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**Date:10-10-1444 233Chem KSU College of science Chemistry Dept.**

**Constants:**

 **R=** $8.314 Jmol^{-1}K^{-1}$**= 0.0821 litre.atm** $.mol^{-1}K^{-1}$**.**

1. **Choose the correct answer of the following**

1. In the isolated system:

1. Δm = 0, ΔQ = 0
2. Δm ≠ 0, ΔQ = 0
3. Δm ≠ 0, ΔQ ≠ 0
4. Δm = 0, ΔQ ≠ 0

2. All the following function are state functions except

1. Internal Energy
2. Work
3. Volume
4. Pressure

3. The example of extensive properties is

1. Boiling point
2. Density
3. Enthalpy
4. Color

4. Fall of leaves from trees is

1. Reversible process
2. No energy loss
3. Each step is in equilibrium
4. Fast change in the system

5. In the Isobaric and adiabatic processes,

1. dT = 0 and q = 0 respectively
2. dV = 0 and dP = 0 respectively
3. dP = 0 and q = 0 respectively
4. dV = 0 and q = 0 respectively

6. Calculate the work in (J) produced as a result of expansion of one mole of ideal gas through reversible process at 207 °C from 32.17L to 35.22 L

1. -361.47
2. -155.87
3. -4369.07
4. -1722.09

7. Molar Heat capacity is

1. the amount of energy required to raise the temperature of one gram
2. the amount of energy required to raise the temperature of one mole of an object (by one degree).
3. the amount of energy required to raise the temperature of one mole of an object
4. the amount of energy required to raise the temperature of one gram of an object (by one degree).

8. The difference between CV and CP for liquid and solid is

1. Cp - Cv= R
2. Cp - Cv= 0
3. Cp - Cv= 1
4. Cp /Cv= γ

9. ΔH is positive if

a) The surroundings give heat to the system

b) The system gives heat to the surroundings

c) The surroundings gains heat from the system

d) all the above

10. A gas, while expanding absorbs 25 J of heat and does 243 J of work. What is internal energy for the gas?

1. +218 J
2. +268 J
3. - 218 J
4. – 268 J

**II. Which of the following statement is true (T) and which one is false (F)?**

 1) ΔE = q + w; is the first law of thermodynamics. ( )

 2) Enthalpy is an extensive property and a path function. ( )

3) Path functions depend on the route taken between two states. ( )

4) Isochoric process: dV= 0. ( )

5) In cyclic process: ΔT ≠ 0, ΔV= 0 and ΔP= 0. ( )

6) potential energy is the energy due to position (stored energy). ( )

7) The sign of (q / W) in an isothermal expansion of a reversible process

 is negative ( )

8) Heat at constant volume is ΔE. ( )

9) q is a state function. ( )

10) J = kg m2 s-2 = Pa m3 ( )

**III. Answer the following problems:**

1. Calculate the work done when the gas expands isothermally against a constant external pressure of 9.8 kPa until its volume has increased by $4.5 dm^{3}$

2. As ample consisting of 3.00 mol He is expanded isothermally at 25°C from $33.8 dm^{3}$ to $40.7 dm^{3}$

 calculate Δ*E, w*, q, and Δ*H* for

(a) a reversible expanding against a constant external pressure.

Δ*E* =

 W =

q =

Δ*H* =

b) a reversible free expanding (against zero external pressure).

Δ*E* =

W =

q =

Δ*H*

3. 130 J of energy is supplied as heat to 3 moles of an ideal gas at constant volume ,the temperature rises by 4 k, Calculate the molar heat capacity at constant pressure.