



DPP-5 [Isothermal Process]

Jo apne sapno ke liye ladhte hain, unhe duniya kitni bhi bar rokne ki koshish kare... woh rukte nahi.

Q1. The work done by a weightless piston in causing an expansion ΔV (at constant temperature), when the opposing pressure P is variable, is given by:

(A) $W = -\int PdV$

(B) $W = 0$

(C) $W = -P\Delta V$

(D) None

Q2. The work done by 100 calorie of heat in isothermal expansion of ideal gas is:

(A) 418.4 J

(B) 4.184 J

(C) 41.84 J

(D) None

Q3. Work done in reversible isothermal expansion is given by:

(A) $-2.303 RT \log \frac{V_2}{V_1}$

(B) $\frac{nR}{(\gamma-1)}(T_2-T_1)$

(C) $2.303 RT \log \frac{V_2}{V_1}$

(D) None of these

Q4. If x mole of ideal gas at 27°C expands isothermally and reversibly from a volume of V to $10V$, then the work done is:

(A) $w = xR300 \ln V$

(B) $w = -300xR \ln \frac{y}{10y}$

(C) $w = -300xR \ln 10$

(D) $w = 100xR \ln \frac{1}{y}$

Q5. Calculate work done during isothermal reversible process when 5 mol ideal gas is expanded so that its volume is doubled at 400 K ? [$\log 2=0.3$]

(A) -11.5 kJ

(B) -344 kJ

(C) 0

(D) -2.8 kJ

Q6. The work done in ergs for a reversible expansion of one mole of ideal gas from 10 L to 20 L at 25°C is:

(A) $-2.303 \times 8.31 \times 10^7 \times 298 \log 2$

(B) $-2.303 \times 0.0821 \times 298 \log 2$

(C) $-2.303 \times 0.0821 \times 298 \log 0.5$

(D) $-2.303 \times 2 \times 298 \log 2$

Q7. A piston filled with 0.04 mol of an ideal gas expands reversibly from 50.0 mL to 375 mL at a constant temperature of 37°C . As it does so, it absorbs 208 J of heat. The values of q and w for the process will be:

(A) $q = +208 \text{ J}$, $w = -208 \text{ J}$

(B) $q = -208 \text{ J}$, $w = -208 \text{ J}$

(C) $q = -208 \text{ J}$, $w = +208 \text{ J}$

(D) $q = +208 \text{ J}$, $w = +208 \text{ J}$

Q8. If an ideal gas expands isothermally from 50 L to 100 L against 2 atm external pressure, then values of W , ΔU and q respectively will be – [NCERT Pg.166]

(A) -100 L atm , zero and $+100 \text{ L atm}$

(B) -50 L atm , zero and $+50 \text{ L atm}$

(C) $+100 \text{ L atm}$, zero and -100 L atm

(D) $+50 \text{ L atm}$, zero and -50 L atm

Q9. Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is – [NEET-2019] (Given that $1 \text{ L bar} = 100 \text{ J}$)

(A) -30 J

(B) 5 kJ

(C) 25 J

(D) 30 J

Q10. Two moles of a gas expands isothermally from 5 dm^3 to 40 dm^3 against a constant external pressure of 2 atm at 298 K. The work done (in J) is approximately:

(A) -7091

(B) -8000

(C) -6000

(D) -9000

Q11. Calculate w for the isothermal reversible expansion of 1 mol of an ideal gas from an initial pressure of 1.0 bar to a final pressure of 0.1 bar at a constant temperature of 273 K. [$\log_{10} 10 = 1$]

(A) -5227.2 J

(B) $+5227.2 \text{ J}$

(C) -2257 J

(D) $+2257 \text{ J}$

Q12. At 27°C , one mole of an ideal gas is compressed isothermally and reversibly from a pressure of 2 atm to 10 atm. The value of q in cal is: [$\log_5 5 = 0.3$]

(A) -965.87

(B) $+965.87$

(C) -500.00

(D) $+500.00$

Q13. Two litre of N_2 at 0°C and 5 atm are expanded isothermally against a constant external pressure of 1 atm until the pressure of gas reaches 1 atm. Assuming the gas to be ideal calculate work of expansion ?

(A) -504.2 J

(B) -405.2 J

(C) $+810.4 \text{ J}$

(D) -810.4 J

Q14. 1 mole of ideal gas (A) expands from 2 L to 4 L through reversible isothermal process. 3 mol of another ideal gas (B) expands from 2 L to $x \text{ L}$ and does the same amount of work as done by gas (A). The value of x is:

(A) 2

(B) 8

(C) $(8)^{1/3}$

(D) $(4)^{2/3}$

- Q15.** For a reversible process at $T = 300\text{K}$, the volume is increased from $V_i = 1\text{L}$ to $V_f = 10\text{L}$. Calculate ΔH if the process is isothermal –
- (A) 11.47 kJ (C) 0
 (B) 4.98 kJ (D) -11.47 kJ
- Q16.** One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 litre to 10 litres. The ΔE for this process is ($R=2 \text{ cal mol}^{-1}\text{K}^{-1}$):
- (A) 1381.1 cal (C) 163.7 cal
 (B) Zero (D) 9 L atm
- Q17.** Expansion of ideal gas takes place from 1 L to 10 L in vacuum isothermally at 300 K. Which of the following is correct?
- (A) $\Delta H = 0$ (C) $w = 0$
 (B) $q = 0$ (D) All of these
- Q18.** Internal energy change during a reversible isothermal expansion of an ideal gas is:
- (A) Always negative (C) Zero
 (B) Always positive (D) May be positive or negative
- Q19.** Which of the following can be zero for isothermal reversible expansion?
- (A) ΔE (C) ΔT
 (B) ΔH (D) All of these
- Q20.** 10 mol of an ideal gas at 27°C and 10 atm undergoes the following changes: (i) Isothermal & reversible expansion to 246 L (ii) Isothermal & irreversible expansion to 246 L (iii) Isochoric heating to 177°C Match Column I with Column II.

Column I

- I. Isothermal reversible expansion
 II. Isothermal irreversible expansion
 III. Isochoric heating

Column II

- a. $w = -57.41 \text{ kJ}$
 b. $w = -22.43 \text{ kJ}$
 c. $w = 0$

- (A) I-a, II-b, III-c
 (B) I-b, II-a, III-c
 (C) I-c, II-a, III-b
 (D) I-a, II-c, III-b