

Biochemistry Historical and Quantitative Milestones

Biochemistry · Answer Key · 20 Questions

1. In what year did James B. Sumner publish his definitive proof that the enzyme urease is a protein, thereby settling a long-standing debate?

A) 1926

B) 1932

C) 1940

D) 1918

2. The first crystal structure of a protein, myoglobin, was determined by John Kendrew and Max Perutz in which year?

A) 1953

B) 1958

C) 1962

D) 1948

3. How many carbon atoms are present in the core structure of a steroid nucleus (gonane)?

A) 15

B) 17

C) 19

D) 21

4. The complete human mitochondrial genome consists of approximately how many base pairs?

A) 12,500

B) 16,569

C) 22,400

D) 8,200

5. The term 'biochemistry' (Biochemie) was first coined by which German chemist in 1903?

A) Carl Neuberg

B) Eduard Buchner

C) Hermann Emil Fischer

D) Frederick Gowland Hopkins

6. What is the standard free energy change ($\Delta G'^{\circ}$) for the hydrolysis of phosphoenolpyruvate (PEP) in kJ/mol?

- A) -30.5
- B) -42.3
- C) -61.9**
- D) -14.8

7. At a pH of 7.4, what is the approximate net charge of a molecule of the amino acid histidine (pKa of imidazole group is ~6.0)?

- A) -1
- B) 0**
- C) +1
- D) +0.5

8. The 'Central Dogma' of molecular biology was first articulated by Francis Crick in what year?

- A) 1953
- B) 1957**
- C) 1961
- D) 1965

9. How many turns are found in a standard B-DNA double helix that contains 105 base pairs?

- A) 10.5**
- B) 9.5
- C) 11.0
- D) 10.0

10. Who was awarded the 1907 Nobel Prize in Chemistry for his discovery of cell-free fermentation?

- A) Eduard Buchner**
- B) Arthur Harden
- C) Hans von Euler-Chelpin
- D) Otto Warburg

11. In the standard genetic code, how many of the 64 possible codons are classified as 'stop' codons?

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

12. The peptide hormone insulin consists of two chains connected by how many interchain disulfide bridges?

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

13. What is the approximate molecular weight (in kDa) of a single subunit of the E. coli RNA polymerase core enzyme (beta subunit)?

- A) 151 kDa**
- B) 95 kDa
- C) 43 kDa
- D) 110 kDa

14. The Henderson-Hasselbalch equation was derived by Lawrence Joseph Henderson in 1908 and later modified by Karl Hasselbalch in what year?

- A) 1910
- B) 1912
- C) 1916**
- D) 1920

15. How many ATP molecules are consumed in the priming phase of glycolysis per molecule of glucose?

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

16. Which vitamin is chemically known as pteroylmonoglutamic acid?

- A) B1
- B) B9**
- C) B12
- D) C

17. The average molecular weight of an amino acid residue in a protein is considered to be approximately how many Daltons?

- A) 95
- B) 110**
- C) 128
- D) 145

18. How many high-energy phosphate bonds are broken to activate an amino acid for protein synthesis via aminoacyl-tRNA synthetase?

A) 1

B) 2

C) 3

D) 4

19. Frederick Sanger determined the full amino acid sequence of bovine insulin in which year?

A) 1945

B) 1953

C) 1958

D) 1962

20. The Michaelis constant (K_m) is numerically equivalent to the substrate concentration at which the reaction velocity is what fraction of V_{max} ?

A) $1/4$

B) $1/2$

C) $3/4$

D) $1/3$