex IV
- d) Complex III



19.

In the electron transport chain, which complex directly uses oxygen?

- a) Complex I
- b) Complex II
- c) Complex IV**
- d) Complex III



20.

Which molecule carries electrons from Complex I and Complex II to Complex III in the electron transport chain?

- A) Ubiquinone (Coenzyme Q)
- B) Cytochrome c
- C) Oxygen
- D) NADH



20.

Which molecule carries electrons from Complex I and Complex II to Complex III in the electron transport chain?

A) Ubiquinone (Coenzyme Q)

B) Cytochrome c


C) Oxygen

D) NADH



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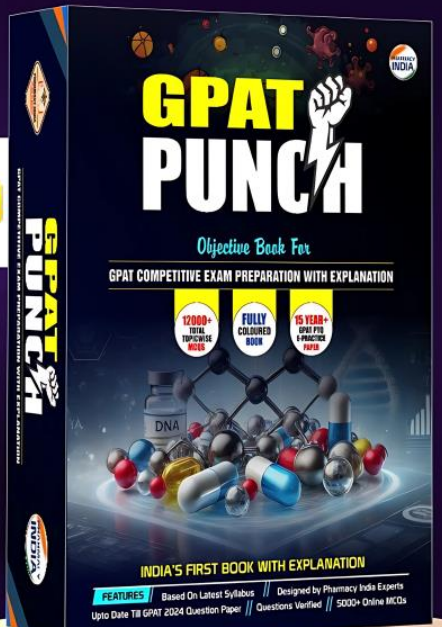
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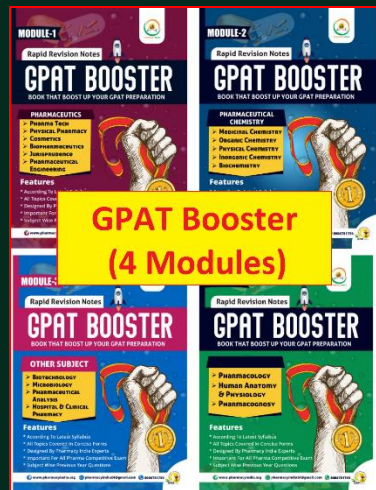
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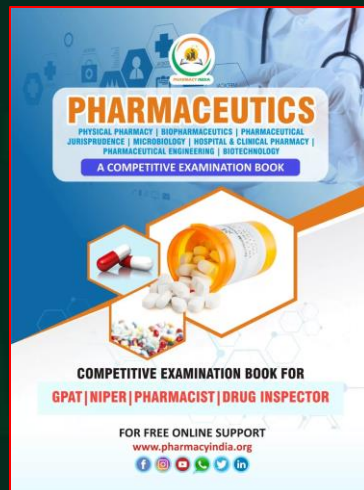
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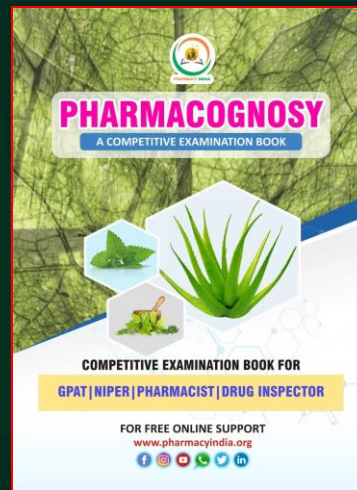


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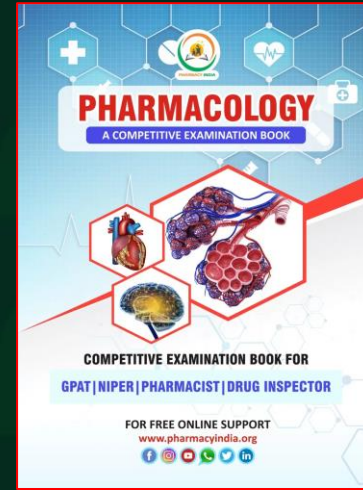
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21.

In the electron transport chain, FADH₂ donates electrons at which complex?

- A) Complex I
- B) Complex II
- C) Complex III
- D) Complex IV



21.

In the electron transport chain, FADH₂ donates electrons at which complex?

- A) Complex I
- B) Complex II**
- C) Complex III
- D) Complex IV



22.

Which of the following is oxidized during cellular respiration?

- a) Oxygen
- b) Glucose
- c) NAD^+
- d) Acetyl-CoA



22.

Which of the following is oxidized during cellular respiration?

- a) Oxygen
- b) Glucose**
- c) NAD^+
- d) Acetyl-CoA



23.

Which molecule serves as the primary electron carrier in the citric acid cycle?

- a) NADH
- b) FADH₂
- c) ATP
- d) Acetyl-CoA



23.

Which molecule serves as the primary electron carrier in the citric acid cycle?

- a) NADH
- b) FADH₂
- c) ATP
- d) Acetyl-CoA



24.

The proton gradient across the inner mitochondrial membrane is generated by which process?

- A) ATP synthesis
- B) Electron transport and proton pumping
- C) Glucose breakdown
- D) Pyruvate decarboxylation



24.

The proton gradient across the inner mitochondrial membrane is generated by which process?

A) ATP synthesis

B) Electron transport and proton pumping

C) Glucose breakdown

D) Pyruvate decarboxylation



25.

Which of the following enzymes catalyzes the reduction of hydrogen peroxide to water in cells?

- a) Superoxide dismutase
- b) Catalase
- c) Glutathione reductase
- d) Alcohol dehydrogenase



25.

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- a) Superoxide dismutase
- b) Catalase**
- c) Glutathione reductase
- d) Alcohol dehydrogenase



26.

In the electron transport chain, what is the main function of ATP synthase?

- a) Transfer electrons from NADH to oxygen
- b) Synthesize ATP from ADP and phosphate
- c) Pump protons across the inner mitochondrial membrane
- d) Convert FADH₂ to FAD



26.

In the electron transport chain, what is the main function of ATP synthase?

- a) Transfer electrons from NADH to oxygen
- b) Synthesize ATP from ADP and phosphate**
- c) Pump protons across the inner mitochondrial membrane
- d) Convert FADH₂ to FAD



27.

Which molecule acts as the electron carrier in the mitochondrial inner membrane?

- a) Cytochrome c
- b) NADH
- c) FADH₂
- d) ATP



27.

Which molecule acts as the electron carrier in the mitochondrial inner membrane?

- a) Cytochrome c
- b) NADH
- c) FADH₂
- d) ATP



28.

During the oxidation of fatty acids, which coenzyme is involved in the process of dehydrogenation?

- a) NAD^+
- b) FAD
- c) Coenzyme A
- d) ATP



28.

During the oxidation of fatty acids, which coenzyme is involved in the process of dehydrogenation?

- a) NAD^+
- b) FAD**
- c) Coenzyme A
- d) ATP



29. What is the net gain of ATP in glycolysis?

- a) 4 ATP
- b) 2 ATP
- c) 3 ATP
- d) 1 ATP



29. What is the net gain of ATP in glycolysis?

- a) 4 ATP
- b) 2 ATP**
- c) 3 ATP
- d) 1 ATP



30.

Which of the following is produced during the reduction of NAD^+ to NADH in the citric acid cycle?

- a) ATP
- b) FADH_2
- c) CO_2
- d) Electrons



30.


Which of the following is produced during the reduction of NAD^+ to NADH in the citric acid cycle?

- a) ATP
- b) FADH_2
- c) CO_2
- d) Electrons



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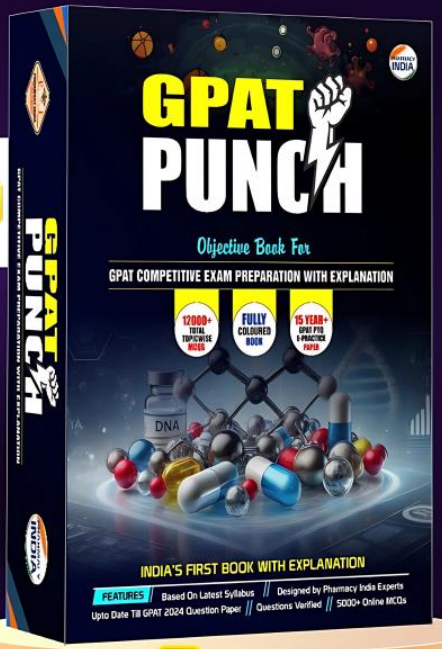
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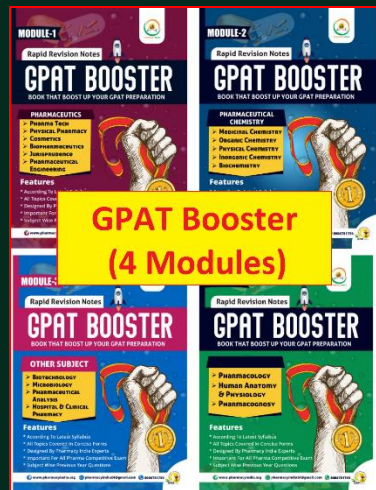
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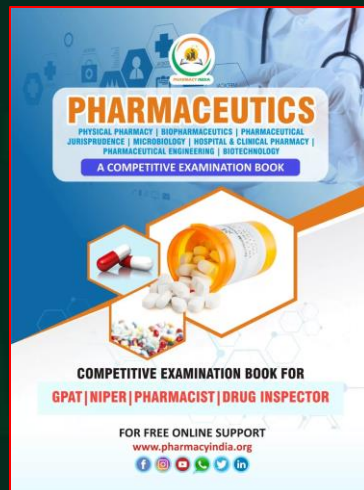
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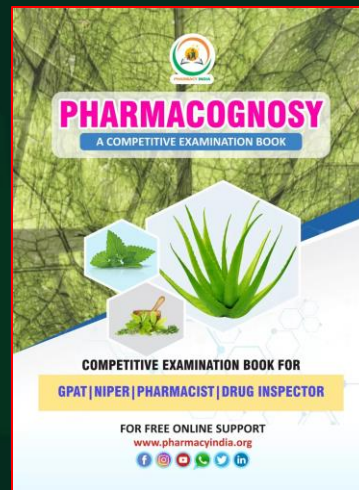


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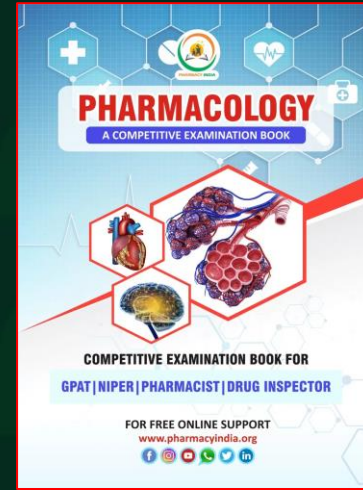
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31.

Which of the following describes a non-competitive inhibitor?

- a) It binds to the active site of the enzyme
- b) It decreases the enzyme's affinity for the substrate
- c) It binds to a site other than the active site
- d) It increases the reaction rate



31.

Which of the following describes a non-competitive inhibitor?

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- b) It decreases the enzyme's affinity for the substrate
- c) It binds to a site other than the active site**
- d) It increases the reaction rate



32.

Which enzyme class is responsible for the catalysis of redox reactions (oxidation-reduction)?

- a) Transferases
- b) Hydrolases
- c) Oxidoreductases
- d) Isomerases



32.

Which enzyme class is responsible for the catalysis of redox reactions (oxidation-reduction)?

- a) Transferases
- b) Hydrolases
- c) Oxidoreductases**
- d) Isomerases



33.

In the induced fit model of enzyme action, what happens when the substrate binds to the enzyme?

- a) The enzyme's active site becomes more rigid
- b) The substrate causes a change in the enzyme's shape
- c) The enzyme immediately releases the product
- d) The enzyme remains unchanged



33.

In the induced fit model of enzyme action, what happens when the substrate binds to the enzyme?

- a) The enzyme's active site becomes more rigid
- b) The substrate causes a change in the enzyme's shape**
- c) The enzyme immediately releases the product
- d) The enzyme remains unchanged



34.

What is the effect of increasing substrate concentration on enzyme activity at high substrate levels?

- a) The reaction rate increases indefinitely
- b) The reaction rate decreases
- c) The reaction rate levels off
- d) The enzyme becomes inactive



34.

What is the effect of increasing substrate concentration on enzyme activity at high substrate levels?

- a) The reaction rate increases indefinitely
- b) The reaction rate decreases
- c) The reaction rate levels off**
- d) The enzyme becomes inactive



35.

Which of the following statements is FALSE regarding enzyme specificity?

- a) Enzymes are highly specific for their substrates
- b) The shape of the enzyme's active site determines its specificity
- c) Enzymes can catalyze a wide range of substrates
- d) Enzyme specificity is governed by the enzyme's 3D structure



35.

Which of the following statements is FALSE regarding enzyme specificity?

- a) Enzymes are highly specific for their substrates
- b) The shape of the enzyme's active site determines its specificity
- c) **Enzymes can catalyze a wide range of substrates**
- d) Enzyme specificity is governed by the enzyme's 3D structure



36.

What is the term used to describe an enzyme that requires a metal ion to function?

- a) Apoenzyme
- b) Holoenzyme
- c) Coenzyme
- d) Prosthetic group



36.

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37.

Which of the following is an example of a zymogen (inactive enzyme precursor)?

- a) Pepsinogen
- b) Insulin
- c) Lactase
- d) Amylase



37.

Which of the following is an example of a zymogen (inactive enzyme precursor)?

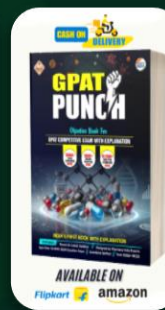
- a) Pepsinogen
- b) Insulin
- c) Lactase
- d) Amylase



38.

Which of the following is the role of ATP in enzyme-catalyzed reactions?

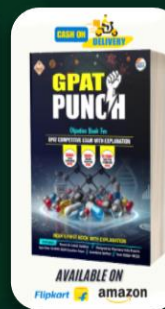
- a) To provide energy for substrate binding
- b) To act as a coenzyme in redox reactions
- c) To provide energy for enzyme activation or phosphorylation
- d) To act as a competitive inhibitor



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39.

Which of the following occurs when the temperature is increased beyond the optimum temperature of an enzyme?

- a) Enzyme activity increases
- b) The enzyme becomes denatured
- c) The enzyme's affinity for the substrate increases
- d) The enzyme becomes more specific



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40.

How does increasing substrate concentration affect enzyme activity at low concentrations of substrate?

- a) It has no effect on enzyme activity
- b) It increases the reaction rate
- c) It decreases the enzyme's specificity
- d) It decreases the rate of reaction



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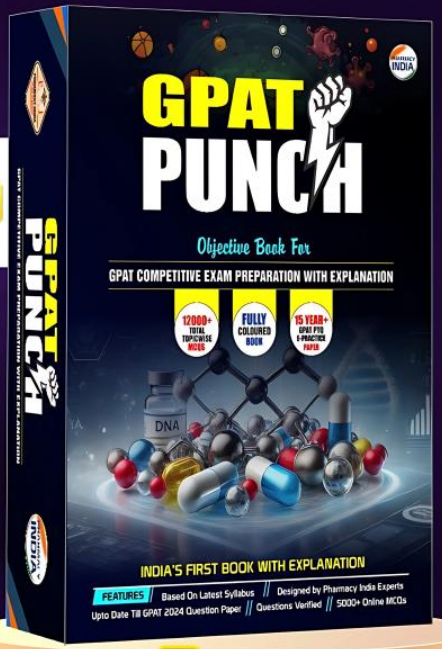
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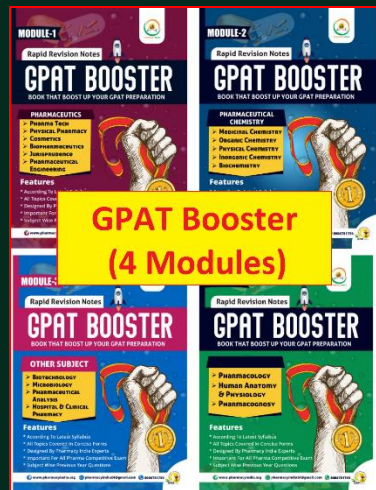
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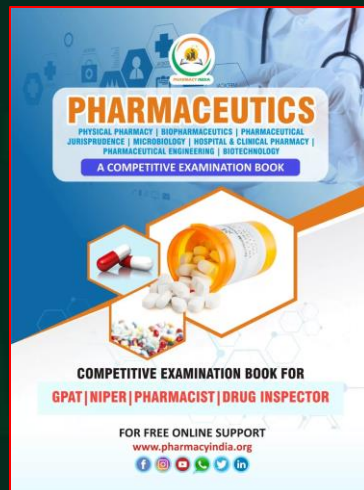
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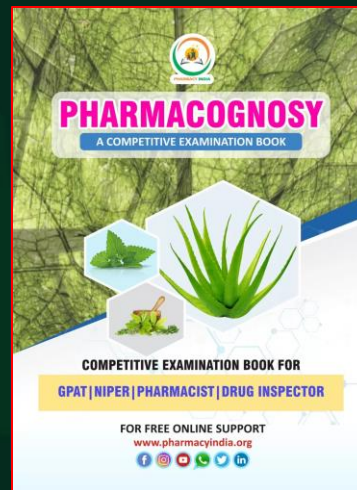
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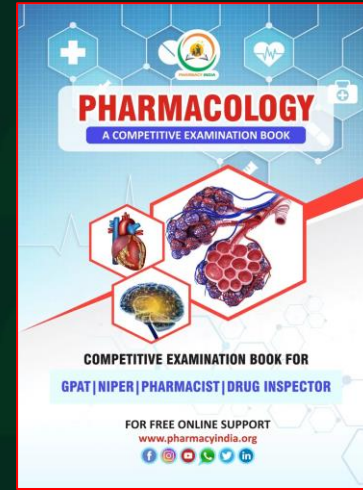
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41.

At high substrate concentrations, the rate of an enzyme-catalyzed reaction tends to:

- a) Increase continuously
- b) Decrease
- c) Level off or reach a maximum rate
- d) Stop completely



41.

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42.

Which of the following best describes the effect of pH on enzyme activity?

- a) Enzymes work best at all pH levels
- b) Each enzyme has an optimum pH range
- c) pH does not affect enzyme activity
- d) Increasing pH always increases enzyme activity



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43.

What happens when the pH is outside the optimal range for an enzyme?

- a) The enzyme's activity increases
- b) The enzyme becomes denatured or its activity decreases
- c) The enzyme works faster
- d) The substrate concentration increases



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44.

What is the effect of enzyme concentration on enzyme activity, assuming substrate concentration is in excess?

- a) Enzyme activity decreases
- b) Enzyme activity increases proportionally
- c) Enzyme activity is unaffected
- d) Enzyme activity fluctuates



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45.

Which of the following statements about enzyme inhibitors is correct?

- a) Enzyme inhibitors always increase the enzyme activity
- b) Enzyme inhibitors only act on substrate binding
- c) Enzyme inhibitors can decrease or stop enzyme activity
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46.

Which of the following types of inhibitors binds to the enzyme's active site, preventing the substrate from binding?

- a) Non-competitive inhibitor
- b) Competitive inhibitor
- c) Allosteric inhibitor
- d) Irreversible inhibitor



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47.

What is the effect of a non-competitive inhibitor on enzyme activity?

- a) It competes with the substrate for the active site
- b) It binds to site other than the active site, altering enzyme activity
- c) It increases the reaction rate
- d) It decreases the substrate's affinity for the enzyme



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48.

Which of the following describes the effect of increasing enzyme concentration while substrate concentration remains constant?

- a) The reaction rate increases the substrate becomes limiting
- b) The reaction rate decreases
- c) The reaction rate remains unchanged
- d) The reaction rate is unaffected by enzyme concentration



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49.

The presence of which of the following might reduce enzyme activity by competing with the substrate for the active site?

- a) Coenzyme
- b) Competitive inhibitor
- c) Non-competitive inhibitor
- d) Substrate



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50.

Which of the following statements is true about enzyme-substrate binding?

- a) Enzymes always bind to substrates in a rigid manner
- b) Enzyme binding to the substrate decreases enzyme activity
- c) Enzyme-substrate binding can be reversible or irreversible
- d) Substrates do not need to fit the enzyme's active site



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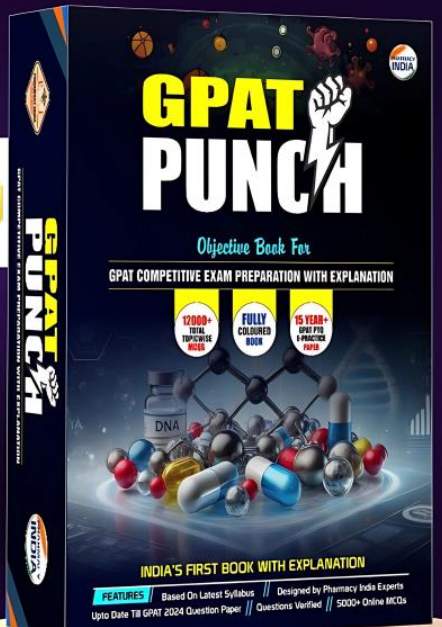
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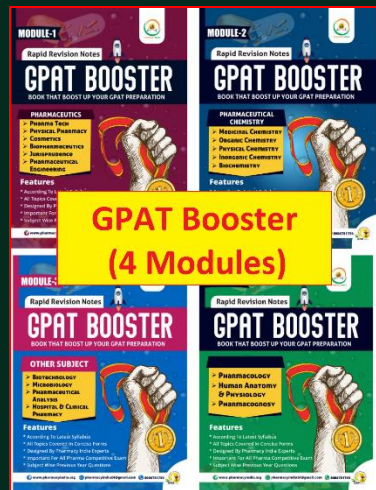
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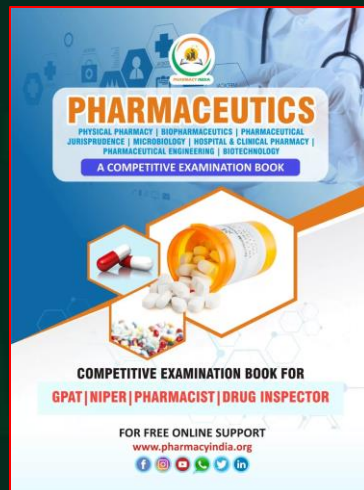
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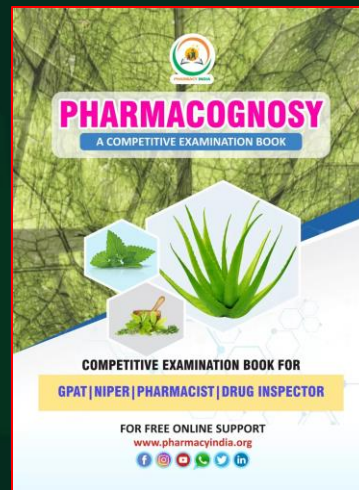


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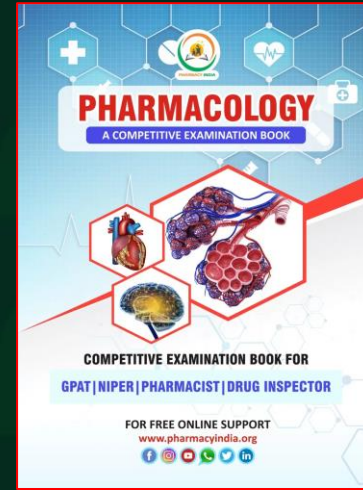
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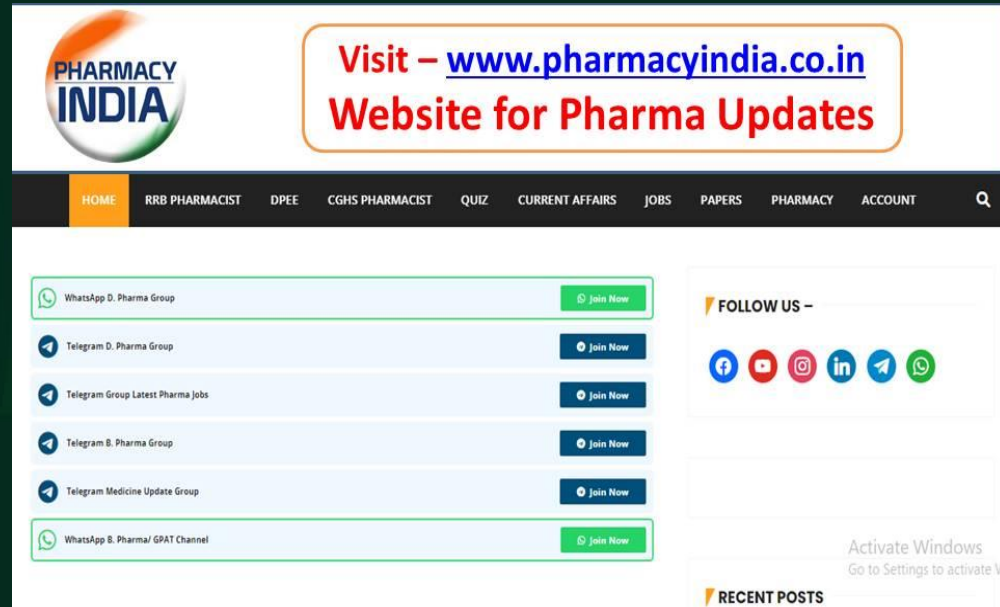
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