EXERCISE - O

SINGLE CORRECT TYPE QUESTIONS

Basic Introduction

1. A system in which exchange of energy is allowed but not matter :
(A) open system (B) closed system (C) isolated system (D) all of the above

CTF077

2. An example of closed system is :
(A) Hot water present in hot beaker
(B) Some amount of water present in equilibrium with it's vapour in a closed and insulated container
(C) Some amount of hot water enclosed in a closed container which is not insulated
(D) none of these

CTF078

3. Since exchange of energy & matter is not allowed in isolated system :
(A) system & surrounding are always separated by only real boundary.
(B) system & surrounding are always separated by only imaginary boundary.
(C) system & surrounding are always separated by a real or imaginary boundary.
(D) none of these

CTF079

4. If x and y are arbitrary extensive variable then,
(A) (x + y) is an intensive variable (B) $\frac{x}{y}$ is intensive variable
(C) (x – y) is intensive variable (D) x × y is intensive variable

CTF080

Thermodynamic Process

5. What is true for a cyclic process [E = internal energy]
(A) w = 0 (B) $\Delta E = 0$ (C) $\Delta H = 0$ (D) B & C both

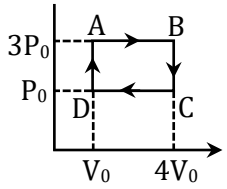
CTF087

Work Calculation

6. The work done during the expansion of a gas from a volume of 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm is -
(A) –608 J (B) +304 J (C) –304 J (D) –6 J

CTF091

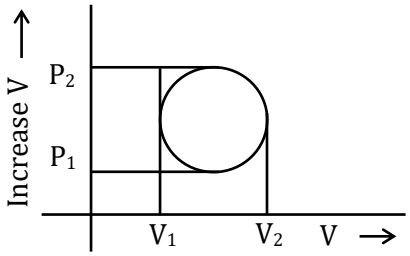
7. What is the work done in cyclic process as shown is given P–V diagram ?



(A) $-6P_0V_0$ (B) $-12P_0V_0$ (C) $9P_0V_0$ (D) $-P_0V_0$

CTF094

8. In the cyclic process in P-V diagram, the magnitude of the work done is



(A) $\pi\left(\frac{P_1 - P_2}{2}\right)^2$ (B) $\pi\left(\frac{V_2 - V_1}{2}\right)^2$

(C) $\frac{\pi}{4}(P_2 - P_1)(V_2 - V_1)$ (D) $\pi(V_2 - V_1)^2$

CTF101

First Law of Thermodynamics

9. The internal energy change when a system goes from state A to B is 40 kJ/mole. 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) Zero (C) 40 kJ (D) > 40 kJ

CTF088

10. One mole of a gas absorbs 200J of heat at constant volume. Its temperature rises from 298 K to 308 K. The change in internal energy is :-

(A) 200 J (B) –200 J (C) $200 \times \frac{308}{298}$ J (D) $200 \times \frac{298}{308}$ J

CTF089

11. Two moles of an ideal gas expand spontaneously into vacuum. The work done is :–

(A) Zero (B) 2 J (C) 4 J (D) 8 J

CTF090

12. Which has maximum internal energy at 298 K?

(A) helium gas (B) oxygen gas (C) ozone gas (D) equal

CTF092

13. An ideal gas is expanded isothermally from 3L to 5L volume at constant pressure of 1.5 atm. What is the change in internal energy of system (in atm L) ?

(A) +3 (B) –3 (C) –6 (D) Zero

CTF095

14. If work done by the system is 300 joule when 100 cal heat is supplied to it. The change in internal energy during the process is :

(A) – 200 Joule (B) 400 Joule (C) 720 Joule (D) 120 Joule

CTF097

15. The work done by a system is 8 J when 40 J heat is supplied to it. The change in internal energy of the system during the process :

(A) 32 J (B) 40 J (C) 48 J (D) –32 J

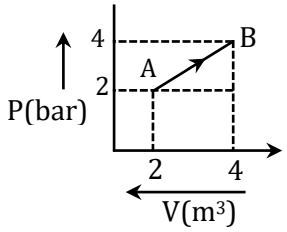
CTF098

16. A system undergoes in which $\Delta E = +300$ J while absorbing 400 J of heat undergoing an expansion against 0.5 bar. What is the change in the volume (in L).

(A) 4 (B) 5 (C) 2 (D) 3

CTF099

17. 1 mole of gas perform the following operation from A to B



If 500 KJ heat is absorbed in this process the ΔU from A to B is :

(A) –100KJ (B) +200KJ (C) +300KJ (D) –400KJ

CTF100

Enthalpy

18. For a monatomic gas, the value of the ratio of $C_{p.m}$ and $C_{v.m}$ is :-

(A) $\frac{5}{3}$ (B) $\frac{7}{5}$ (C) $\frac{9}{7}$ (D) $\frac{9}{11}$

CTF107

19. Enthalpy of the system is given as :-

(A) H + PV (B) U + PV (C) U – PV (D) H – PV

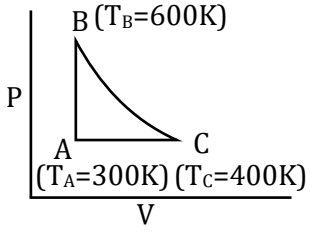
CTF108

20. For and ideal gas $\frac{C_P}{C_V} = \gamma$ the molecular mass is M_w, its specific heat capacity at constant volume is :

(A) $\frac{R}{M(\gamma-1)}$ (B) $\frac{M}{\gamma-1}$ (C) $\frac{\gamma RM}{\gamma-1}$ (D) $\frac{\gamma R}{M(\gamma-1)}$

CTF109

21. A heat engine carries one mole of an ideal diatomic gas around the cycle as show in the figure, the amount of heat added in the process AB & heat removed in the process CA are :



(A) $q_{AB} = 750R$ & $q_{CA} = -450R$ (B) $q_{AB} = 650R$ & $q_{CA} = -350R$

(C) $q_{AB} = 750R$ & $q_{CA} = -350R$ (D) $q_{AB} = 650R$ & $q_{CA} = -450R$

CTF110

22. A gas is heated at constant pressure. The fraction of heat absorbed used in doing work is

(A) $\frac{1}{\gamma}$ (B) $1 - \frac{1}{\gamma}$ (C) $\gamma - 1$ (D) γ

CTF112

Isothermal, Isochoric, Isobaric, Adiabatic, Polytropic & Free Expansion Process

23. Maximum work can a gas do, if its alone of expand isothermally against?

(A) vacuum (B) high pressure of surrounding

(C) low pressure of surrounding (D) atmospheric pressure

CTF093

24. 2 moles of an ideal monoatomic gas undergoes reversible expansion from (4 L, 400 K) to 8L such that $TV^2 = k$. The change in Enthalpy of the gas

(A) –1500 R (B) – 300 R (C) 1500 R (D) 3000 R

CTF111

25. For the reaction :

$C_3H_{8\,(g)} + 5O_{2\,(g)} \rightarrow 3CO_{2\,(g)} + 4H_2O_{(l)}$,

value of $\Delta H - \Delta U$ is :-

(A) +RT (B) –3RT (C) +3RT (D) –RT

CTF113

26. Work done in isothermal reversible process for ideal gas is-

(A) $-nRT \ln\left(\frac{V_2}{V_1}\right)$ (B) $-P(V_2 - V_1)$ (C) $\left(\frac{P_2V_2 - P_1V_1}{\gamma - 1}\right)$ (D) 0

CTF117

27. Which of the following is/are correct for Isochoric heating of an ideal gas :

(A) $\Delta T = 0$ (B) $\Delta U = 0$ (C) $q = 0$ (D) $w = 0$

CTF119

28. The slopes of isothermal and adiabatic curves are related as-

(A) Isothermal curve slope = adiabatic curve slope

(B) Isothermal curve slope = $\gamma \times$ adiabatic curve slope

(C) Adiabatic curve slope = $\gamma \times$ isothermal curve slope

(D) Adiabatic curve slope = $\frac{1}{2} \times$ isothermal curve slope

CTF120

29. Two moles of an ideal gas ($C_V = \frac{5}{2}R$) was compressed adiabatically against constant pressure of 2 atm, which was initially at 350 K and 1 atm pressure. The work involve in the process is equal to -

(A) 250 R (B) 300 R (C) 400 R (D) 500 R

CTF121

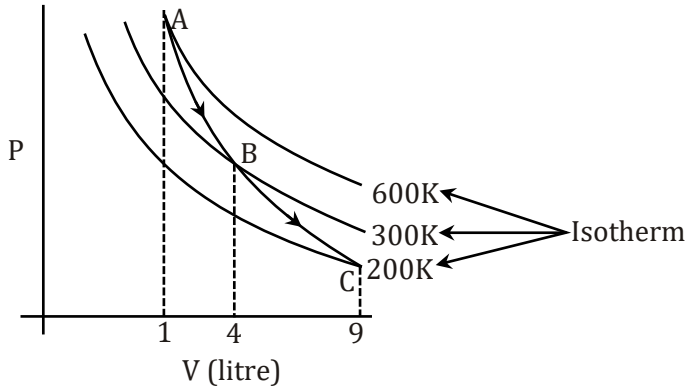
30. In a polytropic process, heat rejected is given by :

(A) $\frac{\gamma}{\gamma - 1} \times$ work done on the system (B) $\frac{\gamma - n}{\gamma - 1} \times$ work done on the system

(C) $\frac{\gamma - n}{\gamma} \times$ work done on the system (D) $\frac{\gamma - n}{\eta} \times$ work done on the system

CTF122

31. The given figure shows a polytropic process ABC for one mole of an ideal gas. Calculate the polytropic index (x) for the process-



(A) 1/2 (B) –1/2 (C) 3/2 (D) None

CTF123

32. A gas expands against a variable pressure given by $P=\frac{10}{V}$ atm, where V is volume of gas of each stage of expansion. Further during expansion from volume 10 L to 100 L, the gas undergoes a change in internal energy of 420 J. How much heat is absorbed by the gas during expansion ?

(A) q = 2752.2 J (B) q = 2652.2 J (C) q = 2852.2 J (D) q = 2452.2 J

CTF124

MULTIPLE CORRECT TYPE QUESTIONS

33. For an isolated system the wall/boundary separating the system from surrounding must be :

(A) rigid (B) adiabatic (C) impermeable (D) diathermal

CTF081

34. Which of the following physical quantities are both independent from amount and path?

(A) Internal Energy

(B) Temperature

(C) Molar heat exchanged at constant volume

(D) Molar heat exchanged at constant pressure

CTF082

35. Intensive properties are

(A) Density (B) Entropy (C) Boiling point (D) Heat capacity

CTF083

36. Which of the following is/are state function ?

(A) Enthalpy (B) Heat (C) Entropy (D) Gibb's force energy

CTF084

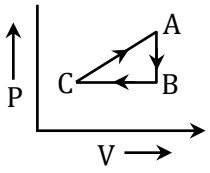
37. Among the following, the intensive property is (properties are) :

(A) Molar conductivity (B) E.M.F of a cell

(C) Resistance (D) Heat capacity

CTF085

38. 1 mole of monoatomic ideal gas perform the following operation :

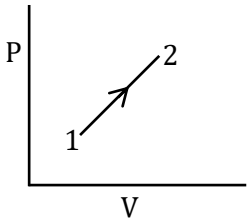


Select correct statements :

(A) A to B is endothermic process.
(B) B to C is endothermic process.
(C) C to A is endothermic process.
(D) ΔU in cyclic process ABCA is zero.

CTF096

39. Determine the sign of ΔU, w & q in the following process :



(A) $\Delta U>0$ (B) $q>0$ (C) $w<0$ (D) $w>0$

CTF102

40. For a diatomic gas which options is/are correct :

(A) $\gamma = 1.40$ (B) $C_P = \frac{7R}{2}$ (C) $C_V = \frac{5R}{2}$ (D) $\gamma = 1.67$

CTF114

41. Ten moles of an ideal gas ($\gamma = 1.2$) is heated from 27°C to 47°C at constant volume. Which of the following is incorrect :

(A) $w > 0$ (B) $w = 0$ (C) $\Delta U = 200R$ (D) $\Delta H = 240R$

CTF125

EXERCISE - S

Basic Introduction

1. How many of the following are intensive
(a) Temperature (b) Internal Energy (c) Heat (d) Molar volume
(e) Molar heat capacity (f) viscosity

CTF086

Heat & Work

2. Calculate the time (min.) for which a 100 watt electric heater must operate to evaporate 50 g sample of benzene at its boiling point. Given, standard enthalpy of vaporisation of benzene equal to 30.8 kJ/mol
(power = energy/time; 1 W = 1 J s^{-1})

CTF103

3. Calculate the work done (in joule) by a system when one mol of a gas occupying 2 L volume is allowed to expand to 10 L volume against an external pressure of one atmosphere.

CTF104

4. A gas expands from 3 dm^3 to 5 dm^3 against a constant pressure of 3 atm. The work done during expansion is used to heat 10 mol of water of temperature 290 K. Calculate final temperature of water. Specific heat of water = 4.184 J g^- K.

CTF116

5. Find the work done (in atm-litre) when 1 mole of gas expands from 1 litre to 5 litre against constant of 1 ATM pressure.

CTF127

First Law of Thermodynamic

6. 1 mol of an ideal diatomic gas is expanded by heating from state-I (10 litre, 500K) to (20 litre, 800K) against constant pressure 2 bar. Find heat supplied in joule.
(Given R = 25/3 J/mole/K)

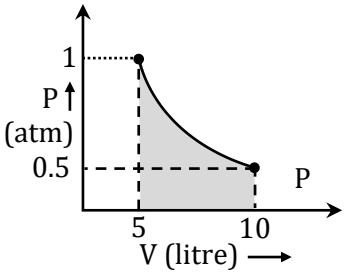
CTF128

Isothermal Process

7. At 3 atmosphere pressure and 273 K, 1.5 L of H_2 gas allowed to expand isothermally at constant pressure of one atmosphere till pressure of the gas became one atmosphere. Calculate the work of expansion of H_2 gas.

CTF105

8. Shaded area in the graph will be (in atm-L) : (ln2 = 0.7)



CTF129

9. An ideal gas expands isothermally from 10^{-3} m^3 to 10^{-2} m^3 at 300 K against a constant pressure of 10^5 Nm^{-2}. Calculate work in joule.

CTF130

10. An ideal gas undergoes expansion from A(10 atm, 1 litre) to B(1 atm, 10 litre), first against 5 atm and then against 1 atm, isothermally. Calculate the amount of heat absorbed (in litre-atm)

CTF131

Adiabatic Process

11. One mole of an ideal monoatomic gas undergoes expansion along a straight line on P–V curve from initial state A(3L, 8 atm) to final state B(7.5 L, 2 atm). Calculate q for the above process in L atm

CTF132

12. A gas is expanded in adiabatic process from 2L to 5L against constant external pressure of 1 bar then internal energy change in bar litre will be :

CTF133

13. Calculate the work done in calories by system in an irreversible (single step) adiabatic expansion of 1 mole of a polyatomic gas ($\gamma = 4/3$) from 400 K and pressure 16 atm to 1 atm. Also calculate work done in kcal if process done reversibly and adiabatically.

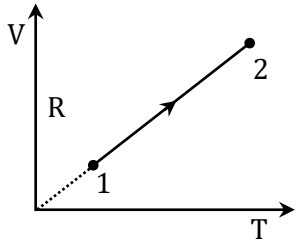
CTF134

14. A monoatomic ideal gas undergoing irreversible adiabatic compression from 4L to 1L against 1 bar pressure. Calculate the enthalpy change of gas (in J) . (Given: 1 bar-L = 100 J)

CTF135

Miscellaneous

15. Volume vs Temperature graph of 3 moles of O_2 gas is as shown in figure. The ratio of heat absorbed & the work done by the gas in process 1-2 is -



CTF136

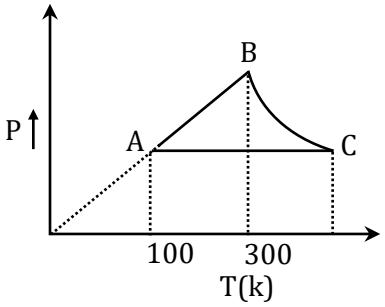
16. When 1 mole of ice melt at 0°C and at constant pressure of 1 atm, 1440 calories of heat are absorbed by the system. The molar volumes of ice and water are 0.0196 and 0.0180 litre respectively. Calculate ΔH and ΔU (in calori) for the reaction.

CTF137

17. Find the work done (in kJ) when one mole of the gas is expanded reversibly and isothermally from 5 atm to 1 atm at 27°C. (ln5 = 1.6)

CTF138

18. Calculate the net work done in the following cycle for one mol of an ideal gas (in calorie), where in process BC, PT = constant. (R = 2cal/mol-K).



CTF139

19. $\frac{1}{22.4}$ mol of an ideal monoatomic gas undergoes a reversible process for which $PV^2 = C$. The gas is expanded from initial volume of 1 L to final volume of 2 L starting from initial temperature of 273 K. Find the heat exchanged q during the process. Express your answer in litre atm.

$R = \frac{22.4}{273}$ L atm mole^{-1} degree^{-1}.

CTF140

20. For 1 mole of ideal monoatomic gas if $\frac{P}{V^2}$ = constant and initial temperature is 100 K. If gas is expanded from 1 L to 2 L then find

(a) heat capacity of the process (in cal/K-mol)

(b) total heat absorbed (in cal)

(c) work (in cal)

(d) (in cal) change in internal energy.

(Assume $R = 0.0821 \frac{L-atm}{mole-k}$, 1 L-atm = 24 cal)

CTF141

21. What is the degree of freedom of NH_3 at room temperature ?

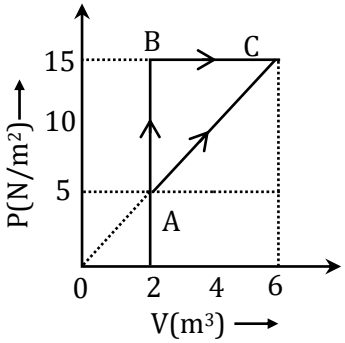
CTF106

22. Find total degree of freedom and break up as translational, rotational or vibrational degree of freedom in following cases.

(i) CO_2 (ii) SO_2 (iii) He (iv) NH_3

CTF142

23. The given figure shows a change of state A to state C by two paths ABC and AC for an ideal gas. Calculate the :



(a) Internal energy at C if the internal energy (in Joule) of gas at A is 10 J and amount of heat supplied to change its state to C through the path AC is 200J.

CTF143

(b) Amount of heat (in joule) supplied to the gas to go from A to B, if internal energy change of gas from A to B is 10 J.

CTF144

24. In an insulated container 1 mol of a liquid, molar volume 100 mL is at 1 bar. Liquid steeply taken to 100 bar, when volume of liquid decreases by 1 mL. Find ΔH and ΔU for the process in terms of bar–mL.

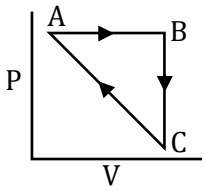
CTF115

25. Enthalpy change in calorie for 1 mol of diatomic ideal gas under going the state change (2 atm, 300 K) to (3 atm, 360 K) will be ?

CTF145

EXERCISE - JEE (Main) PYQ

1. An ideal gas undergoes a cyclic process as shown in figure.



Given :

$\Delta U_{BC} = -5$ kJ mol^{-1}, $q_{AB} = 2$ kJ mol^{-1}

$w_{AB} = -5$ kJ mol^{-1}, $W_{CA} = 3$ kJ mol^{-1}

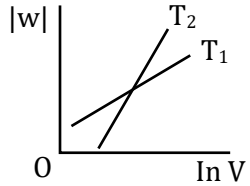
Heat absorbed by the system during process CA is :- **[JEE (Main) 2018]**

(1) 18 kJ mol^{-1} (2) +5 kJ mol^{-1} (3) –5 kJ mol^{-1} (4) –18 kJ mol^{-1}

CTF036

2. Consider the reversible isothermal expansion of an ideal gas in a closed system at two different temperatures T_1 and T_2 ($T_1 < T_2$). The correct graphical depiction of the dependence of work done (w) on the final volume (V) is: **[JEE (Main) 2019]**

(1)



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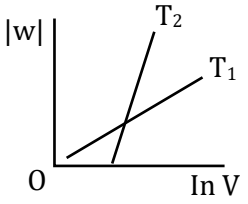

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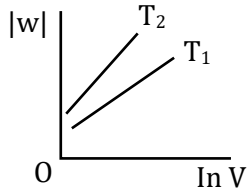
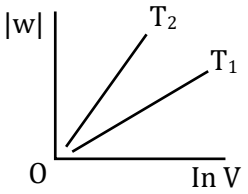


(4)



CTF037

3. An ideal gas undergoes isothermal compression from 5 m^3 to 1 m^3 against a constant external pressure of 4 Nm^{-2}. Heat released in this process is used to increase the temperature of 1 mole of Al. If molar heat capacity of Al is 24 J mol^{-1} K^{-1}, the temperature of Al increases by **[JEE (Main) 2019]**

(1) $\frac{3}{2}$ K (2) $\frac{2}{3}$ K (3) 1 K (4) 2 K

CTF038

4. An ideal gas is allowed to expand from 1L to 10L against a constant external pressure of 1 bar. The work done in kJ is : **[JEE (Main) 2019]**

(1) –9.0 (2) +10.0 (3) –0.9 (4) –2.0

CTF039

5. During compression of a spring the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. The change in internal energy, "U" (in kJ) is : **[JEE (Main) 2019]**

(1) –12 (2) –8 (3) 8 (4) 12

CTF040

6. Which one of the following equations does not correctly represent the first law of thermodynamics for the given process involving an ideal gas ? (Assume non expansion work is zero)

[JEE (Main) 2019]

(1) Cyclic process : $q = -w$
(2) Adiabatic process : $\Delta U = -w$
(3) Isochoric process : $\Delta U = q$
(4) Isothermal process : $q = -w$

CTF041

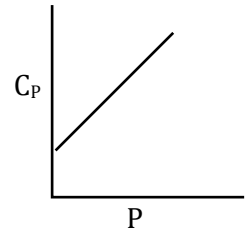
7. 5 mole of an ideal gas at 100 K are allowed to undergo reversible compression till its temperature becomes 200 K. If $C_v = 28\ J\ K^{-1}\ mol^{-1}$, calculate ΔU and ΔPV for this process. ($R = 8.0\ j\ K^{-1}\ mol^{-1}$)

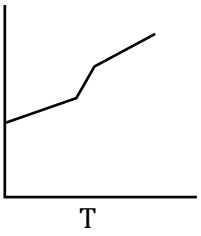
[JEE (Main) 2019]

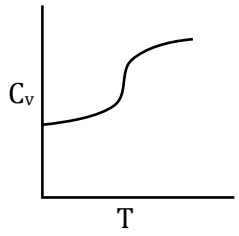
(1) $\Delta U = 14$ kJ; $\Delta(PV) = 18$ kJ
(2) $\Delta U = 14$ kJ; $\Delta(PV) = 0.8$ kJ
(3) $\Delta U = 14$ kJ; $\Delta(PV) = 4$ kJ
(4) $\Delta U = 14$ kJ; $\Delta(PV) = 8.0$ kJ

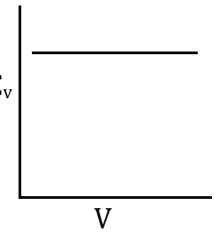
CTF042

8. For a diatomic ideal gas in a closed system, which of the following plots does not correctly describe the relation between various thermodynamic quantities ? **[JEE (Main) 2019]**

(1) 

(2) 

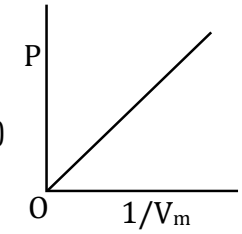
(3) 

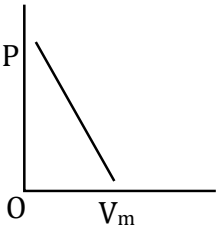
(4) 

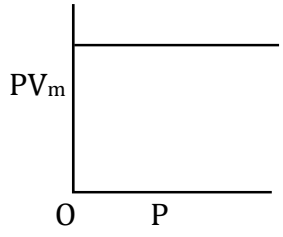
CTF043

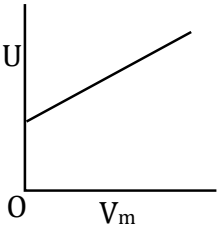
9. The combination of plots which does not represent isothermal expansion of an ideal gas is :

[JEE (Main) 2019]

(A) 

(B) 

(C) 

(D) 

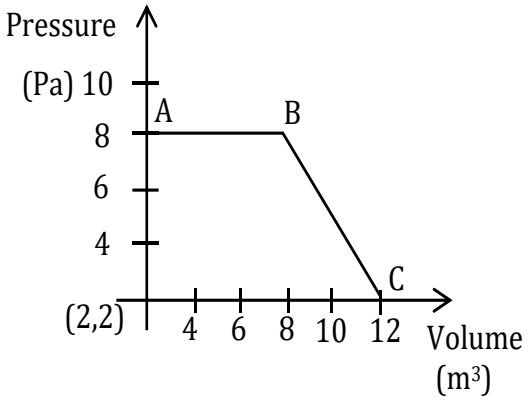
(1) (B) and (C) (2) (A) and (D) (3) (B) and (D) (4) (A) and (B)

CTF044

10. Five moles of an ideal gas at 1 bar and 298 K is expanded into vacuum to double the volume. The work done is _____ J. **[JEE (Main) 2020]**

CTF045

11. The magnitude of work done by a gas that undergoes a reversible expansion along the path ABC shown in the figure is _____ **[JEE (Main) 2020]**



CTF046

12. At constant volume, 4 mol of an ideal gas when heated from 300 K to 500K changes its internal energy by 5000 J. The molar heat capacity at constant volume is _____. **[JEE (Main) 2020]**

CTF047

13. 200mL of 0.2M HCl is mixed with 300 mL of 0.1 M NaOH. The molar heat of neutralization of this reaction is –57.1 kJ. The increase in temperature in °C of the system on mixing is $x \times 10^{-2}$.
The value of x is _____. (Nearest integer)
[Given : Specific heat water = 4.18 J $g^{-1}K^{-1}$
Density of water = 1.00 g cm^{-3}]
(Assume no volume change on mixing) **[JEE (Main) 2021]**

CTF048

14. The reaction of cyanamide, $NH_2CN_{(s)}$ with oxygen was run in a bomb calorimeter and ΔU was found to be –742.24 kJ mol^{1-}. The magnitude of ΔH_{298} for the reaction

$NH_2CN(s)+\frac{3}{2}O_2(g) \rightarrow N_2(g)+CO_2(g)+H_2O(\ell)$ is ___ kJ. (Rounded off to the nearest integer)

[Assume ideal gases and R = 8.314 J mol^{-1} K^{-1}] **[JEE (Main) 2021]**

CTF049

15. For the reaction
$H_2F_2(g) \rightarrow H_2(g) + F_2(g)$
$\Delta U = -59.6$ kJ mol^{-1} at 27°C.
The enthalpy change for the above reaction is (–) ___ kJ mol^{-1} [nearest integer]
Given : R = 8.314 JK^{-1} mol^{-1}. **[JEE (Main) 2022]**

CTF050

16. The molar heat capacity for an ideal gas at constant pressure is 20.785 J $K^{-1}mol^{-1}$. The change in internal energy is 5000 J upon heating it from 300K to 500K. The number of moles of the gas at constant volume is _____ [Nearest integer]
(Given: R = 8.314 J K^{-1} mol^{-1}) **[JEE (Main) 2022]**

CTF146

17. What happens when methane undergoes combustion in systems A and B respectively?

Adiabatic system	Diathermic container
System A	System B

[JEE (Main) 2023]

(1)

System A	System B
Temperature rises	Temperature remains same

(2)

System A	System B
Temperature falls	Temperature rises

(3)

System A	System B
Temperature falls	Temperature remains same

(4)

System A	System B
Temperature remains same	Temperature rises

CTF147

18. The total number of intensive properties from the following is ____

Volume, Molar heat capacity, Molarity, E^{θ}_{cell}, Gibbs free energy change, Molar mass, Mole

[JEE (Main) 2023]

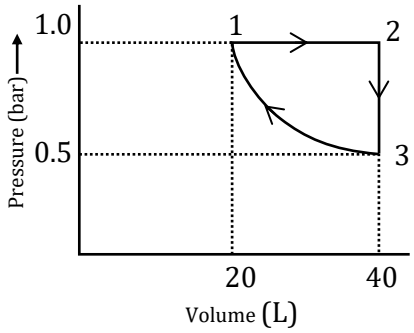
CTF148

19. When a 60 W electric heater is immersed in a gas for 100s in a constant volume container with adiabatic walls, the temperature of the gas rises by 5°C. The heat capacity of the given gas is _____ J K^{-1} (Nearest integer)

[JEE (Main) 2023]

CTF149

20. One mole of an ideal monoatomic gas is subjected to changes as shown in the graph. The magnitude of the work done (by the system or on the system) is _____ J (nearest integer).



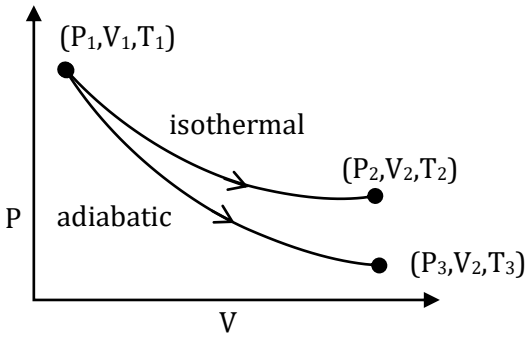
Given : log 2 = 0.3, ln 10 = 2.3

[JEE (Main) 2023]

CTF150

EXERCISE - JEE (Advanced) PYQ

1. The reversible expansion of an ideal gas under adiabatic and isothermal conditions is shown in the figure. Which of the following statement(s) is (are) correct ? **[JEE (Advanced) 2012]**



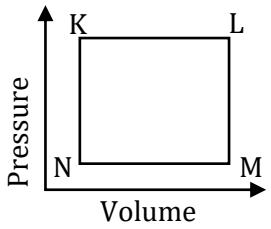
(A) $T_1 = T_2$ (B) $T_3 > T_1$

(C) $w_{isothermal} > w_{adiabatic}$ (D) $\Delta U_{isothermal} > \Delta U_{adiabatic}$

CTF070

Paragraph for Question 2 and 3

A fixed mass 'm' of a gas is subjected to transformation of states from K to L to M to N and back to K as shown in the figure.



2. The pair of isochoric processes among the transformation of states is **[JEE (Advanced) 2013]**

(A) K to L and L to M (B) L to M and N to K (C) L to M and M to N (D) M to N and N to K

CTF071

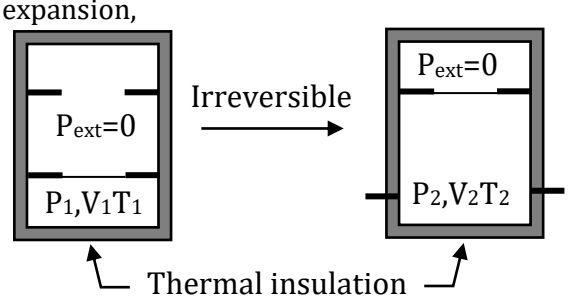
3. The succeeding operations that enable this transformation of states are **[JEE (Advanced) 2013]**

(A) Heating, cooling, heating, cooling (B) Cooling, heating, cooling, heating

(C) Heating, cooling, cooling, heating (D) Cooling, heating, heating, cooling

CTF072

4. An ideal gas in thermally insulated vessel at internal pressure = P_1, volume = V_1 and absolute temperature = T_1 expands irreversibly against zero external pressure, as shown in the diagram. The final internal pressure, volume and absolute temperature of the gas are P_2, V_2 and T_2, respectively. For this expansion, **[JEE (Advanced) 2014]**



(A) q = 0 (B) $T_2 = T_1$ (C) $P_2V_2 = P_1V_1$ (D) $P_2V_2^{\gamma} = P_1V_1^{\gamma}$

CTF073

5. An ideal gas is expanded from (p_1, V_1, T_1) to (p_2, V_2, T_2) under different conditions. The correct statement(s) among the following is(are) :- **[JEE (Advanced) 2017]**

(A) The work done on the gas is maximum when it is compressed irreversibly from (p_2, V_2) to (p_1, V_1) against constant pressure p_1

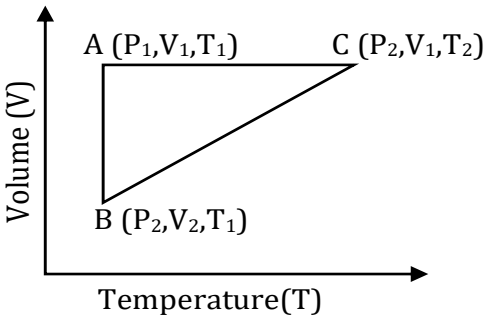
(B) The work done by the gas is less when it is expanded reversibly from V_1 to V_2 under adiabatic conditions as compared to that when expanded reversibly from V_1 to V_2 under isothermal conditions.

(C) The change in internal energy of the gas (i) zero, if it is expanded reversibly with $T_1 = T_2$, and (ii) positive, if it is expanded reversibly under adiabatic conditions with $T_1 \neq T_2$

(D) If the expansion is carried out freely, it is simultaneously both isothermal as well as adiabatic

CTF074

6. A reversible cyclic process for an ideal gas is shown below. Here, P, V and T are pressure, volume and temperature, respectively. The thermodynamic parameters q, w, H and U are heat, work, enthalpy and internal energy, respectively. **[JEE (Advanced) 2018]**



The correct option(s) is (are)

(A) $q_{AC} = \Delta U_{BC}$ and $w_{AB} = P_2 (V_2 - V_1)$

(B) $w_{BC} = P_2 (V_2 - V_1)$ and $q_{BC} = \Delta H_{AC}$

(C) $\Delta H_{CA} < \Delta U_{CA}$ and $q_{AC} = \Delta U_{BC}$

(D) $q_{BC} = \Delta H_{AC}$ and $\Delta H_{CA} > \Delta U_{CA}$

CTF075

7. In thermodynamics the P-V work done is given by

$$w = -\int dV P_{ext}$$

For a system undergoing a particular process, the work done is,

$$w = -\int dV \left(\frac{RT}{V-b} - \frac{a}{V^2} \right)$$

This equation is applicable to a **[JEE (Advanced) 2020]**

(A) System that satisfies the van der Waals equation of state.

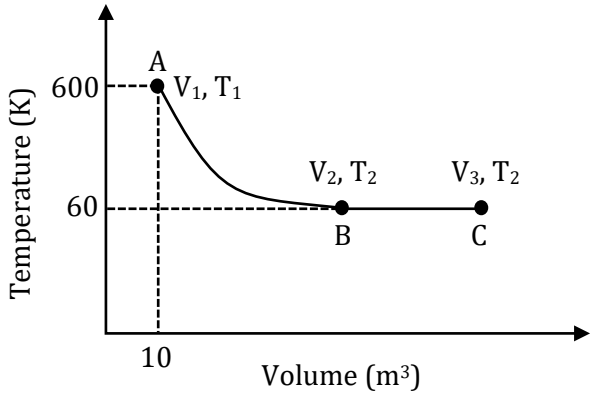
(B) Process that is reversible and isothermal.

(C) Process that is reversible and adiabatic.

(D) Process that is irreversible and at constant isothermal.

CTF076

8. One mole of an ideal monoatomic gas undergoes two reversible processes (A $\rightarrow$ B and B $\rightarrow$ C) as shown in the given figure :



A $\rightarrow$ B is an adiabatic process. If the total heat absorbed in the entire process (A $\rightarrow$ B and B $\rightarrow$ C) is $RT_2 \ln 10$, the value of $2 \log V_3$ is _____.

[Use, molar heat capacity of the gas at constant pressure, $C_{p,m} = \frac{5}{2} R$]

[JEE (Advanced) 2023]

CTF151

JEE (Main) Practice Paper

This paper is for yourself practice and assessment the discussion of this paper is optional though you can see PDF solutions or video solutions or solutions in hardcopy whichever is provided.

SECTION–A

- This section contains **TWENTY** questions.
- Each question has **FOUR** options (1), (2), (3) and (4). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +4, if only the bubble corresponding to the correct option is darkened.
Zero Marks : 0, if none of the bubbles is darkened.
Negative Marks : –1 in all other cases

---

1. The piece of zinc at a temperature of 20.0°C weighing 65.38 g is dropped into 180 g of boiling water (T = 100°C). The specific heat of zinc is 0.400 J g^{-1} $°C^{-1}$ and that of water is 4.20 J $g^{-1}°C^{-1}$. What is the final common temperature reached by both the zinc and water :-

(1) 97.3°C (2) 33.4°C (3) 80.1°C (4) 60.0°C

CTF001

2. What is the change in internal energy ΔU, for a system that does 70 joules of work as it absorbs 45 joules of heat ?

(1) 115 J (2) 25 J (3) –25 J (4) –115 J

CTF002

3. When 1 mol gas is heated at constant volume, temperature is raised from 298 to 308 K. Heat supplied to the gas is 500 J. Then which statement is correct :-

(1) q = w = 500 J, ΔU = 0 (2) q = ΔU = 500 J, w = 0
(3) q = w = 500 J, ΔU = 0 (4) ΔU = 0, q = w = –500 J

CTF003

4. How much heat, in joules, must be added to 0.250 mol of Ar(g) to raise its temperature from 20°C to 36.0°C at constant pressure ?

(1) 50.0 (2) 83.2 (3) 187 (4) 200

CTF004

5. Two moles of an ideal monoatomic gas are allowed to expand adiabatically and reversibly from 300 K and 200 K. The work done in the system is (C_v = 12.5 J/K/mol)

(1) –12.5 kJ (2) –2.5 kJ (3) –6.25 kJ (4) 500 kJ

CTF005

6. The difference between heat of reaction at constant pressure and constant volume for the reaction $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(l)$ at 25° in kJ mol^{-1} is :-

(1) –7.43 (2) +3.72 (3) –3.72 (4) +7.43

CTF006

7. Molar heat capacity of water in equilibrium with ice at constant pressure is :-

(1) zero (2) infinity (3) 40.45 kJ K^{-1} mol^{-1} (4) 75.48 kJ K^{-1} mol^{-1}

CTF007

8. One mole of an ideal monoatomic gas expanded irreversibly in two stage expansion.
State-1 (8.0 bar, 4.0 litre, 300 K)
State-2 (2.0 bar, 16litre, 300 K)
State-3 (1.0 bar, 32 litre, 300 K)
Total heat absorbed by the gas in the process is :
(1) 116 J (2) 40 J (3) 4000 J (4) None of these

CTF008

9. The gas expands adiabatically at constant pressure such that:- $T \propto \frac{1}{\sqrt{V}}$.

The value of γ, i.e. (C_p/C_v) of the gas will be:
(1) 1.30 (2) 1.50 (3) 1.70 (4) 2

CTF009

10. If the internal energy of an ideal gas decreases by the same amount as the work done by the system, the process is
(1) cyclic (2) isothermal (3) adiabatic (4) isolated

CTF010

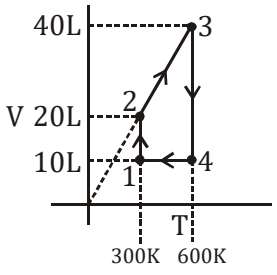
11. An insulated container of gas has two chambers separated by an insulating partition. One of the chambers has volume V_1 and contains ideal gas at pressure P_1 and temperature T_1. The other chamber has volume V_2 and contains same ideal gas at pressure P_2 and temperature T_2. If the partition is removed without doing any work on the gas, the final equilibrium temperature of the gas in the container will be :
(1) $\frac{T_1T_2(P_1V_1+P_2V_2)}{P_1V_1T_2+P_2V_2T_1}$ (2) $\frac{P_1V_1T_1+P_2V_2T_2}{P_1V_1+P_2V_2}$ (3) $\frac{P_1V_1T_2+P_2V_2T_1}{P_1V_1+P_2V_2}$ (4) $\frac{T_1T_2(P_1V_1+P_2V_2)}{P_1V_1T_1+P_2V_2T_2}$

CTF011

12. For a process which follows the equation $PV^3 = C$, the work done when one mole of ideal gas was taken from 1 atm to $2\sqrt{2}$ atm starting from initial temperature of 300 K is
(1) 300 R (2) 150 R (3) 600 R (4) 900 R

CTF012

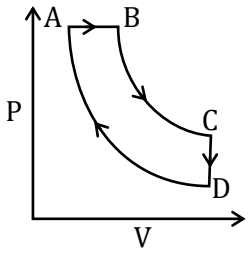
13. What is the net work done (w) when 1 mole of monoatomic ideal gas undergoes in a process described by 1, 2, 3, 4 in given V–T graph
Use : R = 2cal/mole K
ln 2 = 0.7

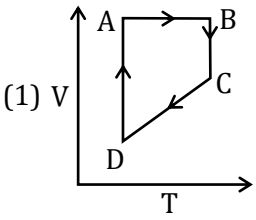


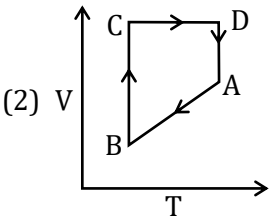
(1) –600 cal (2) – 660 cal (3) + 660 cal (4) + 600 cal

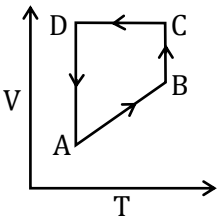
CTF013

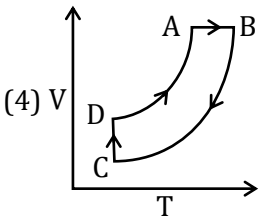
14. A cyclic process ABCD is shown in PV diagram for an ideal gas. Which of the following diagram represents the same process ?



(1) 

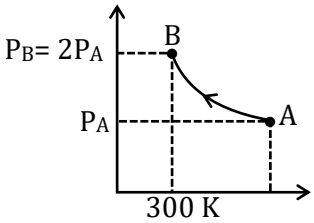
(2) 

(3) 

(4) 

CTF014

15. 2 moles of an ideal monoatomic gas is taken from state A to state B through a process AB in which PT = constant. The process can be represented on a P-T graph as follows:



$P_B = 2P_A$

Select the incorrect option(s):

(1) Heat evolved by the gas during process AB = 2100 R

(2) Heat absorbed by the gas during process AB = 2100 R

(3) dU = –900 R

(4) W = –1200R

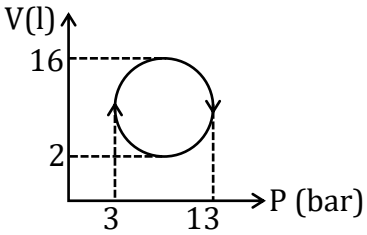
CTF015

16. The heat capacity of liquid water is 75.6 J/mol.K, while the enthalpy of fusion of ice is 6.0 kJ/mol. What is the smallest number of ice cubes at 0°C, each containing 9.0 g of water, needed to cool 500 g of liquid water from 20°C to 0°C ?

(1) 1 (2) 7 (3) 14 (4) 252

CTF016

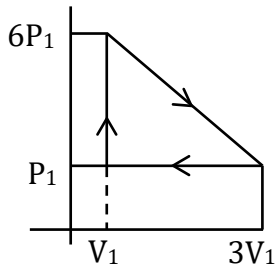
17. Work (in kJ) in the following cyclic process is



(1) –11 (2) –11000 (3) 11 (4) 11000

CTF017

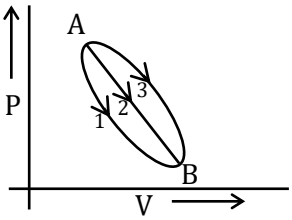
18. An ideal gas is taken around the cycle ABCA as shown in P–V diagram. The Net work done during the cycle is equal to:



(1) $12\ P_1V_1$ (2) $6\ P_1V_1$ (3) $5\ P_1V_1$ (4) P_1V_1

CTF018

19. A given mass of gas expands reversibly A to B by three paths 1, 2 and 3 as shown in the figure. If w_1, w_2 and w_3 respectively be work done by the gas along paths then :



(1) $w_1 > w_2 > w_3$ (2) $w_1 < w_2 < w_3$ (3) $w_1 = w_2 = w_3$ (4) $w_2 < w_3 < w_1$

CTF019

20. An ideal gas expands against a constant external pressure 2.0 atm from 20L to 40L and absorbs 10 kJ of heat from surrounding what is the change in internal energy of system (1atm litre = 101.3 J)

(1) 4052 J (2) 5948 J (3) 14052 J (4) 9940 J

CTF020

SECTION-B

- This section will have **TEN questions**. Candidate can choose to attempt any 5 questions out of these 10 questions. In case if candidate attempts more than 5 questions, first 5 attempted questions will be considered for marking.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value (Answer should be rounded off to the nearest integer).
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4, if only correct answer is given.
Zero Marks : 0, if no answer is given.
Negative Marks :-1 for incorrect answer

1. How many changes at constant pressure is work done by the surrounding on system ?

Initial state		**Final state**
(i) H_2O (g)	$\longrightarrow$	H_2O(l)
(ii) H_2O (s)	$\longrightarrow$	H_2O(g)
(iii) H_2O (l)	$\longrightarrow$	H_2O(s)
(iv) $3H_2$ (g) + N_2(g)	$\longrightarrow$	$2NH_3$(g)
(v) $CaCO_3$ (s)	$\longrightarrow$	CaO (s) + CO_2(g)
(vi) $2O_3$ (g)	$\longrightarrow$	$3O_2$(g)
(vii) N_2O_4 (g)	$\longrightarrow$	$2NO_2$(g)
(viii) A(g) + B(g)	$\longrightarrow$	C(g)
(ix) $2C_6H_6$(l) + $15O_2$ (g)	$\longrightarrow$	$12CO_2$ (g) + $6H_2O$(l)
(x) CH_4(g) + $2Cl_2$(g)	$\longrightarrow$	CCl_4(l) + $2H_2$(g)

CTF021

2. The gas is cooled and loses 65 J of heat. The gas contracts as it cools and work done on the system equal to 20 J which is exchanged with the surroundings. What is the value of ΔE (in joules) ?

CTF022

3. Molar heat capacity of an ideal gas at constant volume is given by $C_V = (16.5 + 10^{-2}\,T)\ \frac{J}{K\text{-}mol}$.

If 2 moles of this ideal gas are heated at constant volume from 300K to 400K. Then the change in internal energy (in kJ) will be approximately.

CTF023

4. What is ΔU in kJ when 2.0 mole of liquid water vaporises at 100°C ? The heat of vaporisation, (ΔH vap.) of water at 100°C is 40.66 kJ mol^{-1}.

CTF024

5. If 1.0 kcal of heat is added to 1.2 L of O_2 in a cylinder at constant pressure of 1 atm, the volume increases to 1.5 L. Calculate ΔE of the process in kJ.

CTF025

6. Water expands when it freezes. Determine amount of work (in joules), done when a system consisting of 1.0 L of liquid water freezes under a constant pressure of 1.0 atm and forms 1.1 L of ice.

CTF026

7. One mole of solid Zn is placed in excess of dilute H_2SO_4 at 27°C in a cylinder fitted with a piston. Find the value of ΔE (in kJ) for the process if the area of piston is 500 cm^2 and it moves out by 50 cm against a pressure of 1 atm during the reaction. The heat given to surrounding is 36.5 kJ.

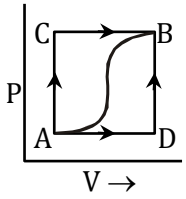
$Zn(s) + 2H^{\oplus}(aq) \rightarrow Zn^{2\oplus}(aq) + H_2(g)$

CTF027

8. Five moles of an ideal gas at 300K, expanded isothermally from an initial pressure of 4 atm to a final pressure of 1 atm against a constant external pressure of 1 atm. Calculate the corresponding value of the total work done (in kJ) all if expansion process is followed by reversible compression process for same value of pressure and temperature (ln2 = 0.7, R = 8.3 J/kmol)

CTF028

9. When a system is taken from state A to state B along the path ACB, 80J of heat flows into the system and the system does 30J of work. Find (in joule)



How much heat flows into the system along path ADB if the work done by the system is 10J ?

CTF029

10. Find the value of $\left(\frac{X}{Y}\right)\times Z$

Where X = Total degree of freedom of O_2
Y = Total degree of freedom of Ne
Z = Total degree of freedom of H_2O
(Consider vibrational degree of freedom)

CTF030

JEE (Advanced) Practice Paper

This paper is for yourself practice and assessment the discussion of this paper is optional though you can see PDF solutions or video solutions or solutions in hardcopy whichever is provided.

SECTION–I

- This section contains **SIX** questions.
- Each question has FOUR options (A), (B), (C) and (D). ONLY ONE of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories:

Full Marks : +3, If only the bubble corresponding to the correct option is darkened.
Zero Marks : 0, If none of the bubbles is darkened.
Negative Marks : –1, in all other cases

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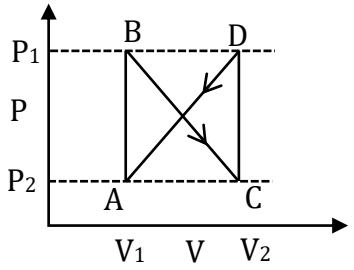
1. Out of boiling point (I), entropy (II), pH (III) and density (IV), intensive properties are
(A) I, II (B) I, II, III (C) I, III, IV (D) All of these

CTF051

2. A gas $\left(C_{v,m}=\frac{5}{2}R\right)$ behaving ideally was allowed to expand reversibly and adiabatically from 1 litre to 32 litre. Its initial temperature was 327° C. The molar enthalpy change (in J/mole) for the process is :-
(A) –1125 R (B) – 575 R (C) –1575 R (D) None of these

CTF052

3. An ideal gas is taken around the cycle ABCDA as shown in figure. The net work done during the cycle is equal to :-



(A) Zero (B) Positive (C) Negative (D) We cannot predict

CTF053

4. An amount Q of heat is added to a monoatomic ideal gas in a process in which the gas performers a work Q/2 on its surrounding. The molar heat capacity of gas (in cal/K-mol) for the process is.
(A) 3R (B) 5R (C) 4R (D) 2R

CTF054

5. **Statement-1 :** There is no change in enthalpy of an ideal gas during compression at constant temperature.
Statement-2 : Enthalpy of an ideal gas is a function of temperature and pressure.
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is **NOT** the correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is false, statement-2 is true.

CTF055

6. **Statement-1 :** Due to adiabatic expansion, the temperature of an ideal gas always decreases.
Statement-2 : For an adiabatic process, $\Delta U = w$.
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is **NOT** the correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is false, statement-2 is true.

CTF056

SECTION–II

- This section contains **FIVE** questions.
- Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct option(s).
- For each question, choose the correct option(s) to answer the question.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks	:	+4, if only (all) the correct option(s) is (are) chosen.
Partial Marks	:	+3, if all the four options are correct but ONLY three options are chosen.
Partial Marks	:	+2, if three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks	:	+1, if two or more options are correct but ONLY one option is chosen and it is a correct option.
Zero Marks	:	0, if none of the options is chosen (i.e. the question is unanswered).
Negative Marks	:	–2 in all other cases.

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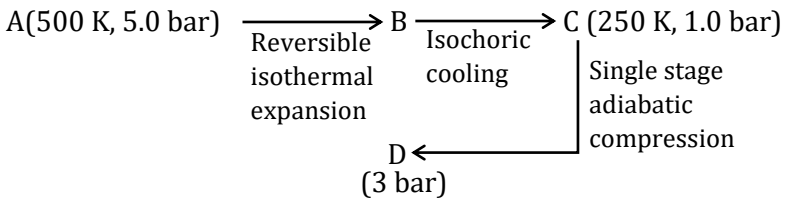
7. Two moles of an ideal gas ($C_{v,m} = \frac{3}{2}R$) is subjected to following change of state



The correct statement is/are
(A) The pressure at B is 2.0 bar
(B) The temperature at D is 450 K
(C) $\Delta H_{CD} = 1000\ R$
(D) $\Delta U_{BC} = 375\ R$

CTF057

8. Which of the following statement is/are correct ?
(A) Enthalpy can be written as H = f(P, T) for a substance (no physical or chemical change)
(B) Absolute value of enthalpy cannot be determined
(C) The heat absorbed during the isothermal expansion of an ideal gas against vacuum is zero
(D) During compression of an ideal gas at constant pressure the temperature of gas decreases.

CTF058

9. Choose the correct statement(s)

(A) During adiabatic expansion of an ideal gas, magnitude of work obtained is equal to ΔH of gas.

(B) For same change in temperature of ideal gas through adiabatic process, magnitude of W will be same in reversible as well as irreversible process

(C) During an adiabatic reversible expansion of an ideal gas, temperature of the system increases.

(D) For same change in volume of ideal gas, ΔU is less in adiabatic expansion than in isobaric expansion if expansion starts with same initial state.

CTF059

10. Choose the correct statement(s) among the following -

(A) Internal energy of H_2O remains constant during conversion of liquid into its vapour at constant temperature.

(B) During fusion of ice into water, enthalpy change and internal energy change are almost same at constant temperature

(C) Molar heat capacity of gases is temperature dependent

(D) During boiling of H_2O at 1 atm, 100°C, average kinetic energy of H_2O molecules increases.

CTF060

11. Suppose that the volume of a certain ideal gas is to be doubled by one of the following processes :

(A) isothermal expansion (B) adiabatic expansion

(C) free expansion in insulated condition (D) expansion at constant pressure.

If E_1, E_2, E_3 and E_4 respectively are the changes in average kinetic energy of the molecules for the above four processes, then-

(A) $E_2 = E_3$ (B) $E_1 = E_3$ (C) $E_1 > E_4$ (D) $E_4 > E_3$

CTF061

SECTION–III

- This section contains **THREE** questions.
- Each question has matching lists. The codes for the lists have choices (A), (B), (C) and (D) out of which ONLY ONE is correct
- For each question, marks will be awarded in one of the following categories :

Full Marks : +3, if only the bubble corresponding to the correct option is darkened.

Zero Marks : 0, if none of the bubbles is darkened.

Negative Marks : –1, in all other cases.

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12. Match Column-I with Column-II

Column–I (Ideal Gas)	**Column-II (Related equations)**
(P) Reversible isothermal process	(1) $W = 2.303\ n\ RT \log(P_2/P_1)$
(Q) Reversible adiabatic process	(2) $W = nC_{V,m}(T_2 - T_1)$
(R) Irreversible adiabatic process	(3) $W = -2.303nRT \log(V_2/V_1)$
(S) Irreversible isothermal process	(4) $W = -\int_{V_i}^{V_f} P_{ext.}\,dV$

(A) P → 1,3,4; Q → 2,4; R → 2,4; S → 4 (B) P → 1; Q → 2; R → 4; S → 3

(C) P → 2; Q → 1; R → 3; S → 4 (D) P → 1; Q → 2; R → 3; S → 4

CTF062

13. Match the column

Column–I	**Column–II**
(P) Isothermal vaporisation of water at 100°C & 1 atm	(1) $\Delta T = 0$
(Q) Isothermal reversible expansion of an ideal gas	(2) $\Delta U = 0$
(R) Adiabatic free expansion of ideal gas	(3) $\Delta H = 0$
(S) Isochoric heating of an ideal gas	(4) $q = 0$
	(5) $w = 0$

(A) P → 1; Q → 1,2,3; R → 1,2,3,4,5; S → 5 (B) P → 1, 2; Q → 2,4, 5; R → 4; S → 3
(C) P → 2; Q → 1,2,3; R → 3; S → 4, 5 (D) P → 1, 3, 5; Q → 2; R → 3; S → 4

CTF063

14. Match the following, and select the correct code :-

Column-I	**Column-II**
(P) Isothermal process (reversible)	(1) $q = 2.303\ nRT \log \frac{P_1}{P_2}$
(Q) Adiabatic process (reversible)	(2) $PV^{\gamma} = \text{const.}$
(R) Isochoric process	(3) $q = P_{ext.}(V_2 - V_1)$
(S) Isothermal process (irreversible)	(4) Area under P-V curve is zero

(A) P-2; Q-1; R-4; S-3 (B) P-1; Q-2; R-4; S-3
(C) P-2; Q-1; R-3; S-4 (D) P-1; Q-2; R-3; S-4

CTF064

SECTION–IV

- This section contains **a** paragraph.
- Based on each paragraph, there are **THREE** questions.
- Each question has **FOUR** options (A), (B), (C) and (D) **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +3, if only the bubble corresponding to the correct answer is darkened.
Zero Marks : 0 in all other cases.

Paragraph for Question 15, 16 and 17

As a result of the isobaric heating by $\Delta T = 72K$, one mole of a certain ideal gas obtains an amount of heat Q = 1.60 kJ.

15. The work performed by the gas is -
(A) 8.60 kJ (B) 0.60 kJ (C) 16.60 kJ (D) 4.60 kJ

CTF065

16. The increment of its internal energy (in kJ) is
(A) 1.0 (B) 1.6 (C) 2.2 (D) 2.0

CTF066

17. The value of γ for the gas is -
(A) 0.6 (B) 1.4 (C) 1.6 (D) 1.5

CTF067

SECTION–V

- This section contains **TWO** questions.
- The answer to each question is a **NUMERICAL VALUE.**
- For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g. 6.25, 7.00, –0.33, –.30, 30.27, –127.30, if answer is 11.36777..... then both 11.36 and 11.37 will be correct).
- Answer to each question will be evaluated according to the following marking scheme:
  Full Marks : +3, if ONLY the correct numerical value is entered as answer.
  Zero Marks : 0 in all other cases.

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18. The volume of a gas decreases from 500 cc to 300 cc when a sample of gas is compressed by an average constant pressure of 0.6 atm. During this process 10 J of heat is liberated. The change in internal energy is (round off to the nearest integer)

CTF068

19. Calculate the magnitude of work done by 2 mole ideal gas in kJ, when expansion is taking place from 2 litre to 22 litre against constant external pressure of 1 atm
[**Given :** 1 litre-atm = 100 J]

CTF069

ANSWER KEY

EXERCISE - O

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	B	C	C	B	D	A	A	C	B	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	A	C	D	D	A	C	A	A	B	A
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	C	B	B	A	B	A	D	C	D	B
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	C	A	ABC	BCD	AC	ACD	AB	CD	ABC	ABC
Que.	41									
Ans.	ACD									

EXERCISE - S

1. 4 **2.** 3.29 **3.** – 810.4 **4.** 290.8 **5.** –4.00
6. 8250.00 **7.** 303.9 **8.** 3.50 **9.** –900.00 **10.** 13.00
11. 9.00 **12.** –3.00 **13.** –562.50, –1.20 **14.** 500.00 **15.** 3.50
16. 1440.00 , (1440.03 to 1440.04) **17.** –3.90 to –4.00 **18.** –800.00 **19.** –0.25
20. ((a) 3.67 ; (b) 2566.67 ; (c) –466.67 ; (d) 2100.00) **21.** 6
22. (i) 9, 3, 2, 4 (ii) 9, 3, 3, 3 (iii) 3, 3, 0, 0 (iv) 12, 3, 3, 6 **23.** (a) 170.00 (b) 10.00
24. 9900 **25.** 420.00

EXERCISE - JEE (Main) PYQ

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	2	2	2	3	3	2	3	1	3	0
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	48	6.25	82	741	57	2	1	4	1200	620

EXERCISE - JEE (Advanced) PYQ

Que.	1	2	3	4	5	6	7	8
Ans.	ACD	B	C	ABC	ABD	BC	ABC	7

JEE (Main) Practice Paper

Section-A	Q.	1	2	3	4	5	6	7	8	9	10
	A.	1	3	2	2	2	1	2	3	2	3
	Q.	11	12	13	14	15	16	17	18	19	20
	A.	1	2	3	3	2	3	3	3	2	2
Section-B	Q.	1	2	3	4	5	6	7	8	9	10
	A.	5	–45	4	75	4	–10	–39	8	60	18

JEE (Advanced) Practice Paper

Section-I	**Q.**	**1**	**2**	**3**	**4**	**5**	**6**	
	A.	C	C	A	A	C	B	
Section-II	**Q.**	**7**	**8**	**9**	**10**	**11**		
	A.	ABC	ABCD	BD	BC	BD		
Section-III	**Q.**	**12**	**13**	**14**				
	A.	A	A	B				
Section-IV	**Q.**	**15**	**16**	**17**				
	A.	B	A	C				
Section-V	**Q.**	**18**	**19**					
	A.	2.00	2.00					

Important Notes