

[MHT-CET 2007]

1. Which of the following is a path function ?
 a) Internal energy b) Enthalpy c) Work d) Entropy

[MHT-CET 2009]

2. At the same conditions of pressure, volume and temperature, work done is maximum for which gas if all gases have equal masses ?
 a) NH_3 b) N_2 c) Cl_2 d) H_2S

[MHT-CET 2016]

3. Identify an extensive property amongst the following.
 a) Viscosity b) Heat capacity c) Density d) Surface tension

[MHT-CET 2019]

4. Which of following properties is extensive?
 a) Volume b) Density c) Melting point d) Boiling point

[MHT-CET 2020]

5. Which of the following is NOT an intensive property?
 a) Surface tension b) Density c) Heat capacity d) Refractive index
6. Which is true for heat and temperature?
 a) Both are intensive properties
 b) Intensive and extensive properties respectively
 c) Both are extensive properties
 d) Extensive and intensive properties respectively
7. Which of the following is an extensive property ?
 a) Density b) Surface tension
 c) Specific heat d) Volume
8. Thermodynamics deals with
 a) microscopic properties of system
 b) macroscopic properties of the system.
 c) rates at which physical and chemical processes occur.
 d) the path between the two states of the system.
9. Which of the following is an intensive property ?
 a) Internal energy b) Mass
 c) Volume d) Melting point
10. Identify the unit used for measurement of energy according to international system of units.
 a) $\text{J K}^{-1} \text{mol}^{-1}$ b) $\text{kg m}^2 \text{s}^{-2}$
 c) $\text{kg m}^{-1} \text{s}^{-2}$ d) $\text{kg m}^{-2} \text{s}^2$

[MHT-CET 2021]

11. The expansion of gas having no opposing force is called as
 a) free expansion b) reversible expansion
 c) adiabatic expansion d) isothermal expansion
12. What is the constant external pressure of an ideal gas when expanded from $2 \times 10^{-2} \text{ m}^3$ to $3 \times 10^{-2} \text{ m}^3$, if the work done by the gas is -5.09 kJ ?
 a) $5.09 \times 10^5 \text{ Nm}^{-2}$ b) $1.01 \times 10^5 \text{ Nm}^{-2}$ c) $2.02 \times 10^5 \text{ Nm}^{-2}$ d) $5.60 \times 10^5 \text{ Nm}^{-2}$
13. Which among the following is an extensive property?
 a) volume b) viscosity c) surface tension d) specific heat
14. The change in internal energy of a system depends upon
 a) initial and final states of a system b) path followed by system
 c) total and final states of a system d) number of steps involved in system.
15. Which among the following is NOT an extensive property?
 a) Mass b) Volume c) Pressure d) Internal energy

[MHT-CET 2022]

16. Which among the following pairs is of extensive and intensive properties respectively?
 a) Surface tension and heat capacity b) Viscosity and pressure
 c) Volume and number of moles d) Internal energy and temperature
17. Which among the following properties is NOT a state function?
 a) Pressure b) Enthalpy c) Work d) Volume
18. Which among the following is NOT an intensive property?
 a) Heat capacity b) Surface tension c) Viscosity d) Pressure
19. Identify false statement among the following.
 a) Work is a state function
 b) Pressure and volume are state functions.
 c) Work appears at the boundary of the system.
 d) Temperature is a state function.

First Law of thermodynamics and Internal energy

[MHT-CET 2006]

20. In a closed container, a liquid is stirred with a paddle to increase the temperature. Which of the following is true?
 a) $\Delta U = W \neq 0, Q = 0$ b) $\Delta U = W = Q, Q \neq 0$
 c) $\Delta U = 0, W = Q, Q \neq 0$ d) $W = 0, \Delta U = Q, Q \neq 0$

[MHT-CET 2009]

21. In..... process, work is done at the expense of internal energy
 a) isothermal b) isochoric c) adiabatic d) isobaric

[MHT-CET 2015]

22. Find the correct equation.
 a) $U_2 - U_1 - H_2 + H_1 = n_2 RT - n_1 RT$ b) $U_2 - U_1 - H_2 + H_1 = n_2 RT + n_1 RT$
 c) $H_2 - H_1 - U_2 + U_1 = n_2 RT - n_1 RT$ d) $H_2 - H_1 - U_2 + U_1 = n_2 RT + n_1 RT$

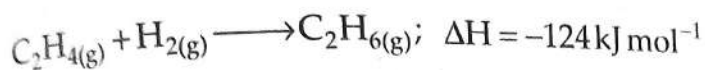
In which of the following reactions, ΔH is not equal to ΔU ?

35. a) $2\text{SO}_{2(g)} + \text{NO}_{2(g)} \longrightarrow \text{SO}_{3(g)} + \text{NO}_{(g)}$ b) $\text{N}_{2(g)} + \text{O}_{2(g)} \longrightarrow 2\text{NO}_{(g)}$
 c) $\text{H}_{2(g)} + \text{I}_{2(g)} \longrightarrow 2\text{HI}_{(g)}$ d) $2\text{SO}_{2(g)} + \text{O}_{2(g)} \longrightarrow 2\text{SO}_{3(g)}$

36. 2.5 kJ of work is done on the system and it releases 1500 J of heat. What is the change in internal energy?

- a) 4000 J b) 1000 J c) 1500 J d) 2500 J

37. From the following reaction, calculate the amount of heat liberated during formation of 75 g ethane. (At mass: C = 12, H = 1)



- a) 248 kJ b) 310 kJ c) 372 kJ d) 284 kJ

38. A sample of gas absorbs 4000 kJ of heat and surrounding does 2000 J of work on sample, what is the value of ΔU ?

- a) 4000 kJ b) 6000 kJ c) 2000 kJ d) 4002 kJ

39. Which of the following statements does not represent first law of thermodynamics?

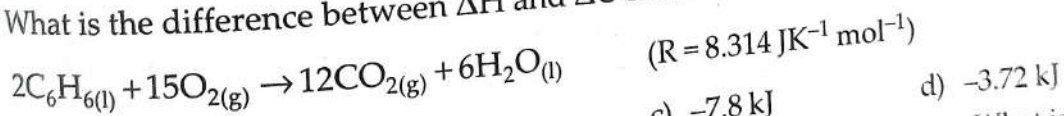
- a) The spontaneous flow of heat is always unidirectional from high to low temperature.
 b) The total internal energy of an isolated system is constant.
 c) Total energy of universe is constant.
 d) When one form of energy disappears, exactly equivalent amount of other form must appear.

[MHT-CET 2021]

40. What is the value of $\Delta H - \Delta U$ for the formation of 2 moles of ammonia from $\text{H}_{2(g)}$ and $\text{N}_{2(g)}$?

- a) $-\frac{RT}{2}$ b) $\frac{RT}{2}$ c) $-2RT$ d) $2RT$

41. What is the difference between ΔH and ΔU for reaction given below at 298 K?



- a) -2.72 kJ b) -7.43 kJ c) -7.8 kJ d) -3.72 kJ

42. A system gives out x J of heat and does y J of work on its surrounding. What is the internal energy change?

- a) $-x - y$ b) $y - x$ c) $x - y$ d) $x + y$

43. A system does 394 J of work on surrounding by absorbing 701 J heat. What is the change in internal energy of the system?

- a) 547 J b) 1095 J c) 307 J d) 394 J

44. In a process, a system perform 238 J of work on it's surrounding by absorbing 54 J of heat. What is the change in internal energy of system during this operation?

- a) 222 J b) -192 J c) 54 J d) -184 J

45. When x kJ heat is provided to a system, work equivalent to y J is done on it. What is internal energy change during this operation?

- a) $(1000x + y)$ J b) $1000(x + y)$ J c) $(x + 1000y)$ J d) $x + y$ J

46. For isochoric process, the first law of thermodynamics can be expressed as

- a) $\Delta U = Q_V$ b) $\Delta U = Q - P\Delta V$ c) $\Delta U = -W$ d) $W = -Q$

47. For isobaric process the mathematical expression of first law of thermodynamics can be expressed as -
 a) $\Delta U = Q_V$ b) $-\Delta U = -W$ c) $W = -Q$ d) $\Delta U = Q_p - P\Delta V$
48. A system gives out 30 J heat and does 75 J work on its surroundings. What is the internal energy change?
 a) -30 J b) -75 J c) -105 J d) -45 J
49. What is the difference between ΔH and ΔU at 298 K for the following reaction?

$$C_2H_4(g) + 3O_2(g) \longrightarrow 2CO_2(g) + 2H_2O(l)$$

 a) -4.95 kJ b) -7.30 kJ c) -2.45 kJ d) -14.8 kJ
50. Which of the following is NOT true for relation between ΔH and ΔU ?
 a) If $\Delta n = 0$, $\Delta H = \Delta U$ b) If $\Delta n < 0$, $\Delta H < \Delta U$
 c) If $\Delta n > 0$, $\Delta H > \Delta U$ d) If $\Delta n < 0$, $\Delta H > \Delta U$
51. In a reversible process the system absorbs 652 kJ of heat and performs 250 kJ work. What is the increase in internal energy of the system?
 a) 750 kJ b) 875 kJ c) 187 kJ d) 402 kJ
52. A system absorbs x J of heat and does y J of work on its surrounding. What is the internal energy change?
 a) $x - y$ J b) xy J c) $x + y$ J d) $y - x$ J
53. 2 L of gas at STP is supplied with 300 J of heat. What will be the change in internal energy when volume of gas increases to 2.5 L?
 a) 249.3 J b) 300 J c) 600 J d) 350.6 J
54. During a process, system absorbs x J heat and does some work. The change in internal energy for the process is y J. What is the work done by the system?
 a) $-x - y$ b) $y - x$ J c) $x + y$ J d) $x - y$ J
55. A gas is allowed to expand in an insulated container against a constant external pressure of 2.5 atm from 2.5 to 4.5 L, the change in internal energy of the gas in joules is
 a) -836.3 J b) -1136.2 J c) -450 J d) -506.5 J
- [MHT-CET 2022]**
56. If a system absorbs 30 kJ of heat and performs 12 kJ of work on the surrounding. What is the increase in internal energy of the system?
 a) 18 kJ b) 360 kJ c) 42 kJ d) 2.5 kJ
57. Identify the process having $\Delta V = 0$.
 a) Isobaric b) Isochoric c) Adiabatic d) Isothermal
58. If 65 kJ of work is done on the system and it releases 25 kJ of heat. What is change in internal energy of the system?
 a) 90 kJ b) 16.25 kJ c) 2.6 kJ d) 40 kJ
59. What is change in internal energy if a system gains x J of heat and y J work is done on it?
 a) $x + y$ b) $x - y$ c) $-x - y$ d) $-x + y$
60. A certain system is exothermic by 260 kJ and does 10 kJ of work. What is the change in internal energy?
 a) -250 kJ b) -270 kJ c) -140 kJ d) -540 kJ

- Chemical
61. A gas is of 2.5 bar
 a) -112
62. Calculate system
 a) -23.0
63. What is and 40
 a) -180
64. For the ΔU is the sure is
 a) ΔH
65. What is heat is
 a) $X +$
66. If Q is first law
 a) $Q =$
67. Which
 a) $Q =$
68. A system increases
 a) 625
69. What is the for
 a) $-\frac{1}{2}$
70. A system energy
 a) $x +$
71. What is the for
 $2C_6H_6$
72. A system internal
 a) decrease
 c) increase

61. A gas is allowed to expand in an insulated container against a constant external pressure of 2.5 bar from 4.5 dm^3 to $7 \times 10^{-3} \text{ m}^3$. What is the change in internal energy of the gas?
a) -112.3 J b) -312.5 J c) -625 J d) -3.25 J
62. Calculate the change in internal energy of the system if 37.6 J of work is done by the system with heat loss of 14.6 J .
a) -23.0 J b) -12.57 J c) -549 J d) -52.2 J
63. What is change in internal energy when system does 140 kJ of work on surrounding and 40 kJ of heat is added to system?
a) -180 kJ b) -100 kJ c) -200 kJ d) -280 kJ
64. For the reaction, $\text{C}_2\text{H}_5\text{OH}_{(l)} + 3\text{O}_{2(g)} \longrightarrow 2\text{CO}_{2(g)} + 3\text{H}_2\text{O}_{(l)}$
 ΔU is the heat of reaction at constant volume. Then heat of reaction at constant pressure is
a) $\Delta H = \Delta U + RT$ b) $\Delta H = \Delta U - RT$ c) $\Delta H = \Delta U + 2RT$ d) $\Delta H = \Delta U - 2RT$
65. What is the internal energy change when $X \text{ J}$ of work is done on the system and $Y \text{ J}$ of heat is transferred to surrounding?
a) $X + Y \text{ J}$ b) $XY \text{ J}$ c) $Y - X \text{ J}$ d) $X - Y \text{ J}$
66. If Q is the heat liberated from the system and W is the work done on the system then first law of thermodynamics can be written as
a) $Q = W - \Delta U$ b) $Q = -W$ c) $Q = \Delta U + W$ d) $Q = \Delta U - W$
67. Which among the following relations is correct for adiabatic process?
a) $Q = W$ b) $\Delta U = 0$ c) $\Delta V = 0$ d) $Q = 0$
68. A system absorbs 375 kJ of heat and performs 250 kJ of work on the surrounding. The increase in internal energy of system is
a) 625 kJ b) 250 kJ c) 312 kJ d) 125 kJ
69. What is the difference between the enthalpy change and internal energy change for the formation of one mole of ammonia in standard state?
a) $-\frac{1}{2}RT$ b) $-2RT$ c) $-\frac{3}{2}RT$ d) $-RT$
70. A system releases $x \text{ J}$ of heat and $y \text{ J}$ of work is done on it. What is change in internal energy?
a) $x + y \text{ J}$ b) $x - y \text{ J}$ c) $-x + y \text{ J}$ d) $-x - y \text{ J}$
71. What is the difference between change in enthalpy and change in internal energy of the following reaction at 27°C ? ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)
 $2\text{C}_6\text{H}_{6(l)} + 15\text{O}_{2(g)} \longrightarrow 12\text{CO}_{2(g)} + 6\text{H}_2\text{O}_{(l)}$
a) -7.48 kJ b) -3.07 kJ c) -3.77 kJ d) -7.00 kJ
72. A system absorbs 25 kJ of heat and performs 12 kJ of work on the surrounding then net internal energy of the system
a) decreases by 37 kJ b) decreases by 12 kJ
c) increases by 13 kJ d) increases by 25 kJ