

Biochemistry Historical Milestones and Quantitative Constants

Biochemistry · Answer Key · 20 Questions

1. In what year did James Sumner prove that enzymes are proteins by crystallizing urease?

- A) 1926**
- B) 1932
- C) 1915
- D) 1940

2. What is the standard free energy change ($\Delta G'^{\circ}$) for the hydrolysis of ATP to ADP and inorganic phosphate at pH 7.0?

- A) -15.5 kJ/mol
- B) -30.5 kJ/mol**
- C) -45.2 kJ/mol
- D) -10.0 kJ/mol

3. How many amino acid residues are typically contained in a single molecule of bovine insulin, as determined by Frederick Sanger in 1953?

- A) 32
- B) 41
- C) 51**
- D) 65

4. Who was the scientist that first proposed the 'Induced Fit' model of enzyme-substrate interaction in 1958?

- A) Emil Fischer
- B) Daniel Koshland**
- C) Linus Pauling
- D) John Kendrew

5. How many protons are pumped across the inner mitochondrial membrane for every molecule of NADH oxidized by Complex I?

- A) 2
- B) 4**
- C) 6
- D) 8

6. In 1952, which researchers used a blender and a centrifuge to demonstrate that DNA is the genetic material of bacteriophages?

- A) Watson and Crick
- B) Hershey and Chase**
- C) Meselson and Stahl
- D) Avery and MacLeod

7. What is the approximate pH of human blood in a healthy adult?

- A) 6.8
- B) 7.0
- C) 7.4**
- D) 7.8

8. Frederick Sanger was awarded the Nobel Prize in Chemistry twice; in which year did he receive his second prize for DNA sequencing?

- A) 1965
- B) 1972
- C) 1980**
- D) 1988

9. How many carbon atoms are present in a single molecule of glucose?

- A) 3
- B) 5
- C) 6**
- D) 12

10. In the year 1937, which scientist described the citric acid cycle, also known as the Krebs cycle?

- A) Hans Krebs**
- B) Otto Warburg
- C) Fritz Lipmann
- D) Carl Cori

11. What is the number of base pairs in one full turn of the B-DNA double helix?

- A) 8.5
- B) 10.5**
- C) 12.0
- D) 14.5

12. The protein hemoglobin consists of how many polypeptide subunits?

- A) 1
- B) 2
- C) 4**
- D) 8

13. Linus Pauling published his seminal paper describing the alpha-helix structure of proteins in which year?

- A) 1945
- B) 1951**
- C) 1953
- D) 1958

14. Approximately how many ATP molecules are produced from the complete aerobic oxidation of one molecule of glucose in eukaryotic cells?

- A) 20-22
- B) 28-30
- C) 36-38**
- D) 40-42

15. Who received the 1962 Nobel Prize in Chemistry for determining the three-dimensional structures of globular proteins, specifically myoglobin?

- A) Max Perutz
- B) John Kendrew**
- C) Dorothy Hodgkin
- D) Robert Woodward

16. What is the pKa of the carboxylic acid group in the amino acid glycine?

- A) 2.34**
- B) 4.25
- C) 6.02
- D) 9.60

17. In 1961, who proposed the Fluid Mosaic Model of biological membranes?

- A) Singer and Nicolson**
- B) Davson and Danielli
- C) Robertson
- D) Gorter and Grendel

18. How many hydrogen bonds form between Guanine and Cytosine in a DNA base pair?

- A) 1
- B) 2
- C) 3**
- D) 4

19. The enzyme catalase has a turnover number (kcat) of approximately how many reactions per second?

- A) 10^2
- B) 10^4
- C) 10^7**
- D) 10^{10}

20. Which scientist discovered the restriction enzymes that earned him a Nobel Prize in 1978?

- A) Hamilton Smith**
- B) Kary Mullis
- C) Arthur Kornberg
- D) Severo Ochoa