

**Automotive Electrical and Engine Performance 9th Edition**  
**Chapter 26 – Vehicle Emission Standards and Testing**  
**Quiz B**

1. What is the stoichiometric air-fuel ratio for gasoline engines?
  - a. 12.7:1
  - b. 13.5:1
  - c. 14.7:1
  - d. 15.5:1
  
2. What component in the exhaust system is primarily responsible for reducing NOx emissions?
  - a. Exhaust gas recirculation (EGR) system
  - b. Catalytic converter
  - c. Oxygen sensor
  - d. Air injection system
  
3. Which gas is referred to as the "rich indicator" in exhaust analysis?
  - a. HC
  - b. CO
  - c. O<sub>2</sub>
  - d. CO<sub>2</sub>
  
4. What happens to oxygen levels in the exhaust when the engine operates under a lean condition?
  - a. Oxygen levels decrease significantly.
  - b. Oxygen levels remain constant.
  - c. Oxygen levels increase.
  - d. Oxygen levels oscillate randomly.

5. Which exhaust emission level indicates an efficiently operating engine?
- a. CO<sub>2</sub> between 12%-15%
  - b. HC below 50 ppm
  - c. O<sub>2</sub> above 5%
  - d. NO<sub>x</sub> exceeding 1,000 ppm
6. How is water (H<sub>2</sub>O) formed during the combustion process?
- a. By the interaction of nitrogen and oxygen in the combustion chamber
  - b. From the oxidation of hydrocarbons
  - c. Through the reduction of carbon monoxide in the catalytic converter
  - d. Via vapor condensation in cold exhaust systems
7. What could cause excessive hydrocarbon (HC) emissions?
- a. Lean air-fuel mixture
  - b. Engine misfire
  - c. Clogged EGR passages
  - d. Catalytic converter malfunction
8. What is the role of the oxygen sensor (O<sub>2</sub>S) in closed-loop operation?
- a. To ensure all oxygen is removed from the exhaust system
  - b. To monitor and adjust the air-fuel mixture for efficiency
  - c. To prevent excessive carbon dioxide formation
  - d. To reduce combustion chamber temperatures
9. Why might a vehicle fail an emissions test?
- a. MIL (malfunction indicator lamp) is on
  - b. Readiness monitors are incomplete
  - c. High NO<sub>x</sub> or HC emissions
  - d. All of the above

10. Which emission standard represents vehicles with zero tailpipe emissions?

- a. ZEV
- b. SULEV
- c. PZEV
- d. LEV

**Automotive Electrical and Engine Performance 9th Edition**  
**Chapter 26 – Vehicle Emission Standards and Testing**  
**Quiz B**

**Correct Answers:**

1. c
2. b
3. d
4. c
5. a
6. b
7. b
8. a
9. c
10. a