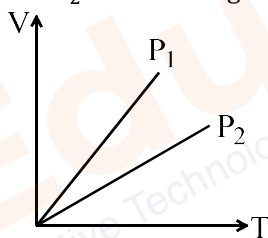


9. V versus T curves at constant pressure P_1 and P_2 for an ideal gas are shown in figure. Which is correct?



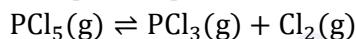
- a) $P_1 > P_2$ b) $P_1 < P_2$ c) $P_1 = P_2$ d) All of these
10. An open vessel containing air is heated from 300 K to 400 K. The fraction of air originally present which goes out of it is:
 a) $\frac{3}{4}$ b) $\frac{1}{4}$ c) $\frac{2}{3}$ d) $\frac{1}{8}$
11. The species having pyramidal shape is
 a) SO_3 b) BrF_3 c) SiO_3^{2-} d) OSF_2
12. In which of the following molecules are all the bonds not equal?
 a) AlF_3 b) NF_3 c) ClF_3 d) BF_3
13. The correct order of bond angles is:
 a) $\text{PF}_3 < \text{PCl}_3 < \text{PBr}_3 < \text{PI}_3$
 b) $\text{PF}_3 < \text{PBr}_3 < \text{PCl}_3 < \text{PI}_3$
 c) $\text{PI}_3 < \text{PBr}_3 < \text{PCl}_3 < \text{PF}_3$
 d) $\text{PF}_3 > \text{PCl}_3 < \text{PBr}_3 < \text{PI}_3$
14. The correct order of radii is:
 a) $\text{N} < \text{Be} < \text{B}$ b) $\text{F}^- < \text{O}^{2-} < \text{N}^{3-}$ c) $\text{Na} < \text{Li} < \text{K}$ d) $\text{Fe}^{3+} < \text{Fe}^{2+} < \text{Fe}^{4+}$
15. The bond order is maximum in:
 a) H_2 b) H_2^+ c) He_2 d) He_2^+
16. Which of the following is least ionic?
 a) CaF_2 b) CaBr_2 c) CaI_2 d) CaCl_2
17. In which of the following compound sp^2 hybridisation is absent?
 a) $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$ b) $\text{CH} \equiv \text{C} - \text{CH}_2 - \text{CH}_3$
 c) $\text{CH}_2 - \text{CH} = \text{CH}_2$ d) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{CH}_3$
18. Which one of the following pairs of species has the same bond order:
 a) NO^+ and CN^+ b) CN^- and NO^+ c) CN^- and CN^+ d) O_2^- and CN^-

19. The structure of ICl_2^- is:
- Trigonal
 - Octahedral
 - Square planar
 - Distorted trigonal bipyramid
20. The correct ionic radii order is:
- $\text{N}^{3-} > \text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+}$
 - $\text{N}^{3-} > \text{Na}^+ > \text{O}^{2-} > \text{F}^- > \text{Mg}^{2+} > \text{Al}^{3+}$
 - $\text{Na}^+ > \text{O}^{2-} > \text{N}^{3-} > \text{F}^- > \text{Mg}^{2+} > \text{Al}^{3+}$
 - $\text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{N}^{3-} > \text{Mg}^{2+} > \text{Al}^{3+}$
21. NF_3 is:
- Non-polar compound
 - Electrovalent compound
 - Having low value of dipole moment than NH_3
 - Having more dipole moment than NH_3
22. How many σ and π -bonds are present in given compound?
- $$\begin{array}{c} \text{Ph} - \text{CH} = \text{C} - \text{C}_2\text{H}_5 \\ | \\ \text{CH}_3 \end{array}$$
- 19 σ and 4 π - bonds
 - 22 σ and 4 π - bonds
 - 25 σ and 4 π - bonds
 - 26 σ and 4 π - bonds
23. The d -orbital involved in sp^3d -hybridisation is
- $d_{x^2-y^2}$
 - d_{xy}
 - d_{z^2}
 - d_{zx}
24. PCl_5 exists but NCl_5 does not because:
- Nitrogen has no vacant $2d$ -orbitals
 - NCl_5 is unstable
 - Nitrogen atom is much smaller than phosphorus
 - Nitrogen is highly inert
25. The correct order of second ionisation potential of carbon, nitrogen, oxygen and fluorine is:
- $\text{C} > \text{N} > \text{O} > \text{F}$
 - $\text{O} > \text{N} > \text{F} > \text{C}$
 - $\text{O} > \text{F} > \text{N} > \text{C}$
 - $\text{F} > \text{O} > \text{N} > \text{C}$
26. A buffer solution is prepared by mixing 0.1 M ammonia and 1.0 M ammonium chloride. At 298 K, the $\text{p}K_b$ of NH_4OH is 5.0. The pH of the buffer is
- 10.0
 - 9.0
 - 6.0
 - 8.0
27. The solubility in water of a sparingly soluble salt A_2B is $1.0 \times 10^{-3} \text{ mol L}^{-1}$. Its solubility product will be
- 4×10^{-9}
 - 4×10^9
 - 1×10^9
 - 1×10^{-9}
28. At constant temperature, the equilibrium constant (K_p) for the decomposition reaction $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$ is expressed by $K_p = \frac{(4x^2p)}{(1-x^2)}$

Where, p = pressure, x = extent of decomposition. Which one of the following statements is true?

- a) K_p increases with increase of p b) K_p remains constant with change in p and x
c) K_p increases with increase of x d) None of the above

29. Phosphorus pentachloride dissociates as follows, in a closed reaction vessel,



If total pressure at equilibrium of the reaction mixture is p and degree of dissociation of PCl_5 is x , the partial pressure of PCl_3 will be

- a) $\left(\frac{x}{x+1}\right)p$ b) $\left(\frac{2x}{1-x}\right)p$ c) $\left(\frac{x}{x-1}\right)p$ d) $\left(\frac{x}{1-x}\right)p$

30. The first and second dissociation constants of an acid

H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be

- a) 5.0×10^{-5} b) 5.0×10^{15} c) 5.0×10^{-15} d) 0.2×10^5

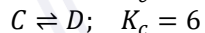
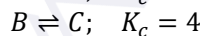
31. The $\text{p}K_b$ value of NH_3 is 5. Calculate the pH of the buffer solution, 1 L of which contains 0.01 M NH_4Cl and 0.10 M NH_4OH

- a) 4 b) 6 c) 8 d) 10

32. The solution of AgCl is unsaturated if:

- a) $[\text{Ag}^+][\text{Cl}^-] < K_{sp}$ b) $[\text{Ag}^+][\text{Cl}^-] > K_{sp}$ c) $[\text{Ag}^+][\text{Cl}^-] = K_{sp}$ d) None of these

33. For the reactions,



K_c for the reaction, $A \rightleftharpoons D$ is:

- a) $(2 + 4 + 6)$ b) $(2 \times 4)/6$ c) $(4 \times 6)/2$ d) $2 \times 4 \times 6$

34. The correct relation for hydrolysis constant of NH_4CN is:

- a) $\sqrt{\frac{K_w}{K_a}}$ b) $\frac{K_w}{K_a \times K_b}$ c) $\frac{\sqrt{K_H}}{c}$ d) $\frac{K_a}{K_b}$

35. 18 mL of mixture of acetic acid and sodium acetate required 6 mL of 0.1 M NaOH for neutralization of the acid and 12 mL of 0.1 M HCl for reaction with salt, separately. If $\text{p}K_a$ of the acid is 4.75, what is the pH of the mixture?

- a) 5.05 b) 4.75 c) 4.5 d) 4.6

ANSWER KEY

- | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| 1. (A) | 2. (C) | 3. (D) | 4. (D) | 5. (A) | 6. (A) | 7. (C) |
| 8. (A) | 9. (B) | 10. (B) | 11. (D) | 12. (C) | 13. (D) | 14. (B) |
| 15. (A) | 16. (C) | 17. (B) | 18. (B) | 19. (D) | 20. (A) | 21. (C) |
| 22. (C) | 23. (D) | 24. (A) | 25. (C) | 26. (D) | 27. (A) | 28. (B) |
| 29. (A) | 30. (C) | 31. (D) | 32. (A) | 33. (D) | 34. (B) | 35. (A) |