PHYSICAL CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP No. 44

Total Marks : 28

Max. Time : 32 min.

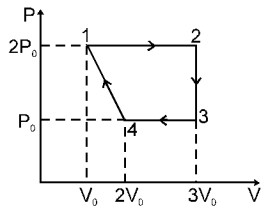
Topic : Thermodynamics & Thermochemistry

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.4	(3 marks, 3 min.)	[12, 12]
Subjective Questions ('–1' negative marking) Q.5 to Q.8	(4 marks, 5 min.)	[16, 20]

1. In thermodynamics, a process is called reversible when :
(A) surrounding and system change into each other.
(B) there is no real boundary between system and surrounding.
(C) the surrounding is always in equilibrium with the system.
(D) the system changes into the surrounding spontaneously.

2. Choose the incorrect statement :
(A) System and surrounding are always separated by a real or imaginary boundary.
(B) Perfectly isolated system can never be created.
(C) In reversible process, energy change in each step can be reversed.
(D) Irreversible process is also called quasi-equilibrium process.

3. For the process on an ideal gas, which of the following statements is true :



(A) v_{mps} at 1 > v_{mps} at 2 > v_{mps} at 3 > v_{mps} at 4. (B) v_{mps} at 1 = v_{mps} at 4 < v_{mps} at 2 < v_{mps} at 3.
(C) v_{mps} at 1 = v_{mps} at 4 < v_{mps} at 3 < v_{mps} at 2 . (D) v_{mps} at 2 > v_{mps} at 3 > v_{mps} at 4 = v_{mps} at 1.

4. Two flask A and B have equal volumes. Flask A contains hydrogen at 600 K while flask B has same mass of CH_4 at 300 K. Then choose the correct options :
(A) In flask A, the molecules move faster than in B, on an average.
(B) In flask B, the molecules move faster than in A, on an average.
(C) Flask A contains greater number of molecules than B.
(D) Flask B contains greater number of molecules than A.

5. Categorise the following into state and path functions :
(a) Internal energy (b) Pressure (c) Volume (d) Temperature (e) Heat
(f) Work (g) Free energy (h) Entropy (i) Molar heat Capacity (j) Height of a hill
(k) Distance travelled in climbing the hill

6. Categorise these properties into extensive and intensive property :
(a) Pressure of gas (b) Volume (c) Density (d) Temperature
(e) Heat capacity (f) Specific heat capacity (g) Molar heat capacity (h) Molarity
(i) Dielectric constant (j) Internal energy (k) Specific internal energy (l) Mass

7. Classify the following among closed, open and isolated system :
(a) Pressure cooker (b) Boiler (c) Liquid cooling system of an automobile (d) Thermos flask
(e) Universe (f) Living things (g) Human body (h) Electrochemical cells
(i) A cup of tea (j) A closely packed room in which a split air-conditioner is working.

8. 7.5 KJ heat is added to a closed system and its internal energy decreases by 12 KJ. So, how much energy is transferred as work? For a new process, if the work is zero, then how much heat is transfered for the same changes in state of system?

Answer Key

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1. (C) **2.** (D) **3.** (C) **4.*** (AC)

5. State function : a, b, c, d, g, h, j ; Path function : e, f, i, k

6. Intensive : a, c, d, f, g, h, i, k ; Extensive : b, e, j, l

7. Open system : b, f, g, i, j ; Closed system : a, c, h ; Isolated system : d, e

Hints & Solutions

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4. (i) Molecules move faster for which $\frac{T}{M}$ greater obviously H_2 molecule move faster.

5. State function : a, b, c, d, g, h, j ; Path function : e, f, i, k

6. Intensive : a, c, d, f, g, h, i, k ; Extensive : b, e, j, l

7. Open system : b, f, g, i, j ; Closed system : a, c, h ; Isolated system : d, e

8. Q = 7.5 KJ
$\Delta U = -12$ KJ
$\Delta U = Q + W$
$W = -12 - 7.5 =$ **–19.5 KJ. Ans.**
Now W = 0,
$\therefore$ $\Delta U = Q$ $\therefore$ $Q = \Delta U =$ **– 12 KJ Ans.**