1. Which cycle is primarily used in internal combustion engines?
a) Carnot cycle
b) Otto cycle
c) Diesel cycle
d) Dual cycle

Answer: b) Otto cycle

Explanation: The Otto cycle is commonly used in gasoline engines, where fuel-air mixture is compressed, ignited, and then expanded to produce work.

2. Which cycle is known for its constant volume heat addition and rejection processes?
a) Carnot cycle
b) Otto cycle
c) Diesel cycle
d) Brayton cycle

Answer: c) Diesel cycle

Explanation: In the Diesel cycle, heat addition and rejection occur at constant volume, distinguishing it from other cycles where these processes typically occur at constant pressure.

3. The Brayton cycle is primarily used in:
a) Refrigeration systems
b) Steam power plants
c) Gas turbine engines
d) Automobile engines

Answer: c) Gas turbine engines

Explanation: The Brayton cycle is commonly used in gas turbine engines, such as those found in aircraft propulsion and electricity generation.

4. Which gas law describes the relationship between pressure, volume, and temperature of an ideal gas?
a) Boyle’s law
b) Charles’s law
c) Gay-Lussac’s law
d) Dalton’s law

Answer: a) Boyle’s law

Explanation: Boyle’s law states that at constant temperature, the volume of a given amount of gas is inversely proportional to its pressure.

5. The PVT relationship for an ideal gas is described by which equation?
a) PV = nRT
b) PV = NkT
c) P = ρRT
d) PV = RT

Answer: d) PV = RT

Explanation: The ideal gas law equation, PV = nRT, describes the relationship between pressure, volume, temperature, and the number of moles of an ideal gas.

6. When a mixture of ideal gases is considered, the total pressure is equal to:
a) The sum of partial pressures of each gas
b) The product of partial pressures of each gas
c) The average of partial pressures of each gas
d) The reciprocal of partial pressures of each gas

Answer: a) The sum of partial pressures of each gas

Explanation: Dalton’s law of partial pressures states that the total pressure exerted by a mixture of non-reacting ideal gases is equal to the sum of the partial pressures of each gas in the mixture.

7. Which property remains additive when dealing with a mixture of ideal gases?
a) Internal energy
b) Enthalpy
c) Entropy
d) Specific heat

Answer: b) Enthalpy

Explanation: Enthalpy is an extensive property, meaning it is additive for a mixture of substances. When ideal gases mix, the enthalpy change of the mixture is simply the sum of the enthalpy changes of the individual gases.

8. The internal energy of an ideal gas depends primarily on its:
a) Temperature
b) Pressure
c) Volume

d) Mass

Answer: a) Temperature

Explanation: The internal energy of an ideal gas depends primarily on its temperature, according to the kinetic theory of gases.

9. Specific heat of gas mixtures is typically expressed in terms of:
a) Molar heat capacity
b) Mass heat capacity
c) Volume heat capacity
d) Constant heat capacity

Answer: a) Molar heat capacity

Explanation: Specific heat of gas mixtures is often expressed in terms of molar heat capacity, which represents the amount of heat required to raise the temperature of one mole of the mixture by one degree Celsius.

10. Which property describes the ability of a gas mixture to absorb or release heat at constant pressure?
a) Internal energy
b) Enthalpy
c) Entropy
d) Specific heat

Answer: b) Enthalpy

Explanation: Enthalpy is the property that describes the heat content of a system at constant pressure. In a gas mixture, enthalpy change reflects the heat absorbed or released during a process at constant pressure.

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