

2020-21

Time - 3 hours

Full Marks - 60

*Answer **all groups** as per instructions.
Figures in the right hand margin indicate marks.*

GROUP – A

1. Answer all questions or fill in the blanks as required. [1 × 8]
- (a) RMS velocity of gas molecule is proportional to _____ of temperature.
- (b) Evaporation of liquid causes _____ .
- (c) Most probable velocity is _____ times rms.
- (d) Mathematical expression of pH is _____ .
- (e) Solution with $\text{pH} < 7$ is called _____ solution.
- (f) Which crystal is used in wrist watch ?
- (g) When pH of a solution is 2, what is the $[\text{H}^+]$ in mole/ltr.
- (h) Solution of CH_3COONa is _____ in nature.

[2]

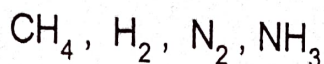
GROUP – B

2. Answer any eight of the following questions within two sentences each.

[1½ × 8

(a) What is the effect of temperature and pressure on coefficient of viscosity of gas ?

(b) Which of the following gases show maximum deviation from ideal gas and why ?



(c) Why a drop of liquid is spherical in shape ?

(d) Why degree of dissociation of CH_3COOH decreases with adding CH_3COONa ?

(e) Why pH of KCN is more than 7 ?

(f) Why $\text{CH}_3\text{COONH}_4$ is a buffer ?

(g) Find the solubility product of AgCl solution, when solubility is 'X' mole/ltr.

(h) Define buffer capacity.

(i) Write the name of method for determining internal structure of crystal.

(j) Define common ion effect.

GROUP – C

3. Answer any eight of the following questions within 75 words each.

[2 × 8

- (a) At what temperature is the average velocity of O_2 molecule is equal to root mean square velocity at $27^\circ C$?
- (b) The ratio of molar heat of a gas (atomic weight = 16) at constant pressure to constant volume is 1.41. Determine the molecular weight of gas.
- (c) Why surface tension of liquid vanishes at its critical temperature ?
- (d) A solution of 0.03 M of acetic acid is found to be dissociated to the extent of 1.25%. Calculate the dissociation constant of acid.
- (e) Given, $pH = 5$. What is the $[OH^-]$?
- (f) $K_w = 4 \times 10^{-14}$. What is its pH ?
- (g) What is differences between Schottky and Frenkel defect ?
- (h) What is F-centre ?
- (i) What is the relationship between solubility and solubility product in $Al(OH)_3$?
- (j) Write two features of a good acid-base indicator.

[4]

GROUP – D

Answer **any four** questions within 500 words each.

4. Derive critical constant values from Van der Waal's equation. [6]
5. Define surface tension and how it can be measured ? [6]
6. Derive kinetic gas equation. [6]
7. Write short notes : [3 × 2]
 - (a) Common ion effect
 - (b) Viscosity
8. Derive $2d \sin \theta = n\lambda$. [6]
9. Derive Henderson equation for acidic buffer. [6]
10. What is a buffer solution ? Why $\text{CH}_3\text{COONH}_4$ is a buffer but not NaCl ? [6]