



New programs
Course: Engineering Chemistry

Date: 18/7/2020
Time: 2 hr

Total Marks: 70

Please Answer All Questions

Question: 1

Marks (20)

- Explain the concept of an ideal gas as described through the assumptions of the kinetic theory of gases?
- Show how you can obtain the values of universal gas constant (R) in different three units?
- Explain the behavior of pressure-volume curves for a gas when it is compressed isothermally?
- List two conditions under which deviations from ideal behavior are observed?

Question: 2

Marks (20)

- A 10 liters flask contains 0.50 gm. each of hydrogen, H_2 ; carbon monoxide, CO; carbon dioxide, CO_2 and methane CH_4 at $27^\circ C$. Calculate the partial pressure of CO_2 gas in atm?
- An ideal gas at 650 mm Hg occupies a bulb of unknown volume. A certain portion of this gas is withdrawn and found to occupy a 2.05 cm^3 at S.T.P. The pressure of the gas remaining in the bulb is 590 mm Hg. Assuming that the pressure measurements of the gas in the bulb were made at the same temperature, $23^\circ C$, What is the volume of the bulb?

Question: 3

Marks (15)

- What is meant by closed and open systems?
- How Entropy is implied in the second law and third law of thermodynamic?
- Calculate the change in internal energy, (ΔE), when 28 gm of methane gas (CH_4), are expanded from 5 liters to 15 liters by raising the temperature of the gas, while the pressure is kept constant at 8.6184 atm. (consider methane behaves as an ideal gas during this process, specific heat is constant with variation in temperature and $C_p = 5.34 + 0.0115 T$)?

Question: 4

Marks (15)

- What is meant by colligative properties of solutions?
- Explain the phenomena of osmosis? What is meant by isotonic, hypotonic and hypertonic solutions?
- Benzene and toluene form solutions that are nearly ideal. At $80^\circ C$, the vapor pressures of pure benzene and pure toluene are 753 torr. and 290 torr. respectively. Calculate the vapor pressure of a solution made by mixing 100 gm benzene, (C_6H_6), with 100 gm toluene, ($C_6H_5CH_3$) ?

With my best wishes,
Prof. Dr. Mohamed Elhalwany

The Molecular weight of elements are: C=12, H=1 and O= 16 gm/gm.mol