

Automotive Electrical and Engine Performance 8th 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 NO_x 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. O₂
 - d. CO₂

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. CO₂ between 12%-15%
 - b. HC below 50 ppm
 - c. O₂ above 5%
 - d. NO_x exceeding 1,000 ppm
6. How is water (H₂O) 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 (O₂S) 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_x 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

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Correct Answers:

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