

Advanced Chemistry in Human Health

Advanced Chemistry · Answer Key · 8 Questions

1. What is the primary mechanism by which statin drugs reduce cholesterol synthesis in the human body?

- A) Increasing bile acid excretion.
- B) Irreversibly inhibiting HMG-CoA reductase.
- C) Reversibly inhibiting HMG-CoA reductase.**
- D) Upregulating LDL receptors.

2. In Alzheimer's disease, the pathological aggregation of amyloid-beta peptides primarily involves the formation of what type of protein secondary structure?

- A) Alpha-helices
- B) Beta-sheets**
- C) Triple helices
- D) Random coils

3. The irreversible enzyme phosphofructokinase-1 (PFK-1) catalyzes a key regulatory step in glycolysis. Which molecule allosterically inhibits PFK-1 in the presence of high energy charge within a cell?

- A) Fructose-2,6-bisphosphate
- B) ADP
- C) AMP
- D) ATP**

4. What is the primary mechanism by which organophosphate pesticides exert their toxic effects on the human nervous system?

- A) Blocking voltage-gated sodium channels.
- B) Irreversibly inhibiting acetylcholinesterase.**
- C) Activating GABA receptors.
- D) Mimicking serotonin.

5. Many drugs undergo biotransformation in the liver, primarily via the cytochrome P450 (CYP) enzyme system. What type of chemical reaction is most commonly catalyzed by CYP enzymes during Phase I metabolism?

- A) Glucuronidation
- B) Sulfation
- C) Oxidation**
- D) Acetylation

6. The primary buffer system regulating blood pH is the bicarbonate buffer system. Which enzyme catalyzes the reversible conversion of carbon dioxide and water into carbonic acid?

- A) Carbonic anhydrase**
- B) Hexokinase
- C) Lactate dehydrogenase
- D) Creatine kinase

7. Steroid hormones, such as cortisol and estrogen, exert their effects in target cells primarily by what mechanism?

- A) Binding to G-protein coupled receptors on the cell surface.
- B) Activating ion channels.
- C) Directly diffusing across the cell membrane and binding to intracellular receptors.**
- D) Phosphorylating membrane-bound enzymes.

8. Lead poisoning in the human body primarily exerts its toxic effects by interfering with enzymes due to lead's high affinity for which specific functional group?

- A) Hydroxyl groups
- B) Carboxyl groups
- C) Sulfhydryl groups**
- D) Amine groups