Exam-1 [Thermodynamics] JEE

(System, Properties, Process, FLOT)

Q1. Assertion (A): A process is called adiabatic if the system does not exchange heat with the surroundings.
Reason (R): It does not involve increase or decrease in temperature of the system.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false
(d) A is false but R is true

Q2. 1 L of an ideal gas is allowed to expand isothermally into vacuum until the total volume is 20 L. The amount of heat absorbed in this expansion is . . . L atm.
(a) 0
(b) 19
(c) 20
(d) 18

Q3. Among the following the path variable is
(a) Internal energy (U)
(b) Volume (V)
(c) Heat (q)
(d) Enthalpy (H)

Q4. The internal energy change when a system goes from state A to B is 40 kJ/mol. If the system goes from A to B by a reversible path and returns to state A by an irreversible path, what would be the net change in internal energy?
(a) 40 kJ
(b) $>$ 40 kJ
(c) $<$ 40 kJ
(d) zero

Q5. A system absorbs 20 kJ heat and does 10 kJ of work. The internal energy of the system
(a) increases by 10 kJ
(b) decreases by 10 kJ
(c) increases by 30 kJ
(d) decreases by 30 kJ

Q6. The volume of a system becomes twice its original volume on the absorption of 300 cal of heat. The work done on the surrounding was found to be 200 cal. What is ΔU for the system?
(a) 500 cal
(b) 300 cal
(c) 100 cal
(d) –500 cal

Q7. One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 litre to 10

litre. ΔE for this process is : (R = 2 cal mol^{-1} K^{-1})

(a) 163.7 cal

(b) Zero

(c) 1381.1 cal

(d) 9 litre atm

Q8. In an adiabatic process, no transfer of heat takes place between system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following

(a) $q = 0,\ w \neq 0,\ \Delta T = 0$

(b) $q = 0,\ w = 0,\ \Delta T \neq 0$

(c) $q = 0,\ w = 0,\ \Delta T = 0$

(d) $q = 0,\ w \neq 0,\ \Delta T < 0$

Q9. The work done during the expansion of a gas from 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm is (1 L atm = 101.32 J)

(a) –6 J

(b) –608 J

(c) +304 J

(d) –304 J

Q10. What will be the work done when one mole of a gas expands isothermally from 15 L to 50 L against a constant pressure of 1 atm at 25°C?

(a) –3542 cal

(b) –843.3 cal

(c) –718 cal

(d) –60.23 cal

Section – B : Integer Type Questions

I1. Two litres of an ideal gas at a pressure of 10 atm expands isothermally into a vacuum until its total volume is 10 litres. How much heat is absorbed and how much work is done in the expansion?

I2. During compression of a spring the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. Calculate the change in internal energy (in kJ).

I3. An ideal gas is allowed to expand from 1 L to 10 L against a constant external pressure of 1 bar. Calculate the work done in litre bar.