MINOR - I (Jan 2021)

M.M.-30 Applied Chemistry (EEE-I) Time-1½ hr

Note: Attempt all questions.

Marks

[3] 1. Explain why:

(a) The isothermal reversible work of expansion of an ideal gas is greater than that of an adiabatic reversible expansion.

(b) Isothermal reversible work of compression of an ideal gas is less than that of irreversible compression.

[2] 2. Calculate the enthalpy change of the process

$$H_2O\,(s, -10^\circ C) \longrightarrow H_2O\,(l, -10^\circ C)$$

given $C_p\,(H_2O, l) = 75.4\ J\,k^{-1}\,mol^{-1}$

$C_p\,(H_2O, s) = 37.2\ J\,k^{-1}\,mol^{-1}$

$H_2O\,(l, 0^\circ C) \longrightarrow H_2O\,(s, 0^\circ C)$ $\quad \Delta H = -6008\ J\,mol^{-1}$

[2] 3. When can an isothermal expansion be reversible as well?

OR

What according to you should the entropy vs. time graph look like? Explain your graph.

[1½] 4. What is the minimum energy required by an engine working between 0°C and 100°C to do a work of 500 KJ.

[1½] 5. Calculate the absolute entropy of a substance at 10K whose C_p is $3\ J\,k^{-1}\,mol^{-1}$ at 10K.

[4] 6. One mole of an ideal gas at 300K is allowed to expand from a volume of 1 l to 2 l at 300K against a constant pressure of 1 atm. Calculate q, w, ΔU, ΔH, ΔG, ΔS_{sys}, ΔS_{surr} ?

Marks

[2] 7. For the western standard cell calculate at 30°C ΔG, ΔH and ΔS using the following data:
$E = 1.01\ V$ at $25^\circ C$; $n = 2$; $F = 96500\ C$
$(\partial E/\partial T)_p = -5.0 \times 10^{-5}\ V K^{-1}$.

[3] 8. What is Polydispersity Index (PDI). Which sample according to you will have higher PDI: polystyrene formed by (a) free radical polymerization OR (b) ionic polymerization?

[1] 9. Which method is most suitable to prepare a block copolymer?

[3] 10. What is a stereoregular polymer? Which method should be employed for its synthesis? [OR]

[3] What are chain transfer reactions and what are its effects?

[3] 11. What are the advantages and disadvantages of homogeneous and heterogeneous catalysis?

[2] 12. Plot the rate constant vs. pH graph for (a) acid catalysed reaction (b) enzyme catalyzed reaction.

[1] 13. Which catalyst is employed for industrial prepration of
(a) aldehyde from alkene
(b) Acetic acid.

[1] 14. What is Michaelis-Menten constant?