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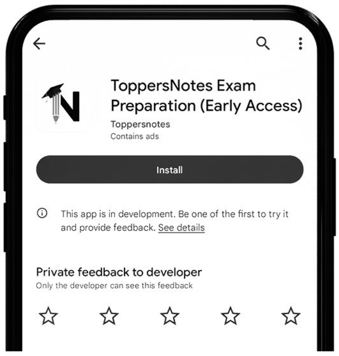

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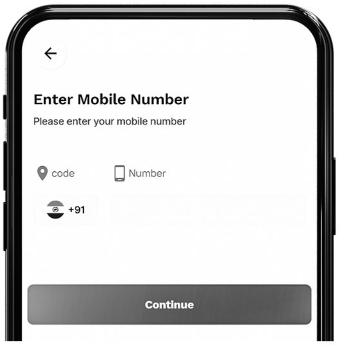

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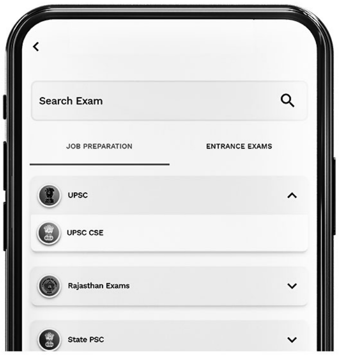

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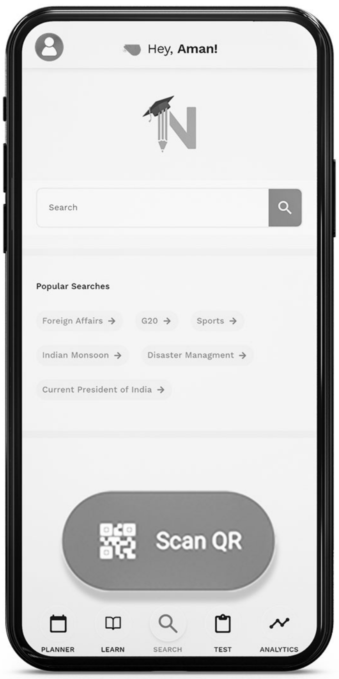

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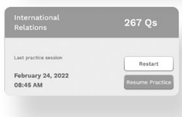

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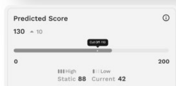

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Class - 11^{th}

Chemistry

Equilibrium

Law of Chemical Equilibrium and Equilibrium Constant

1998

Q.292 If K_1 and K_2 are the respective equilibrium constants for the two reactions,

$$XeF_{6(g)} + H_2O_{(g)} \rightarrow XeOF_{4(g)} + 2HF_{(g)}$$

$$XeO_{4(g)} + XeF_{6(g)} \rightarrow XeOF_{4(g)} + XeO_3F_{2(g)},$$

the equilibrium constant of the reaction,

$$XeO_{4(g)} + 2HF_{(g)} + XeO_3F_{2(g)} + H_2O_{(g)},$$

will be -

(a) K_1/K_2 (b) $K_1 . K_2$

(c) $K_1/(K_2)^2$ (d) K_2/K_1

2005

Q.293 Equilibrium constants K_1 and K_2, for the following equilibria :

$$NO_{(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons NO_{2(g)} \text{ and}$$

$$2NO_{2(g)} \rightleftharpoons 2NO_{(g)} + O_{2(g)}$$

are related as

(a) $K_2 = 1/K_1^2$ (b) $K_2 = K_1^2$

(c) $K_2 = 1/K_1$ (d) $K_2 = K_1/2$

2008

Q.294 The value of equilibrium constant of the reaction,

$$HI_{(g)} \rightleftharpoons \frac{1}{2}H_{2(g)} + \frac{1}{2}I_{2(g)}$$

is 8.0. The equilibrium constant of the reaction

$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ will be

(a) 16 (b) 1/8

(c) 1/16 (d) 1/64

2009

Q.295 The dissociation constants for acetic acid and HCN at 25°C are 1.5×10^{-5} and 4.5×10^{-10} respectively The equilibrium constant for the equilibrium,

$CN^- + CH_3COOH \rightleftharpoons HCN + CH_3COO^-$ would be

(a) 3.0×10^{-5} (b) 3.0×10^{-4}

(c) 3.0×10^{4} (d) 3.0×10^{5}

2011

Q.296 For the reaction,

$$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)},$$

the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction,

$$2NO_{(g)} + O_{2(g)} \rightleftharpoons 2NO_{2(g)}$$

What is K for the reaction,

$$NO_{2(g)} \rightleftharpoons \frac{1}{2}N_{2(g)} + O_{2(g)}$$

(a) $\frac{1}{2K_1K_2}$ (b) $\frac{1}{4K_1K_2}$

(c) $\left[\frac{1}{2K_1K_2}\right]^{1/2}$ (d) $\frac{1}{K_1K_2}$

2012

Q.297 Given that the equilibrium constant for the reaction,

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$$

has a value of 278 at a particular temperature. What is the value of the equilibrium constant for the following reaction at the same temperature ?

$$SO_{3(g)} \rightleftharpoons SO_{2(g)} + \frac{1}{2}O_{2(g)}$$

(b) 1.8×10^{-3}

(b) 3.6×10^{-3}

(c) 6.0×10^{-2}

(d) 1.3×10^{-5}

Q.298 Given the reaction between 2 gases represented by A_2 and B_2 to give the compound $AB_{(g)}$.$A_{2(g)} + B_{2(g)} \rightleftharpoons 2AB_{(g)}$

At equilibrium, the concentration of $A_2 = 3.0 \times 10^{-3}M$, of $B_2 = 4.2 \times 10^{-3} - M$, of $AB = 2.8 \times 10^{-3}\ M$

If the reaction takes place in a sealed vessel at 527°C, then the value of K_c will be

(a) 2.0 (b) 1.9

(C) 0.62 (d) 4.5

2015

Q.299 If the equilibrium constant for $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ is K, the equilibrium constant for $\frac{1}{2}N_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons NO_{(g)}$ will be

(a) $\frac{1}{2}K$ (b) K

(c) K^2 (d) $K^{1/2}$

2017

Q.300 The equilibrium constants of the following are -

$N_2 + 3H_2 \rightleftharpoons 2NH_3 ; K_1$

$N_2 + O_2 \rightleftharpoons 2NO; K_2$

$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O; K_3$

The equilibrium constant (K) of the reaction:

$2NH_3 + \frac{1}{2}O_2 \rightleftharpoons 2NO + 3H_2O$ **will be -**

(a) $K_2K_3^3/K_1$ (b) $K_2 K_3/K_2$

(c) $K_2^3 K_3/K_1$ (d) $K_1 K_3^3 / K_2$

Homogeneous Equilibrium

2008

Q.301 The dissociation equilibrium of a gas AB_2 can be represented as:

$2AB_{2(g)} \rightleftharpoons 2AB_{(g)} + B_{2(g)}$

The degree of dissociation is x and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_p and total pressure P is

(a) $(2K_p/P)^{1/2}$ (b) (K_p/P)

(c) $(2K_p/P)$ (d) $(2K_p/P)^{1/3}$

Q.302 The values of K_{p1} and K_{p2} for the reactions,

$X \rightleftharpoons Y + Z$ **……(i)**

$A \rightleftharpoons 2B$ **……(ii)**

are in the ratio 9 : 1. If degree of dissociation of X and A be equal, then total pressure at equilibrium (i) and (ii) are in the ratio

(a) 36 :1 (b) 1 : 1

(c) 3 :1 (d) 1 : 9

2010

Q.303 The reaction, $2A_{(g)} + B_{(g)} \rightleftharpoons 3C_{(g)} + D_{(g)}$ is begun with the concentrations of A and B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the expression

(a) $[(0.75)^3(0.25)] \div [(1.00)^2(1.00)]$

(b) $[(0.75)^3(0.25)] \div [(0.50)^2(0.75)]$

(c) $[(0.75)^3(0.25)] \div [(0.50)^2(0.25)]$

(d) $[(0.75)^3(0.25)] \div [(0.75)^2(0.25)]$

Heterogeneous Equilibrium

2000

Q.304 Equilibrium constant K for following reaction

$MgCO_{3(s)} \rightleftharpoons M_{go(s)} + CO_{2(g)}$

(a) $K_p = P_{CO2}$

(b) $K_p = P_{co_2} \times \frac{P_{co_2} \times P_{mgo}}{P_{mgco_3}}$

(c) $K_p = \frac{P_{co_2} + P_{mgo}}{P_{mgco_3}}$

(d) $K_p = \frac{P_{mgco_3}}{P_{co_2} + P_{mgo}}$

2008

Q.305 If the concentration of OH^- ions in the reaction

$Fe(OH)_{3(s)} \rightleftharpoons Fe^{3+}_{(aq)} + 3OH^-_{(aq)}$

is decreased by 1/4 times, then equilibrium concentration of Fe^{3+} will increase by

(a) 64 times

(b) 4 times

(c) 8 times

(d) 16 times.

2010

Q.306 In which of the following equilibrium K_c and K_p are not equal ?

(a) $2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

(b) $SO_{2(g)} + NO_{2(g)} \rightleftharpoons SO_{3(g)} + NO_{(g)}$

(c) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(d) $2C_{(s)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)}$

2017

Q.307 A 20 litre container at 400 K contains $CO_{2(g)}$ at pressure 0.4 atm and an excess of SrO (neglect the volume of solid Sro). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will be - (Given that : $SrCO_{3(g)} \rightleftharpoons SrO_{(s)} + CO_{2(g)}$, K_p = 1.6 atm)

(a) 10 litre
(b) 4 litre
(c) 2 litre
(d) 5 litre

Applications of Equilibrium Constant

2003

Q.308 In Haber process, 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end ?

(a) 20 litres ammonia, 20 litres nitrogen, 20 litres hydrogen
(b) 10 litres ammonia, 25 litres nitrogen, 15 litres hydrogen
(c) 20 litres ammonia, 10 litres nitrogen, 30 litres hydrogen
(d) 20 litres ammonia, 25 litres nitrogen, 15 litres hydrogen

Q.309 The reaction quotient (Q) for the reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is given by $Q = \frac{[NH_3]^2}{[N_2][H_2]^3}$ The reaction will proceed from right to left if

(a) $Q = K_c$
(b) $Q < K_c$
(c) $Q > K_c$
(d) $Q = 0$

where K_c is the equilibrium constant.

2015

Q.310 If the value of equilibrium constant for a particular reaction is 1.6×10^{12}, then at equilibrium the system will contain

(a) Mostly products
(b) Similar amounts of reactants and products
(c) All reactants
(d) Mostly reactants.

Relationship Between K, Q and G

2010

Q.311 Match List I (Equations) with List II (Type of processes) and select the correct option. List I (Equations) List II (Type of processes).

A. $K_p > Q$

(i) Non-spontaneous

B. $\Delta G°$ < RT InQ

(ii) Equilibrium

C. K_p= Q

(iii) Spontaneous and endothermic

D. $T > \frac{\Delta H}{\Delta S}$

(iv) Spontaneous

(a) A - (i), B - (ii), C- (iii), D - (iv)
(b) A - (iii), B - (iv), C - (ii), D - (i)
(c) A - (iv), B - (i), C- (ii), D - (iii)
(d) A - (ii), B - (i), C - (iv), D - (iii)

2015

Q.312 Which of the following statements is correct for a reversible process in a state of equilibrium ?

(a) $\Delta G° = -2.30\, RT \log K$
(b) $\Delta G° = 2.30\, RT \log K$
(c) $\Delta G = -2.30\, RT \log K$
(d) $\Delta G = 2.30\, RT \log K$

2020

Q.313 Hydrolysis of sucrose is given by the following reaction : Sucrose $+H_2O \rightleftharpoons$ Glucose + Fructose If the equilibrium constant (K_C) is 2×10^{13} at 300 K, the value of $\Delta G°$ at the same temperature will be

(a) $-8.314\, J\, mol^{-1}K^{-1} \times 300\, K \times In(2 \times 10^{13})$

(b) $8.314\, J\, mol^{-1}K^{-1} \times 300\, K \times In(2 \times 10^{13})$

(c) $8.314\, J\, mol^{-1}K^{-1} \times 300\, K \times In(3 \times 10^{13})$

(d) $-8.314\, jmol^{-1}K^{-1} \times 300\, K \times In(4 \times 10^{13})$

Factors Affecting Equilibrium

2000

Q.314 For any reversible reaction, if we increase concentration of the reactants, then effect on equilibrium constant-

(a) Depends on amount of concentration
(b) Unchange
(c) Decrease
(d) Increase

2002

Q.315 Reaction $BaO_{2(s)} \rightleftharpoons BaO_{(s)} + O_{2(g)}$; $\Delta H = +ve.$ In equilibrium condition, pressure of O_2 depends on

(a) Increase mass of BaO_2
(b) Increase mass of BaO
(c) Increase temperature on equilibrium
(d) Increase mass of BaO_2 and BaO both

2006

Q.316 For the reaction :
$CH_{4(g)} + 2O_{2(g)} \rightleftharpoons CO_{2(g)} + 2H_2O_{(l)}$
$\Delta H_r = -170.8\, kJ\, mol^{-1}$. **Which of the following statements is not true ?**

(a) The reaction is exothermic.
(b) At equilibrium, the concentrations of $CO_{2(g)}$ and $H_2O_{(l)}$ are not equal.
(c) The equilibrium constant for the reaction is given by $K_{(p)} = \frac{[CO_2]}{[CH_4][O_2]}$.
(d) Addition of $CH_{4(g)}$ or $O_{2(g)}$ at equilibrium will cause a shift to the right

2011

Q.317 The value of ΔH for the reaction
$X_{2(g)} + 4Y_{2(g)} = 2XY_{4(g)}$ **is less than zero.**
Formation of $XY_{4(g)}$ will be favoured at

(a) High temperature and high pressure
(b) Low pressure and low temperature
(c) High temperature and low pressure
(d) High pressure and low temperature

2013

Q.318 KMnO_4 can be prepared from K_2MnO_4, as per the reaction, $3MnO_4^{2-} + 2H_2 \rightleftharpoons 2MnO_4^- + MnO_2 + 4OH^-$
The reaction can go to completion by removing OH^- ions by adding

(a) CO_2 (b) SO_2
(c) HCl (d) KOH

2014

Q.319 For the reversible reaction,
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ **+ heat**
The equilibrium shifts in forward direction

(a) By increasing the concentration of $NH_{3(g)}$
(b) By decreasing the pressure
(c) By decreasing the concentrations of $N_{2(g)}$ and $H_{2(g)}$
(d) By increasing pressure and decreasing temperature.

Q.320 For a given exothermic reaction, K_P and $K_P$are the equilibrium constants at temperatures T_1 and T_2, respectively. Assuming that heat of reaction is constant in temperature range between T_1, and T_2, it is readily observed that

(a) $K_P > K'_P$ (b) $K_P < K'_P$
(c) $K_P = K'_P$ (d) $K_P = \frac{1}{K'_P}$

2018

Q.321 Which one of the following conditions will favour maximum formation of the product in the reaction

$\boldsymbol{A_{2(g)} + B_{2(g)} \rightleftharpoons X_{2(g)}, \Delta_r H = -X\ kJ}$?

(a) Low temperature and high pressure
(b) Low temperature and low pressure
(c) High temperature and high pressure
(d) High temperature and low pressure

Ionic Equilibrium in Solution

2015

Q.322 Aqueous solution of which of the following compounds is the best conductor of electric current ?

(a) Hydrochloric acid, HCI
(b) Ammonia, NH_3
(c) Fructose, $C_6H_{12}O_6$
(d) Acetic acid, $C_2H_4O_2$

Acids, Bases and Salts

1998

Q.323 Repeated use of which one of the following fertilizers would increase the acidity of the soil ?

(a) Ammonium sulphate
(b) Superphosphate of lime
(c) Urea
(d) Potassium nitrate

1999

Q.324 The strongest conjugate base is

$(a)\ SO_4^{2-}$ $(b)\ Cl^-$
$(c)\ NO_3^-$ $(d)\ CH_3COO^-$

2000

Q.325 Conjugate acid of NH_2^- is

$(a)\ NH_4OH$
$(b)\ NH_4^+$
$(c)\ NH_2^-$
$(d)\ NH_3$

Q.326 Which compound is electron deficient?

$(a)\ BeCl_2$ $(b) BCl_3$
$(c)\ CCl_4$ $(d)\ PCl_5$

2001

Q.327 In HS^-, I^-, $R-NH_2$, NH_3 order of proton accepting tendency will be

(a) $I^- > NH_3 > R-NH_2 > HS^-$
(b) $NH_3 > R-NH_2 > HS^- > I^-$
(c) $R-NH_2 > NH_3 > HS^- > I^-$
(d) $HS^-\ R-NH_2 > NH_3 > I^-$

2003

Q.328 Which one of the following statements is not true ?

(a) Among halide ions, iodide is the most powerful reducing agent.
(b) Fluorine is the only halogen that does not show a variable oxidation state.
(c) HOCI is a stronger acid than HOBr.
(d) HF is a stronger acid than HCl.

Q.329 Which one of the following compounds is not a protonic acid?

(a) $B(OH)_3$ (b) $PO(OH)_3$
(c) $SO(OH)_2$ (d) $SO_2(OH)_2$

2009

Q.330 Which of the following molecules acts as a Lewis acid?

(a) $(CH_3)_2O$ (b) $(CH_3)_3P$
(C) $(CH_3)_3N$ (d) $(CH_3)_3B$

2010

Q.331 Which one of the following molecular hydrides acts as a Lewis acid ?

(a) NH_3 (b) H_2O
(c) B_2H_6 (d) CH_4

2013

Q.332 Which of these is least likely to act as a Lewis base ?

(a) BF_3 (b) PF_3
(c) CO (d) F^-

Q.333 Which is the strongest acid in the following?

(a) $HClO_4$
(b) H_2SO_3
(c) H_2SO_4
(d) $HClO_3$

2016

Q. 334 Which of the following fluoro-compounds is most likely to behave as a Lewis base ?

(a) BF_3 (b) PF_3
(c) CF_4 (d) SiF_4

2019

Q.335 Conjugate base for Bronsted acids H_2O and HF are

(a) H_3O^+ and H_2F^+ respectively
(b) OH^- and H_2F^+ respectively
(c) H_3O^+ and F^- respectively
(d) OH^- and F^-respectively.

Q.336 Which of the following cannot act both as Bronsted acid and as Bronsted base ?

(a) HCO_3^- (6) NH_3
(c) HCl (d) HSO_4^-

Ionization of Acids and Bases

1999

Q.337 The concentration of $[H^+]$ and concentration of $[OH^-]$ of a 0.1 aqueous solution of 2% ionised weak acid is (ionic product of water = 1×10^{-14})

(a) 2×10^{-3} M and 5×10^{-12} M
(b) 1×10^{-3} M and 3×10^{-11} M
(c) 0.02×10^{-3} M and 5×10^{-1} M
(d) 3×10^{-2} M and 4×10^{-13} M

2000

Q.338 Correct relation between dissociation constants of a dibasic acid is

(a) $K_{a_1} = K_{a_2}$ (b) $K_{a_1} < K_{a_2}$
(c) $K_{a_1} > K_{a_2}$ (d) $K_{a1} = \frac{1}{K_{a2}}$

Q.339 Which statement is wrong about pH and H^+ ?

(a) pH of neutral water is not zero.
(b) Adding 1 N solution of CH_3COOH and IN solution of $NaOH$, pH will be seven.
(c) $[H^+]$ of dilute and hot $H_2SO_4$is more than concentrated and cold H_2SO_4.
(d) Mixing solution of CH_3COOH and HCl, pH will be less than 7.

2001

Q.340 Ionisation constant of CH_3COOH is 1.7×10^{-5} and concentration of H^+ ions is 3.4×10^{-4}. Then find out initial concentration of CH_3COOH molecules.

(a) 3.4×10^{-4} (b) 3.4×10^{-3}
(c) 6.8×10^{-4} (d) 6.8×10^{-3}

2002

Q.341 Which has highest pH ?

(a) CH_3COOK (b) Na_2CO_3
(c) NH_4Cl (d) $NaNO_3$

2005

Q.342 At 25°C, the dissociation constant of a base, BOH, is 1.0×10^{-12} The concentration of hydroxyl ions in 0.01M aqueous solution of the base would be

(a) 1.0×10^{-5} mol L^{-1}
(b) 1.0×10^{-6} mol L^{-1}
(c) 2.0×10^{-6} molL^{-1}
(d) 1.0×10^{-7} mol L^{-1}

2006

Q.343 The hydrogen ion concentration of a 10^{-8} M HCl aqueous solution at 298 K (K_w = 10^{-14}) is

(a) 1.0×10^{-8} M
(b) 1.0×10^{-6} M
(c) 1.0525×10^{-7} M
(d) 9.525×10^{-8} M

2007

Q.344 A weak acid, HA, has a K_a of 1.00×10^{-5}. If 0.100 mol of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to

(a) 1.00% (b) 99.9%
(c) 0.100% (d) 99.0%

Q.345 Calculate the pOH of a solution at 25°C that contains 1×10^{-10} M of hydronium ions, i.e. H_3O^+.

(a) 4.000
(b) 9.000
(c) 1.000
(d) 7.000

2008

Q.346 Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H+ ion concentration in the mixture ?

(a) $3.7\times 10^{-3}\ M$

(b) $1.11\times 10^{-3}\ M$

(c) $1.11\times 10^{-4}\ M$

(d) $3.7\times 10^{-4}\ M$

2009

Q.347 The ionization constant of ammonium hydroxide is 1.77×10^{-5} at 298 K. Hydrolysis constant of ammonium chloride is -

(a) 6.50×10^{-12} (b) 5.65×10^{-13}

(c) 5.65×10^{-12} (d) 5.65×10^{-10}

Q.348 What is the [OH-] in the final solution prepared by mixing 20.0 mL of 0.050 M HCl with 30.0 mL of 0.10 M Ba$(OH)_2$?

(a) 0.40 M (b) 0.0050 M

(c) 0.12 M (d) 0.10 M

2010

Q.349 What is (H+) in mol/L of a solution that is 0.20M in $CH_3\,COONa$ and 0.10M in CH_3COOH ? (K_a for $CH_3COOH = 1.8\times 10^{-5}$)

(a) 3.5×10^{-4} (b) 1.1×10^{-5}

(c) 1.8×10^{-5} (d) 9.0×10^{-6}

2012

Q.350 Equimolar solutions of the following substances were prepared separately. Which one of these will record the highest pH value ?

(a) $BaCl_2$ (b) $AlCl_3$

(c) $LiCl$ (d) $BeCl_2$

2013

Q.351 Accumulation of lactic acid ($HC_3H_5O_3$), a monobasic acid in tissues leads to pain and a feeling of fatigue. In a 0.10 M aqueous solution, lactic acid is 3.7% dissociated. The value of dissociation constant, K_a, for this acid will be

(a) 1.4×10^{-5} (b) 1.4×10^{-4}

(c) 3.7×10^{-4} (d) 2.8×10^{-4}

Q.352 At 100°C the K_w of water is 55 times its value at 25°C. What will be the pH of neutral solution ? (log 55 = 1.74)

(a) 7.00 (b) 7.87

(c) 5.13 (d) 6.13

2014

Q.353 Which of the following salts will give highest pH in water ?

(a) KCl (b) $NaCl$

(c) Na_2CO_3 (d) $CuSO_4$

2015

Q.354 What is the pH of the resulting solution when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed ?

(a) 2.0 (b) 7.0

(c) 1.04 (d) 12.65

2016

Q.355 The percentage of pyridine (C_5H_5N) that forms pyridinium ion $(C_5H_5\,NH)$ in a 0.10M aqueous pyridine solution (K_b for $C_5H_5\,N = 1.7\times 10^{-9}$) is

(a) 0.0060% (b) 0.013%

(c) 0.77% (d) 1.6%

2018

Q.356 Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations :

A. $60\ mL\frac{M}{10}HCl + 40\ mL\frac{M}{10}\ NaOH$

B. $55\ mL\frac{M}{10}\ HCl + 45\ mL\ \frac{M}{10}NaOH$

C. $75\ mL\frac{M}{5}HCl + 25\ mL\frac{M}{5}NaOH$

D. $100\ mL\frac{M}{10}\ HCl + 100\ mL\ \frac{M}{10}\ NaOH$

pH of which one of them will be equal to 1?

(a) B (b) A

(c) D (d) C

2019

Q.357 The pH of 0.01 M $NaOH_{(aq)}$ solution will be

(a) 7.01

(b) 2

(c) 12

(d) 9

Class - 12th

Chemistry

The p-Block Elements

Group 15 Elements

1999

Q.855 Which of the following oxides is most acidic ?

(a) As_2O_5 (b) P_2O_5
(c) N_2O_5 (d) Sb_2O_5

2001

Q.856 Nitrogen forms N_2, but phosphorus does not form P_2, however, it converts P_4 reason is

(a) Triple bond present between phosphorus atom
(b) Pπ - Pπ bonding is weak
(c) Pπ - Pπ bonding is strong
(d) Multiple bonds form easily.

2012

Q.857 In which of the following compounds, nitrogen exhibits highest oxidation state?

(a) N_2H_4 (b) NH_3
(c) N_3H (d) NH_2OH

Ammonia

2020

Q.858 Urea reacts with water to form A which will decompose to form B. B when passed through Cu^{2+}_{aq} deep blue colour solution C is formed. What is the formula of C from the following ?

(a) $CuSo_4$ (b) $[Cu(NH_3)_4]^{2+}$
(c) $Cu(OH)_2$ (d) Cuco, $Cu(OH)_2$

Nitric Acid

2016

Q.859 When copper is heated with conc. HNO_3 it produces

(a) $Cu(NO_3)_2$,NO and NO_2
(b) $Cu(NO_3)_2$ and N_2O
(c) $Cu(NO_3)_2$ and NO_2
(d) $Cu(NO_3)_2$ and NO

2002

Q.860 Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because

(a) Zn act as oxidising agent when react with HNO_3
(b) HNO_3 is weaker acid than H_2SO_4 and HCl
(c) in electrochemical series Zn is above hydrogen
(d) NO_3^- is reduced in preference to hydronium

Phosphorus - Allotropic Forms

1999

Q.861 Which of the following phosphorus is the most reactive ?

(a) Scarlet phosphorus
(b) White phosphorus
(c) Red phosphorus
(d) Violet phosphorus

Phosphine

2019

Q.862 A compound 'X' upon reaction with H_2O produces a colourless gas 'Y' with rotten fish smell Gas 'Y' is absorbed in a solution of $CuSO_4$ to give Cu_3P_2 as one of the products. Predict the compound

(a) Ca_3P_2
(b) NH_4 Cl
(c) As_2O_3
(d) $Ca_3(PO_4)_2$

Phosphorus Halides

2019

Q.863 Identify the incorrect statement related to PCl_5 from the following

(a) PC_5 molecule is non-reactive.

(b) Three equatorial P-Cl bonds make an angle of 120° with each other

(c) Two axial P-Cl bonds make an angle of 180° with each other.

(d) Axial P-Cl bonds are longer than equatorial P-Cl bonds.

Oxoacids of Phosphorus

2010

Q.864 Oxidation states of P in $H_4P_2O_5$,$H_4P_2O_6$.$H_4P_2O_7$ are respectively

(a) +3, +5, +4 (b) +5, +3, +4

(c) +5, +4, +3 (d) +3, +4,+5

Q.865 How many bridging oxygen atoms are present in P_4O_{10} ?

(a) 6 (b) 4

(c) 2 (d) 5

2012

Q.866 Which of the following statements is not valid for oxoacids of phosphorus?

(a) Orthophosphoricacid is used in the manufacture of triple superphosphate.

(b) Hypophosphorous acid is a diprotic acid.

(c) All Otoacids contain tetrahedral four coordinated phosphorus.

(d) All oxoacids contain atleast one P = O unit and one P — OH group

2015

Q.867 Strong reducing behaviour of $H_3PO_2$is due to

(a) High electron gain enthalpy of phosphorus.

(b) High oxidation state of phosphorus.

(c) Presence of two -OH groups and one P-H bond.

(d) Presence of one -OH group and two P-H bonds.

2016

Q.868 Which is the correct statement for the given acids ?

(a) Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid.

(b) Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid.

(c) Both are diprotic acids.

(d) Both are triprotic acids.

2019

Q.869 Which of the following oxoacids of phosphorus has strongest reducing property ?

(a) $H_4P_2O_7$ (b) H_3PO_3

(c) H_3PO_2 (d) H_3PO_4

Group 16 Elements

2014

Q.870 Acidity of diprotic acids in aqueous solutions increases in the order

(a) $H_2S < H_2Se < H_2Te$

(b) $H_2Se < H_2S < H_2Te$

(c) $H_2Te < H_2S < H_2Se$

(d) $H_2Se < H_2Te < H_2S$

2019

Q.871 Which is the correct thermal stability order for H_2E (E = O, S, Se, Te and Po) ?

(a) $H_2Se < H_2Te < H_2Po < H_2O < H_2S$

(b) $H_2S < H_2O < H_2Se < H_2Te < H_2Po$

(c) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$

(d) $H_2Po < H_2Te < H_2Se < H_2S < H_2O$ s

Dioxygen

2013

Q.872 Which of the following does not give oxygen on healing ?

(a) $K_2Cr_2O_7$ (b) $(NH_4)_2Cr_2O_7$

(c) $KClO_3$ (d) $Zn(ClO_3)_2$

Simple Oxides

2020

Q.873 Match the following:

Oxide	Nature
(A) CO	(i) Basic
(B) BaO	(ii) Neutral
(C) Al_2O_3	(iii) Acidic
(D) Cl_2O_7	(iv) Amphoteric

Which of the following is correct option ?

	(A)	(B)	(C)	(D)
(a)	(i)	(ii)	(iii)	(iv)
(b)	(ii)	(i)	(iv)	(iii)
(c)	(iii)	(iv)	(i)	(ii)
(d)	(iv)	(ii)	(ii)	(i)

Ozone

2008

Q.874 The angular shape of ozone molecule (O_3) consists

(a) 1σ and 1π bond
(b) 2σ and 1π bond
(c) 1σ and 2π bonds
(d) 2σ and 2π bonds.

Sulphur Dioxide

2012

Q.875 Sulphur trioxide can be obtained by which of the following reaction?

(a) $CaSO_4 + \xrightarrow{\Delta}$ (b) $Fe_2(SO_4)_3 \xrightarrow{\Delta}$
(c) $S + H_2SO_4 \xrightarrow{\Delta}$ (d) $H_2SO_4 + PCl_5 \xrightarrow{\Delta}$

2015

Q.876 Nitrogen dioxide and sulphur dioxide have some properties in common. Which property is shown by one of these compounds, but not by the other ?

(a) Is soluble in water.
(b) Is used as a food preservative.
(c) Forms acid rain.
(d) Is a reducing agent.

Oxoacids of Sulphur

2017

Q.877 In which pair of ions both the species contain S - S bond ?

(a) $S_4O_6^{2-}, S_2O_3^{2-}$ (b) $S_2O_7^{2-}, S_2O_8^{2-}$
(c) $S_4O_6^{2-}, S_2O_7^{2-}$ (d) $S_2O_7^{2-}, S_2O_3^{2-}$

2019

Q.878 Identify the correct formula of oleum from the following:

(a) $H_2S_2O_7$ (b) H_2SO_3
(c) H_2SO_4 (d) $H_2S_2O_8$

2020

Q.879 Which of the following oxoacid of sulphur has –O – O– linkage

(a) H_2SO_3, sulphurous acid
(b) H_2SO_4, sulphuric acid
(c) $H_2S_2O_8$, peroxodisulphuric acid
(d) $H_2S_2O_7$, pyrosulphuric acid

Sulphuric Acid

2010

Q.880 Match List I (substances) with List II (processes) employed in the manufacture of the substances and select the correct option.

List I (Substances) **List II (processes)**
(A) Sulphuric acid (i) Haber's process
(B) Steel (ii) Bessemer's process
(C) Sodium hydroxide
(iii) Leblanc process
(D) Ammonia
(iv) Contact process

(a) A (i), B. (iv). C- (ii), D. (iii)
(b) A (i), B (ii), (iii), D (iv)
(c) A. (iv), B (iii), C(ii), D. (i)
(d) A-(iv), B - (ii), C- (iii), D-(i)

Group 17 Elements

2000

Q.881 Which statement is wrong?
(a) Bond energy of $F_2 > Cl_2$
(b) Electronegativity of F > Cl
(c) F is more oxidising than Cl
(d) Electron affinity of Cl > F

2006

Q.882 Which one of the following orders is not in accordance with the property stated against it ?
(a) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
(b) $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power
(c) HI > HBr > HCl > HF: Acidic property in water
(d) $F_2 > Cl_2 > Br_2 > I_2$:, Electronegativity

2008

Q.883 Which one of the following arrangements does not give the correct picture of the trends indicated against it ?
(a) $F_2 > Cl_2 > Br_2 > I_2$:Bond dissociation energy
(b) $F_2 > Cl_2 > Br_2 > I_2$:Electronegativity
(c) $F_2 > Cl_2 > Br_2 > I_2$:Oxidizing power
(d) $F_2 > Cl_2 > Br_2 > I_2$, : Electron gain enthalpy

2009

Q.884 Among the following which is the strongest oxidising agent ?
(a) Br_2 (b) I_2
(c) Cl_2 (d) F_2

2015

Q.885 The variation of the boiling points of the hydrogen halides is in the order HF > HI > HBr > HCl What explains the higher boiling point of hydrogen fluoride ?
(a) There is strong hydrogen bonding between HF molecules.
(b) The bond energy of HF molecules is greater than in other hydrogen halides.
(c) The effect of nuclear shielding is much reduced in fluorine which polarises the HF molecule.
(d) The electronegativity of fluorine is much higher than for other elements in the group

2016

Q.886 Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules ?
(a) $Br_2 > I_2 > F_2 > Cl_2$ (b) $F_2 > Cl_2 > Br_2 > I_2$
(c) $I_2 > Br_2 > Cl_2 > F_2$ (d) $Cl_2 > Br_2 > F_2 > I_2$

2018

Q.887 Which of the following statements is not true for halogens ?
(a) All form monobasic oxyacids.
(b) All are oxidizing agents.
(c) All but fluorine show positive oxidation states.
(d) Chlorine has the highest electron-gain enthalpy:

2020

Q.888 Statement I: Acid strength increases in the order given as HF << HCl << HBr <<HI.
Statement II: As the size of the elements F, Cl, Br, I increases down the group, the bond strength of HF,HCl, HBr and HI decreases and so the acid strength increases.
In the light of the above statements, choose the correct answer from the options given below.
(a) Statement I is incorrect but statement II is true.
(b) Both statement I and statement II are true
(c) Both statement I and statement II are false.
(d) Statement I is correct but statement II is false.

2021

Q.889 In which one of the following arrangements the given sequence is not strictly according to the properties indicated against it ?
(a) $CO_2 < SiO_2 < SnO_2 < PbO_2$: Increasing Oxidizing power

(b) HF < HCl < HBr < HI
:Increasing acidic strength
(c) $H_2O < H_2S < H_2Se < H_2Te$
:Increasing pk_a values
d) $NH_3 < PH_3 < AsH_3 < SbH_3$
:Increasing acidic character

Chlorine

1999

Q.890 Which of the following is used in the preparation of chlorine
(a) Both MnO_2 and $KMnO_4$
(b) Only $KMnO_4$
(c) Only MnO_2
(d) Either MnO_2 or $KMnO_4$

2012

Q.891 When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from
(a) zero to +1 and zero to -5
(b) zero to -1 ander to +5
(c) zero to -1 and zero to +3
(d) zero to +1 and zero to -3

2019

Q.892 Match the following:

(A) Pure nitrogen	(i) Chlorine
(B) Haber process	(ii) Sulphuric acid
(C) Contact process	(iii) Ammonia
(D) Deacon's process	(iv) Sodium azide or Barium azide

Which of the following is the correct option ?

	(A)	**(B)**	**(C)**	**(D)**
(a)	(iv)	(iii)	(ii)	(i)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(ii)	(iv)	(i)	(iii)
(d)	(iii)	(iv)	(ii)	(i)

Oxoacids of Halogens

2005

Q.893 Which one of the following oxides is expected to exhibit paramagnetic behaviour ?
(a) CO_2 (b) SiO_2
(c) SO_2 (d) ClO_2

2010

Q.894 The correct order of increasing bond angles in the following species is
(a) $Cl_2O < ClO_2 < ClO_2^-$
(b) $ClO_2 < Cl_2O < ClO_2^-$
(c) $Cl_2O < ClO_2^- < ClO_2$
(d) $ClO_2^- < ClO_2 < ClO_2$

2015

Q.895 Which of the statements given below is incorrect ?
(a) O_3 molecule is bent.
(b) ONF is isoelectronic with O_2N^- .
(c) OF_2 is an oxide of fluorine
(d) Cl_2O_7 is an anhydride of perchloric acid.

2016

Q.896 Among the following the correct order of acidity is
(a) $HClO_2 < HClO < HClO_3 < HClO_4$
(b) $HClO_4 < HClO_2 < HClO < HClO_3$
(c) $HClO_3 < HClO_4 < HClO_2 < HClO$
(d) $HClO < HClO_2 < HClO_3 < HClO_4$

Interhalogen Compounds

2017

Q.897 Match the interhalogen compounds of column-I with the geometry in column-II and assign the correct code.

Column I	**Column II**
(A) XX`	(i) T-shape
(B) XX'_3	(ii) Pentagonal bipyramidal
(C) XX'_5	(iii) Linear
(D) XX'_7	(iv) Square pyramidal
	(v) Tetrahedral Code:

	A	B	C	D
(a)	(iii)	(i)	(iv)	(ii)
(b)	(v)	(iv)	(iii)	(ii)
(c)	(iv)	(iii)	(ii)	(i)
(d)	(iii)	(iv)	(i)	(ii)

Group-18 Elements

2000

Q.898 Which compound has planar structure ?

(a) XeF_4 (b) $XeOF_2$

(c) XeO_2F_2 (d) XeO_4

Q.899 Identify the incorrect statement, regarding the molecule XeO_4.

(a) XeO_4 molecule is square planar.

(b) There are four pπ – dπ bonds.

(c) There are four sp^3 - p, σ bonds.

(d) XeO_4 molecule is tetrahedral.

2019

Q.900 Match the Xenon compounds in Column-I with its structure in Column- II and assign the correct code.

Column-I		Column-II	
(A)	XeF_4	(i)	pyramidal
(B)	XeF_6	(ii)	square planar
(C)	$XeOF_4$	(iii)	distorted octahedral
(D)	XeO_3	(iv)	square pyramidal

	(A)	(B)	(C)	(D)
(a)	(iii)	(iv)	(i)	(ii)
(b)	(i)	(ii)	(iii)	(iv)
(c)	(ii)	(iii)	(iv)	(i)
(d)	(ii)	(iii)	(i)	(iv)

2021

Q.901 Noble gases are named because of their inertness towards reactivity. Identify an incorrect statement about them.

(a) Noble gases have large positive values of electron gain enthalpy.

(b) Noble gases are sparingly soluble in water.

(c) Noble gases have very high melting and boiling points.

(d) Noble gases have weak dispersion forces.