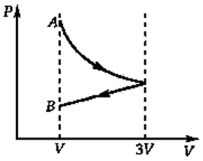
CBSE

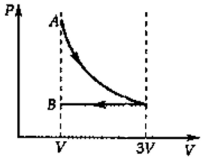
THERMODYNAMICS WS 13

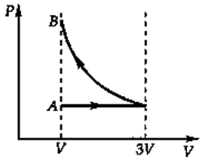
Class 11 - Physics

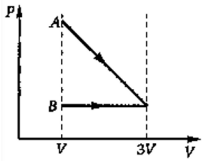
Section A

1. One mole of an ideal gas goes from an initial state A to final state B via two processes: It first undergoes isothermal expansion from volume V to 3 V and then its volume is reduced from 3 V to V at constant pressure. The correct P-V diagram representing the two processes is: **[1]**

a) 

b) 

c) 

d) 

2. A diatomic gas does 100 J of work when it is expanded isobarically. The heat given to the gas during this process is: **[1]**

a) 1050 J
b) 350 J
c) 700 J
d) 175 J

3. **Assertion:** In an isochoric process, work done by the gas is zero. **[1]**
Reason: In a process, if initial volume is equal to the final volume, work done by the gas is zero.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c) Assertion is correct statement but reason is wrong statement.
d) Assertion is wrong statement but reason is correct statement.

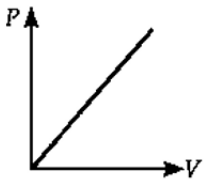
4. **State True or False:** **[1]**
(a) In an isobaric process, the change in internal energy is $\Delta U = nC_p \Delta T$. **[1]**

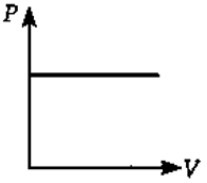
5. In thermodynamic processes which of the following statements is not true? **[1]**

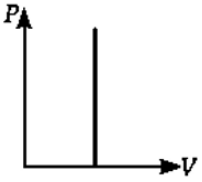
a) in an adiabatic process PV^{γ} = constant
b) in an adiabatic process the system is insulated from the surroundings
c) in an isothermal process the temperature remains constant
d) in an isochoric process pressure remains constant

6. Which of the following graphs between pressure and volume correctly shows isochoric changes? **[1]**

a)
b)



c) 

d) 

7. What is an isobaric process? **[1]**

8. If 70 cal of heat is required to raise the temperature of 2 mol of an ideal gas at constant pressure from 30°C to 35°C, calculate **[1]**

   i. work done by the gas

   ii. increase in internal energy of gas.

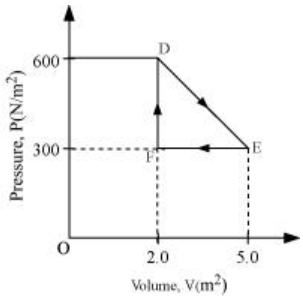
   Take R = 2 cal/mol^{-}K.

9. Can the temperature of gas be increased by keeping its pressure and volume constant? **[1]**

10. What is an isochoric process? **[1]**

Section B

11. A thermodynamic system is taken from an original state to an intermediate state by the linear process shown in figure. **[2]**



Its volume is then reduced to the original value from E to F by an isobaric process. Calculate the total work done by the gas from D to E to F.

12. What are (i) isobaric and (ii) isochoric processes? Write the equation of state for these processes. **[2]**

Section C

13. **Fill in the blanks:** **[3]**

   (a) An _____ process occurs at constant pressure. **[1]**

   (b) An _____ process is one in which volume is kept constant, meaning that the work done by the system will be zero. **[1]**

   (c) A thermodynamic process which occurs at constant volume is an _____ process and the process which occurs at constant pressure is an _____ process. **[1]**

14. 200 cm^3 of a gas is compressed to 100 cm^3 at the atmospheric pressure (10^6 dyne cm^2). Find the resultant pressure if the change is **[3]**

   i. slow

   ii. sudden. Given $\gamma = 1.4$

15. Calculate the amount of heat necessary to raise the temperature of 2 moles of He gas from 20^0C to 50^0C using:- **[3]**

   i. Constant Volume Process

ii. Constant Pressure Process

Here for, He gas; C_V = 1.5 R and C_P = 2.49R

16. If, at 50°C and 75 cm of mercury pressure, a definite mass of a gas is compressed **[3]**

i. slowly

ii. suddenly, then what will be the final pressure and temperature of the gas in each case if the final volume is one-fourth of the initial volume? (γ = 1.5)