



MCAT Practice Questions

Question 1.

Which of the following correctly identifies the atomic number and atomic mass of an element?

- A) Atomic number = number of protons; atomic mass = sum of protons and neutrons
- B) Atomic number = sum of protons and neutrons; atomic mass = number of electrons
- C) Atomic number = number of neutrons; atomic mass = number of protons
- D) Atomic number = total number of subatomic particles; atomic mass = number of protons

Question 2.

What is the valence electron configuration of sulfur (atomic number 16)?

- A) $3s^2 3p^4$
- B) $2s^2 2p^4$
- C) $3s^2 3p^6$
- D) $3d^4 4s^2$

Question 3.

Which element has the highest electronegativity?

- A) Fluorine
- B) Oxygen
- C) Nitrogen
- D) Carbon

Question 4.

How many moles are present in 36 grams of water (H₂O)? (Atomic masses: H = 1 g/mol, O = 16 g/mol)

- A) 1 mole
- B) 2 moles
- C) 0.5 mole
- D) 36 moles

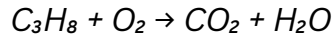
Question 5.

Which type of chemical bond involves the sharing of electron pairs between atoms?

- A) Ionic bond
- B) Covalent bond
- C) Metallic bond
- D) Hydrogen bond

Question 6.

Balance the following equation:



What is the coefficient in front of O₂ in the balanced equation?

- A) 3
- B) 5
- C) 7
- D) 10

Question 7.

In the redox reaction $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$, what is the species being reduced?

- A) Zn
- B) Cu²⁺
- C) Zn²⁺
- D) Cu

Question 8.

What is the common valency of nitrogen in most of its stable compounds?

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

Question 9.

Which functional group is represented by -OH ?

- A) Aldehyde
- B) Ketone
- C) Alcohol
- D) Carboxylic acid

Question 10.

What is the hybridization of the central atom in methane (CH_4)?

- A) sp
- B) sp^2
- C) sp^3
- D) sp^3d

Question 11.

Which bond is the most polar?

- A) C-H ($\Delta\text{EN} = 0.4$)
- B) C-F ($\Delta\text{EN} = 1.5$)
- C) C-C ($\Delta\text{EN} = 0$)
- D) C-Cl ($\Delta\text{EN} = 0.9$)

Question 12.

In an $\text{S}_{\text{N}}2$ reaction, the nucleophile attacks the electrophile from:

- A) The same side as the leaving group
- B) The opposite side of the leaving group
- C) Any direction randomly
- D) The electrophile does not get attacked in $\text{S}_{\text{N}}2$

Question 13.

What is the molecular geometry of ammonia (NH_3)?

- A) Linear
- B) Trigonal planar
- C) Tetrahedral
- D) Trigonal pyramidal

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Question 15.

Which element is a key component of ATP but not typically found in carbohydrates?

- A) Carbon
- B) Hydrogen
- C) Phosphorus
- D) Oxygen

Question 16.

Which of the following amino acid side chains could act as a base under physiological pH (7.4)?

- A) Aspartic acid
- B) Glutamic acid
- C) Lysine
- D) Tyrosine

Question 17.

In the electron transport chain, which molecule acts as the final electron acceptor?

- A) NAD^+
- B) Oxygen (O_2)
- C) FADH_2
- D) ATP synthase

Question 18.

Which of the following metabolic pathways involves iron-containing enzymes for electron transfer?

- A) Glycolysis
- B) TCA cycle
- C) Beta-oxidation
- D) Electron transport chain

Question 19.

Which particle contributes most to the atomic mass of an atom?

- A) Proton
- B) Neutron
- C) Electron
- D) Positron

Question 20.

If a radioactive isotope has a half-life of 10 hours, what fraction of the original sample remains after 30 hours?

- A) $1/8$
- B) $1/4$
- C) $1/2$
- D) $1/16$

Question 21.

In atomic emission spectroscopy, the color of light emitted corresponds to:

- A) Transitions of electrons between energy levels
- B) Nuclear decay of the atom
- C) Absorption of photons by electrons
- D) Ionization of the atom

Question 22.

According to the Pauli exclusion principle, no two electrons in an atom can have the same:

- A) Spin quantum number
- B) Principal quantum number
- C) Set of four quantum numbers
- D) Orbital shape

Question 23.

Which of the following nuclear imaging modalities uses positron-emitting radioisotopes?

- A) MRI
- B) CT scan
- C) PET scan
- D) Ultrasound

Answer Key

1. A

2. A

3. A

4. A

5. B

6. B (Balanced equation: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$)

7. B

8. C

9. C

10. C

11. B

12. B

13. D

14. C

15. C

16. C

17. B

18. D

19. B

20. A

21. A

22. C

23. C