

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

1. What is the stoichiometric ratio of air to fuel for gasoline in internal combustion engines?
  - a. 12:1
  - b. 13.5:1
  - c. 16:1
  - d. 14.7:1
  
2. Which exhaust gas is primarily formed due to high combustion chamber temperatures exceeding 2,500°F?
  - a. Carbon monoxide (CO)
  - b. Hydrocarbons (HC)
  - c. Oxides of nitrogen (NO<sub>x</sub>)
  - d. Carbon dioxide (CO<sub>2</sub>)
  
3. What is the role of a catalytic converter in vehicle exhaust systems?
  - a. Increase NO<sub>x</sub> emissions
  - b. Reduce CO and HC emissions by oxidation
  - c. Directly capture carbon dioxide
  - d. Enhance air–fuel ratio control
  
4. Which of the following is considered the "rich indicator" in exhaust analysis?
  - a. CO
  - b. O<sub>2</sub>
  - c. HC
  - d. NO<sub>x</sub>

5. Which emissions standard level indicates a vehicle is entirely free of tailpipe emissions?
- a. LEV
  - b. ZEV
  - c. SULEV
  - d. ULEV
6. What is a common cause of high unburned hydrocarbon (HC) emissions?
- a. Faulty catalytic converter
  - b. Lean air–fuel mixture
  - c. Ignition system fault
  - d. Excessive exhaust system pressure
7. Which gas is measured to assess combustion efficiency in an engine?
- a. Carbon monoxide (CO)
  - b. Carbon dioxide (CO<sub>2</sub>)
  - c. Hydrocarbons (HC)
  - d. Oxides of nitrogen (NO<sub>x</sub>)
8. What causes the formation of NO<sub>x</sub> during the combustion process?
- a. High temperatures and pressures
  - b. Insufficient oxygen levels
  - c. Low fuel pressure
  - d. Rich fuel mixture
9. What is the acceptable range for oxygen (O<sub>2</sub>) levels in exhaust emissions for a properly operating engine?
- a. 0%–1%
  - b. 1%–3%
  - c. 0%–2%
  - d. 2%–4%

10. Which fault is likely to cause both high HC and CO emissions while CO<sub>2</sub> and O<sub>2</sub> remain low?

- a. Lean mixture
- b. Rich mixture
- c. Faulty EGR valve
- d. Defective fuel pump

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**Correct Answers:**

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