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CHEMISTRY · JEE MAIN

Ionic Equilibrium

Previous Year Questions with answers

153 questions · **120** papers · **2002–2026** · newest paper first

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What is in this PDF: every Ionic Equilibrium question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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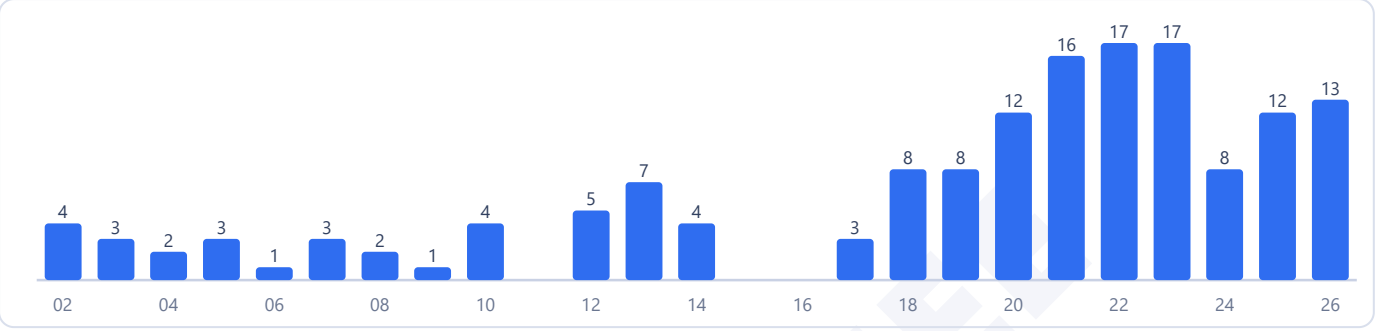
Chapter at a glance

2.3%	153	92 of 162	110 / 43
of Chemistry questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Steady: 0.6 questions per paper in 2024–2026 against 0.7 in 2019–2023.

Questions per year



Counts are the questions we hold: 153 in 120 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2002–2026)



How often it comes up

Ionic equilibrium examines the dissociation and ionization of weak acids, bases, and salts under Unit 6: Equilibrium in the Class 11 curriculum, holding rank 21 among the 31 chemistry chapters with a 2.3 percent share of total chemistry questions. In the computer-based testing era spanning 2019 to 2026, candidates answered 103 questions across 162 papers, representing an average rate of 0.6 questions per shift. The chapter featured in 92 of those 162 papers, and questions were asked every single year throughout the cycle. During the recent 2024 to 2026 testing seasons, examiners set 33 questions across 58 papers, maintaining an average of 0.6 questions per shift and a 2.1 percent subject share. The chapter's share is down compared to the 2002 to 2018 window, which recorded 50 questions across 38 papers for a 3.7 percent share. Relative to the complete 2019 to 2026 baseline, the recent share has stayed about the same. Looking specifically at the 2026 exam cycle, 13 questions appeared across 10 different shifts out of 19 papers. A total of 43 questions between 2019 and 2026 were formatted as numerical answer questions, requiring students to calculate pH values, molar solubilities, and precipitation thresholds to exact figures.

Most-asked topics

The question pool spans four core areas of aqueous ionic behavior:

- **Solubility Equilibria**: 53 questions historically, with 37 appearing between 2019 and 2026, tested up to 2026. This dominant area tests solubility product K sp expressions for binary and ternary salts, common ion effects suppressing solubility, selective fractional precipitation of metal sulfides, and comparative molar solubilities.
- **Acids, Bases & pH**: 53 total questions, including 30 from 2019 to 2026, continuing into 2026. Concepts explore Ostwald's dilution law for weak electrolytes, ionization constants K a and K b, polyprotic acid step-wise dissociation, autoionization of water, and pH calculations for strong and weak acid mixtures.

- **Buffers & Titrations**: 36 lifetime problems, with 29 between 2019 and 2026, tested in 2026. Topics evaluate acidic and basic buffer solutions, the Henderson-Hasselbalch equation, buffer capacity, titration neutralization curves, and pH at half-equivalence points.
- **Salt Hydrolysis**: 11 questions overall, including 7 from 2019 to 2026, last asked in 2024. Questions analyze hydrolysis constants K h, degree of hydrolysis, and pH formulas for salts formed from strong acid-weak base, weak acid-strong base, and weak acid-weak base combinations.

What the questions look like

JEE Main problems in ionic equilibrium combine logarithmic acid-base arithmetic with simultaneous equilibria:

- **Selective precipitation of metal ions**: Saturating an aqueous solution containing two divalent cations with hydrogen sulfide gas at controlled pH, calculating the exact hydronium concentration at which precipitation initiates.
- **Polyprotic acid second ionization concentration**: Deducing the equilibrium concentration of the divalent conjugate base X2- from a weak diprotic acid solution using successive ionization constants K1 and K2.
- **Buffer preparation volumetric proportions**: Finding the exact mixing volumes of hydrochloric acid and weak base required to synthesize a buffer possessing a specified alkaline pH.
- **Salt hydrolysis acidity checks**: Determining whether an aqueous solution of an ammonium salt is acidic, neutral, or basic by comparing acid dissociation and base dissociation constants.

How to practise it

Master the Henderson-Hasselbalch equations for both acidic and basic buffers. For an acidic buffer, pH equals pKa plus log of salt over acid. For a basic buffer, pOH equals pKb plus log of salt over base, followed by subtracting from fourteen to obtain pH at twenty-five degrees Celsius.

For solubility equilibria, write the dissociation equation clearly and identify stoichiometric powers. For a general salt A x B y, solubility product K sp equals x to the power x multiplied by y to the power y multiplied by molar solubility s raised to the power x plus y. In the presence of a common ion, treat the common ion concentration as fixed by the fully dissociated strong electrolyte.

In weak diprotic acid solutions, understand that the concentration of the second dissociated anion X2- is approximately equal to K2, independent of the initial acid concentration, because primary ionization completely suppresses secondary dissociation.

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Q1 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Given is a concentrated solution of a weak electrolyte A_xB_y of concentration 'c' and dissociation constant 'K'. The degree of dissociation is given by :

(A) $\left[K \times c^{x+y-1}\, x^x y^y\right]^{x+y}$

(B) $\left(\dfrac{K}{c^{x+y-1}\, x^x y^y}\right)^{\frac{1}{x+y}}$

(C) $\left(\dfrac{c^{x+y-1}\, x^x y^y}{K}\right)^{x+y}$

(D) $\left(\dfrac{c^{x+y-1}\, x^x y^y}{K}\right)^{\frac{1}{x+y}}$

Answer: (B) $\left(\dfrac{K}{c^{x+y-1}\, x^x y^y}\right)^{\frac{1}{x+y}}$ · Official NTA final key

Q2 JEE Main 2026 · 5 Apr · Shift 1 MCQ

M_3A_2 is a sparingly soluble salt of molar mass y g mol^{-1} and solubility x g L^{-1}. The ratio of the molar concentration of the anion (A^{3-}) to the solubility product of the salt is

(A) $\frac{1}{54} \cdot \frac{y^4}{x^4}$

(B) $\frac{y^5}{108\, x^4}$

(C) $108 \cdot \frac{x^5}{y^5}$

(D) $\frac{1}{108} \cdot \frac{y^4}{x^4}$

Answer: (A) $\frac{1}{54} \cdot \frac{y^4}{x^4}$ · Official NTA final key

Q3 JEE Main 2026 · 5 Apr · Shift 1 MCQ

Arrange the following resultant mixtures in increasing order of their pH values

A. 10 mL 0.2 M $Ca(OH)_2$ + 25 mL 0.1 M HCl

B. 10 mL 0.01 M H_2SO_4 + 10 mL 0.01 M $Ca(OH)_2$

C. 10 mL 0.1 M H_2SO_4 + 10 mL 0.1 M KOH

Choose the correct answer from the options given below:

(A) B < C < A

(B) C < A < B

(C) C < B < A

(D) A < C < B

Answer: (C) C < B < A · Official NTA final key

Q4 JEE Main 2026 · 4 Apr · Shift 1 Numerical

The pH of a solution obtained by mixing 5 mL of 0.1 M NH_4OH solution with 250 mL of 0.1 M NH_4Cl solution is _____ $\times 10^{-2}$. (Nearest integer)

Given: $\mathrm{pK_b}$ $(\mathrm{NH_4OH})$ = 4.74

$\log 2 = 0.30$

$\log 3 = 0.48$

$\log 5 = 0.70$

Numerical value type: the answer is a number.

Answer: 756. · Official NTA final key

Q5 JEE Main 2026 · 4 Apr · Shift 2 MCQ

20 mL of a solution of acetic acid required 28.4 mL of 0.1 M NaOH for its neutralization. A solution (X) was prepared by mixing 20 mL of the above acetic acid and 14.2 mL of 0.1 M NaOH solution. What is the pH of the solution (X)? ($\mathrm{pK_a}$ value of acetic acid is 4.75).

(A) 7.0
(B) 4.75
(C) 3.5
(D) 4.82

Answer: (B) 4.75 · Official NTA final key

Q6 JEE Main 2026 · 2 Apr · Shift 1 MCQ

The solubility product constants of $\mathrm{Ag_2CrO_4}$ and AgBr are $32x$ and $4y$ respectively at 298 K. The value of $\left(\frac{\text{molarity of } \mathrm{Ag_2CrO_4}}{\text{molarity of AgBr}}\right)$ can be expressed as :

(A) $\frac{2\sqrt[3]{x}}{y}$
(B) $2\sqrt{\frac{x}{y}}$
(C) $\sqrt{\frac{x}{y}}$
(D) $\frac{\sqrt[3]{x}}{\sqrt{y}}$

Answer: (D) $\frac{\sqrt[3]{x}}{\sqrt{y}}$ · Official NTA final key

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Q7 JEE Main 2026 · 2 Apr · Shift 2 MCQ

The first and second ionization constants of a weak dibasic acid $\mathrm{H_2A}$ are 8.1×10^{-8} and 1.0×10^{-13} respectively. 0.1 mol of $\mathrm{H_2A}$ was dissolved in 1L of 0.1 M HCl solution. The concentration of $\mathrm{HA^-}$ in the resultant solution is :

(A) 0.1 M
(B) 9.53×10^{-6} M
(C) 8.1×10^{-8} M
(D) 1.0×10^{-13} M

Answer: (C) 8.1×10^{-8} M · Official NTA final key

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Q8 JEE Main 2026 · 2 Apr · Shift 2 MCQ

At 25°C, 20.0 mL of 0.2 M weak monoprotic acid HX is titrated against 0.2 M NaOH. The pH of the solution (a) at the start of the titration (when NaOH has not been added) and (b) when 10 mL of NaOH is added respectively, are :

Given : $K_a = 5 \times 10^{-4}$

$pK_a = 3.3$

$\alpha \ll 1$

(A) (a) 0.7, (b) 2.0

(B) (a) 2.0, (b) 3.3

(C) (a) 1.1, (b) 2.2

(D) (a) 3.0, (b) 2.2

Answer: (B) (a) 2.0, (b) 3.3 · Official NTA final key

Q9 JEE Main 2026 · 28 Jan · Shift 1 MCQ

Consider a weak base 'B' of $pK_b = 5.699$. 'x' mL of 0.02 M HCl and 'y' mL of 0.02 M weak base 'B' are mixed to make 100 mL of a buffer of pH 9 at 25 °C. The values of 'x' and 'y' respectively are:

[Given: log 2 = 0.3010, log 3 = 0.4771, log 5 = 0.699]

(A) $x = 42.7, y = 57.3$

(B) $x = 11.1, y = 88.9$

(C) $x = 85.7, y = 14.3$

(D) $x = 14.3, y = 85.7$

Answer: (D) $x = 14.3, y = 85.7$ · Official NTA final key

Q10 JEE Main 2026 · 28 Jan · Shift 1 Numerical

Consider the dissociation equilibrium of the following weak acid

$HA \rightleftharpoons H^+(aq) + A^-(aq)$

If the pKa of the acid is 4, then the pH of 10 mM HA solution is _____. (Nearest integer)

[Given: The degree of dissociation can be neglected with respect to unity]

Numerical value type: the answer is a number.

Answer: 3. · Official NTA final key

Q11 JEE Main 2026 · 24 Jan · Shift 1 Numerical

Consider two Group IV metal ions X^{2+} and Y^{2+}.

A solution containing 0.01 M X^{2+} and 0.01 M Y^{2+} is saturated with H_2S. The pH at which the metal sulphide YS will form as a precipitate is _____. (Nearest integer)

(Given: K_{sp} (XS) $= 1 \times 10^{-22}$ at 25°C, K_{sp} (YS) $= 4 \times 10^{-16}$ at 25°C, $[H_2S] = 0.1$M in solution, $K_{a1} \times K_{a2}$ (H_2S) $= 1.0 \times 10^{-21}$, log 2 = 0.30, log 3 = 0.48, log 5 = 0.70)

Numerical value type: the answer is a number.

Answer: 4. · Official NTA final key

Q12 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Which of the following mixture gives a buffer solution with pH $= 9.25$?

Given : $pK_b\ (NH_4OH) = 4.75$

(A) 0.2 M NH_4OH (0.5 L) + 0.1 M HCl (0.5 L)

(B) 0.4 M NH_4OH (1 L) + 0.1 M HCl (1 L)

(C) 0.2 M NH_4OH (0.4 L) + 0.1 M HCl (1 L)

(D) 0.5 M NH_4OH (0.2 L) + 0.2 M HCl (0.5 L)

Answer: (A) 0.2 M NH_4OH (0.5 L) + 0.1 M HCl (0.5 L) · Official NTA final key

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Q13 JEE Main 2026 · 21 Jan · Shift 2 Numerical

The first and second ionization constants of H_2X are 2.5×10^{-8} and 1.0×10^{-13} respectively. The concentration of X^{2-} in 0.1 M H_2X solution is _____ $\times 10^{-15}$ M. (Nearest Integer)

Numerical value type: the answer is a number.

Answer: 100. · Official NTA final key

Q14 JEE Main 2025 · 7 Apr · Shift 1 MCQ

An aqueous solution of HCl with pH 1.0 is diluted by adding equal volume of water (ignoring dissociation of water). The pH of HCl solution would (Given $\log 2 = 0.30$)

(A) increase to 2

(B) increase to 1.3

(C) remain same

(D) reduce to 0.5

Answer: (B) increase to 1.3 · Key from source paper

Q15 JEE Main 2025 · 7 Apr · Shift 2 Numerical

One litre buffer solution was prepared by adding 0.10 mol each of NH_3 and NH_4Cl in deionised water. The change in pH on addition of 0.05 mol of HCl to the above solution is _____ $\times 10^{-2}$. (Nearest integer)

Given : pK_b of $NH_3 = 4.745$ and $\log_{10} 3 = 0.477$

Numerical value type: the answer is a number.

Answer: 48. · Key from source paper

Q16 JEE Main 2025 · 4 Apr · Shift 1 · Numerical

The pH of a 0.01 M weak acid HX $\left(K_a = 4 \times 10^{-10}\right)$ is found to be 5. Now the acid solution is diluted with excess of water so that the pH of the solution changes to 6. The new concentration of the diluted weak acid is given as $x \times 10^{-4} M$. The value of x is _____ (nearest integer)

Numerical value type: the answer is a number.

Answer: 25. · Key from source paper

Q17 JEE Main 2025 · 4 Apr · Shift 2 · Numerical

x mg of $Mg(OH)_2$ (molar mass $= 58$) is required to be dissolved in 1.0 L of water to produce a pH of 10.0 at 298 K . The value of x is _____ mg. (Nearest integer)

(Given : $Mg(OH)_2$ is assumed to dissociate completely in H_2O]

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q18 JEE Main 2025 · 2 Apr · Shift 1 · MCQ

If equal volumes of AB_2 and XY (both are salts) aqueous solutions are mixed, which of the following combination will give a precipitate of AY_2 at 300 K ?

(Given K_{sp} (at 300 K) for $AY_2 = 5.2 \times 10^{-7}$)

(A) $2.0 \times 10^{-4} M AB_2, 0.8 \times 10^{-3} MXY$

(B) $3.6 \times 10^{-3} M AB_2, 5.0 \times 10^{-4} MXY^2$

(C) $2.0 \times 10^{-2} M AB_2, 2.0 \times 10^{-2} MXY$

(D) $1.5 \times 10^{-4} M AB_2, 1.5 \times 10^{-3} MXY$

Answer: (C) $2.0 \times 10^{-2} M AB_2, 2.0 \times 10^{-2} MXY$ · Key from source paper

Q19 JEE Main 2025 · 28 Jan · Shift 1 · MCQ

A weak acid HA has degree of dissociation x . Which option gives the correct expression of (pH $\mathrm{pK_a}$)?

(A) 0

(B) log(1 + 2x)

(C) $\log\left(\frac{1-x}{x}\right)$

(D) $\log\left(\frac{x}{1-x}\right)$

Answer: (D) $\log\left(\frac{x}{1-x}\right)$ · Key from source paper

Q20 JEE Main 2025 · 28 Jan · Shift 2 · MCQ

Arrange the following in increasing order of solubility product : $\mathrm{Ca(OH)_2}$, AgBr, PbS, HgS

(A) $\mathrm{HgS} < \mathrm{AgBr} < \mathrm{PbS} < \mathrm{Ca(OH)_2}$
(B) $\mathrm{Ca(OH)_2} < \mathrm{AgBr} < \mathrm{HgS} < \mathrm{PbS}$
(C) $\mathrm{PbS} < \mathrm{HgS} < \mathrm{Ca(OH)_2} < \mathrm{AgBr}$
(D) $\mathrm{HgS} < \mathrm{PbS} < \mathrm{AgBr} < \mathrm{Ca(OH)_2}$

Answer: (D) $\mathrm{HgS} < \mathrm{PbS} < \mathrm{AgBr} < \mathrm{Ca(OH)_2}$ · Key from source paper

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Q21 JEE Main 2025 · 24 Jan · Shift 1 MCQ

$\mathrm{K_{sp}}$ for $\mathrm{Cr(OH)_3}$ is 1.6×10^{-30}. What is the molar solubility of this salt in water?

(A) $\frac{1.8\times10^{-30}}{27}$
(B) $\sqrt[5]{1.8 \times 10^{-30}}$
(C) $\sqrt[4]{\frac{1.6\times10^{-30}}{27}}$
(D) $\sqrt[2]{1.6 \times 10^{-30}}$

Answer: (C) $\sqrt[4]{\frac{1.6\times10^{-30}}{27}}$ · Key from source paper

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Q22 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Which of the following happens when $\mathrm{NH_4OH}$ is added gradually to the solution containing 1 M $\mathrm{A^{2+}}$ and $1\mathrm{MB^{3+}}$ ions? Given : $\mathrm{K_{sp}\ [A(OH)_2]} = 9 \times 10^{-10}$ and $\mathrm{K_{sp}\ [B(OH)_3]} = 27 \times 10^{-18}$ at 298 K .

(A) Both $\mathrm{A(OH)_2}$ and $\mathrm{B(OH)_3}$ do not show precipitation with $\mathrm{NH_4OH}$
(B) $\mathrm{A(OH)_2}$ will precipitate before $\mathrm{B(OH)_3}$
(C) $\mathrm{B(OH)_3}$ will precipitate before $\mathrm{A(OH)_2}$
(D) $\mathrm{A(OH)_2}$ and $\mathrm{B(OH)_3}$ will precipitate together

Answer: (C) $\mathrm{B(OH)_3}$ **will precipitate before** $\mathrm{A(OH)_2}$ · Key from source paper

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Q23 JEE Main 2025 · 23 Jan · Shift 1 Numerical

If 1 mM solution of ethylamine produces pH = 9, then the ionization constant ($\mathrm{K_b}$) of ethylamine is 10^{-x}. The value of x is _____ (nearest integer). [The degree of ionization of ethylamine can be neglected with respect to unity.]

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q24 JEE Main 2025 · 23 Jan · Shift 2 MCQ

pH of water is 7 at 25°C. If water is heated to 80°C., it's pH will :

(A) Decrease
(B) H^+ concentration increases, OH^- concentration decreases
(C) Remains the same
(D) Increase

Answer: (A) Decrease · Key from source paper

Q25 JEE Main 2025 · 22 Jan · Shift 2 MCQ

The molar solubility(s) of zirconium phosphate with molecular formula $\left(Zr^{4+}\right)_3\left(PO_4^{3-}\right)_4$ is given by relation :

(A) $\left(\frac{K_{sp}}{9612}\right)^{\frac{1}{3}}$
(B) $\left(\frac{K_{sp}}{6912}\right)^{\frac{1}{7}}$
(C) $\left(\frac{K_{sp}}{8435}\right)^{\frac{1}{7}}$
(D) $\left(\frac{K_{sp}}{5348}\right)^{\frac{1}{6}}$

Answer: (B) $\left(\frac{K_{sp}}{6912}\right)^{\frac{1}{7}}$ · Key from source paper

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Q26 JEE Main 2024 · 9 Apr · Shift 2 MCQ

For a sparingly soluble salt AB_2, the equilibrium concentrations of A^{2+} ions and B^- ions are 1.2×10^{-4}M and 0.24×10^{-3}M, respectively. The solubility product of AB_2 is :

(A) 6.91×10^{-12}
(B) 0.276×10^{-12}
(C) 27.65×10^{-12}
(D) 0.069×10^{-12}

Answer: (A) 6.91×10^{-12} · Key from source paper

Q27 JEE Main 2024 · 8 Apr · Shift 2 MCQ

Given below are two statements : Statement (I) : A Buffer solution is the mixture of a salt and an acid or a base mixed in any particular quantities. Statement (II) : Blood is naturally occurring buffer solution whose pH is maintained by H_2CO_3/HCO_3^- $\ominus$ concentrations. In the light of the above statements, choose the correct answer from the options given below :

(A) Statement I is true but Statement II is false
(B) Both Statement I and Statement II are true
(C) Statement I is false but Statement II is true
(D) Both Statement I and Statement II are false

Answer: (C) Statement I is false but Statement II is true · Key from source paper

Q28 JEE Main 2024 · 5 Apr · Shift 2 MCQ

Given below are two statements : Statement I : On passing $HCl_{(g)}$ through a saturated solution of $BaCl_2$, at room temperature white turbidity appears. Statement II : When HCl gas is passed through a saturated solution of NaCl, sodium chloride is precipitated due to common ion effect. In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both Statement I and Statement II are correct
(B) Statement I is correct but Statement II is incorrect
(C) Both Statement I and Statement II are incorrect
(D) Statement I is incorrect but Statement II is correct

Answer: (A) Both Statement I and Statement II are correct · Checked by our team

Q29 JEE Main 2024 · 1 Feb · Shift 1 Numerical

K_a for CH_3COOH is 1.8×10^{-5} and K_b for NH_4OH is 1.8×10^{-5}. The pH of ammonium acetate solution will be

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q30 JEE Main 2024 · 1 Feb · Shift 2 MCQ

Solubility of calcium phosphate (molecular mass, M) in water is W_g per 100 mL at 25°C. Its solubility product at 25°C will be approximately.

(A) $10^7 \frac{W^3}{M}$
(B) $10^7 \frac{W^5}{M}$
(C) $10^3 \frac{W^5}{M}$
(D) $10^5 \frac{W^5}{M}$

Answer: (B) $10^7 \frac{W^5}{M}$ · Key from source paper

Q31 JEE Main 2024 · 30 Jan · Shift 1 Numerical

The pH at which $Mg(OH)_2$ $\left[K_{sp} = 1 \times 10^{-11}\right]$ begins to precipitate from a solution containing 0. 10M Mg^{2+} ions is _____.

Numerical value type: the answer is a number.

Answer: 09. · Key from source paper

Q32 JEE Main 2024 · 30 Jan · Shift 2 Numerical

The pH of an aqueous solution containing 1M benzoic acid pK_a = 4.20 and 1M sodium benzoate is 4.5. The volume of benzoic acid solution in 300 mL of this buffer solution is _____ mL.

Numerical value type: the answer is a number.

Answer: 100. · Key from source paper

Q33 JEE Main 2024 · 27 Jan · Shift 1 MCQ

Given below are two statements :

Statement (I) : Aqueous solution of ammonium carbonate is basic.

Statement (II) : Acidic/basic nature of salt solution of a salt of weak acid and weak base depends on K_a and K_b value of acid and the base forming it.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both Statement I and Statement II are correct
(B) Statement I is correct but Statement II is incorrect
(C) Both Statement I and Statement II are incorrect
(D) Statement I is incorrect but Statement II is correct

Answer: (A) Both Statement I and Statement II are correct · Key from source paper

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Q34 JEE Main 2023 · 15 Apr · Shift 1 MCQ

Which of the following statement(s) is/are correct?
(A) The pH of 1×10^{-8} M HCl solution is 8.
(B) The conjugate base of $\mathrm{H_2PO_4^-}$ is $\mathrm{HPO_4^{2-}}$.
(C) $\mathrm{K_w}$ increases with increase in temperature.
(D) When a solution of a weak monoprotic acid is titrated against a strong base at half neutralisation point, $\mathrm{pH} = \frac{1}{2}\mathrm{pK_a}$. Choose the correct answer from the options given below:

(A) (B), (C)
(B) (A), (D)
(C) (A), (B), (C)
(D) (B), (C), (D)

Answer: (A) (B), (C) · Key from source paper

Q35 JEE Main 2023 · 13 Apr · Shift 1 Numerical

25.0 mL of 0.050 M $\mathrm{Ba(NO_3)_2}$ is mixed with 25.0 mL of 0.020 M NaF. K_{sp} of $\mathrm{BaF_2}$ is 0.5×10^{-6} at 298K. The ratio of $\left[\mathrm{Ba^{2+}}\right]\left[\mathrm{F^-}\right]^2$ and K_{sp} is _____.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q36 JEE Main 2023 · 13 Apr · Shift 2 Numerical

20 mL of 0.1MNaOH is added to 50 mL of 0.1M acetic acid solution. The pH of the resulting solution is $\times 10^{-2}$. (Nearest integer) Given : $\mathrm{pKa}\,\mathrm{CH_3COOH}$ = 4.76
$\log 2$ = 0.30
$\log 3$ = 0.48

Numerical value type: the answer is a number.

Answer: 458. · Key from source paper

Q37 JEE Main 2023 · 12 Apr · Shift 1 Numerical

An analyst wants to convert 1 L HCl of pH = 1 to a solution of HCl of pH = 2. The volume of water needed to do this dilution is _____ mL. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 9000. · Key from source paper

Q38 JEE Main 2023 · 11 Apr · Shift 1 MCQ

25 mL of silver nitrate solution $(1\mathrm{M})$ is added dropwise to 25 mL of potassium iodide solution $(1.05\ \mathrm{M})$ solution. The ion(s) present in very small quantity in the solution is/are

(A) $\mathrm{I^-}$ only
(B) $\mathrm{K^+}$ only
(C) $\mathrm{NO_3^-}$ only
(D) $\mathrm{Ag^+}$ and $\mathrm{I^-}$ both

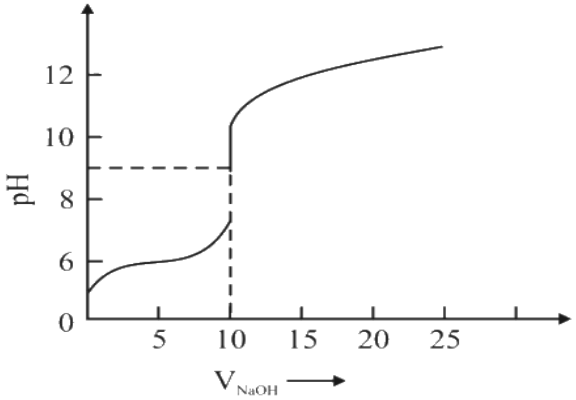
Answer: (D) $\mathrm{Ag^+}$ **and** $\mathrm{I^-}$ **both** · Key from source paper

Q39 JEE Main 2023 · 8 Apr · Shift 1 Numerical

The titration curve of weak acid vs. strong base with phenolphthalein as indicator is shown below.
$\mathrm{K_{phenolphthalein}} = 4 \times 10^{-10}$
Given: $\log 2 = 0.3$
(see the figure above)
The number of following statement/s which is/are correct about phenolphthalein is _____
A. It can be used as an indicator for the titration of weak acid with weak base.
B. It begins to change colour at $\mathrm{pH} = 8.4$
C. It is a weak organic base
D. It is colourless in acidic medium

Q38. The titration curve of weak acid vs. strong base with phenolphthalein as indicator is shown below. The $K_{phenolphthalein} = 4 \times 10^{-10}$

Given: $\log 2 = 0.3$



The number of following statement/s which is/are correct about phenolphthalein is _____

A. It can be used as an indicator for the titration of weak acid with weak base.

B. It begins to change colour at pH $= 8.4$

C. It is a weak organic base

D. It is colourless in acidic medium

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q40 JEE Main 2023 · 8 Apr · Shift 2 MCQ

Given below are two statements:

Statement-I : Methyl orange is a weak acid.

Statement-II : The benzenoid form of methyl orange is more intense/deeply coloured than the quinonoid form.

In the light of the above statement, choose the most appropriate answer from the options given below:

(A) Both **Statement-I** and **Statement-II** are incorrect

(B) **Statement-I** is incorrect but **Statement-II** is correct

(C) Both **Statement-I** and **Statement-II** are correct

(D) **Statement-I** is correct but **Statement-II** is incorrect

Answer: (D) Statement-I is correct but Statement-II is incorrect · Key from source paper

Q41 JEE Main 2023 · 8 Apr · Shift 2 Numerical

The solubility product of $BaSO_4$ is 1×10^{-10} at 298 K. The solubility of $BaSO_4$ in 0.1M $K_2SO_4(aq)$ solution is _____ $\times 10^{-9}$ g L^{-1} (nearest integer).

Given: Molar mass of $BaSO_4$ is 233 g mol^{-1}

Numerical value type: the answer is a number.

Answer: 233. · Key from source paper

Q42 JEE Main 2023 · 6 Apr · Shift 1 MCQ

For a concentrated solution of a weak electrolyte (K_{eq} = equilibrium constant) A_2B_3 of concentration 'C', the degree of dissociation 'α' is

(A) $\left(\frac{K_{eq}}{5c^4}\right)^{\frac{1}{5}}$

(B) $\left(\frac{K_{eq}}{108c^4}\right)^{\frac{1}{5}}$

(C) $\left(\frac{K_{eq}}{25c^2}\right)^{\frac{1}{5}}$

(D) $\left(\frac{K_{eq}}{6c^5}\right)^{\frac{1}{5}}$

Answer: (B) $\left(\frac{K_{eq}}{108c^4}\right)^{\frac{1}{5}}$ · Key from source paper

Q43 JEE Main 2023 · 31 Jan · Shift 2 MCQ

Incorrect statement for the use of indicator in acid-base titration is:

(A) Methyl orange may be used for a weak acid vs weak bas titration.

(B) Phenolphthalein may be used for a strong acid vs strong base titration.

(C) Methyl orange is a suitable indicator for a strong acid vs weak base titration.

(D) Phenolphthalein is a suitable indicator for a weak acid vs strong base titration.

Answer: (A) Methyl orange may be used for a weak acid vs weak bas titration. · Key from source paper

Q44 JEE Main 2023 · 31 Jan · Shift 2 Numerical

At 298 K, the solubility of silver chloride in water is 1.434×10^{-3} g L^{-1}. The value of $-\log K_{sp}$ for silver chloride is

(Given mass of Ag is 107.9 g mol^{-1}, and mass of Cl is 35.5 g mol^{-1})

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q45 JEE Main 2023 · 30 Jan · Shift 1 Numerical

600 mL of 0.01 M HCl is mixed with 400 mL of 0.01 M H_2SO_4. The pH of the mixture is _____ $\times 10^{-2}$. (Nearest integer)

[Given log2 = 0.30, log3 = 0.48, log5 = 0.69, log7 = 0.84, log11 = 1.04]

Numerical value type: the answer is a number.

Answer: 186. · Key from source paper

Q46 JEE Main 2023 · 29 Jan · Shift 1 Numerical

Millimoles of calcium hydroxyide required to produce $100\ mL$ of the aqueous solution of pH 12 is $x \times 10^{-1}$. The value of x is _____ (Nearest integer).

Assume complete dissociation.

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q47 JEE Main 2023 · 25 Jan · Shift 1 Numerical

A litre of buffer solution contains 0.1 mole of each of $\mathrm{NH_3}$ and $\mathrm{NH_4Cl}$. On the addition of 0.02 mole of HCl by dissolving gaseous HCl, the pH of the solution is found to be _____ $\times 10^{-3}$ (Nearest integer)
Given: $\mathrm{pK_b(NH_3)} = 4.745$
$\log 2 = 0.301$
$\log 3 = 0.477$
$T = 298$ K]

Numerical value type: the answer is a number.

Answer: 9079. · Key from source paper

Q48 JEE Main 2023 · 25 Jan · Shift 2 MCQ

When the hydrogen ion concentration $[\mathrm{H^+}]$ changes by a factor of 1000 , the value of pH of the solution

(A) increases by 1000 units
(B) decreases by 3 units
(C) decreases by 2 units
(D) increases by 2 units

Answer: (B) decreases by 3 units · Key from source paper

Q49 JEE Main 2023 · 24 Jan · Shift 1 Numerical

The dissociation constant of acetic is x $\times$ 10^{-5}. When 25 mL of 0.2 M $\mathrm{CH_3COONa}$ solution is mixed with 25 mL of 0.02 M $\mathrm{CH_3COOH}$ solution, the pH of the resultant solution is found to be equal to 5. The value of x is _____.

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q50 JEE Main 2023 · 24 Jan · Shift 2 Numerical

If the pKa of lactic acid is 5, then the pH of 0.005 M calcium lactate solution at 25° C is _____ $\times 10^{-1}$

(Nearest integer)

Numerical value type: the answer is a number.

Answer: 85. · Key from source paper

Q51 JEE Main 2022 · 29 Jul · Shift 1 · Numerical

If the solubility product of PbS is 8×10^{-28}, then the solubility of PbS in pure water at 298 K is $x \times 10^{-16}$ mol L^{-1}. The value of x is _____ (Nearest integer) [Given $\sqrt{2} = 1.41$]

Numerical value type: the answer is a number.

Answer: 282. · Key from source paper

Q52 JEE Main 2022 · 29 Jul · Shift 2 · MCQ

200 mL of 0.01 M HCl is mixed with 400 mL of 0.01 M H_2SO_4. The pH of the mixture is

(A) 1.14
(B) 1.78
(C) 2.34
(D) 3.02

Answer: (B) 1.78 · Key from source paper

Q53 JEE Main 2022 · 29 Jul · Shift 2 · MCQ

A compound 'X' is a weak acid and it exhibits colour change at pH close to the equivalence point during neutralization of NaOH with CH_3COOH. Compound 'X' exists in ionized form in basic medium. The compound 'X' is

(A) methyl orange
(B) methyl red
(C) phenolphthalein
(D) erichrome Black T

Answer: (C) phenolphthalein · Key from source paper

Q54 JEE Main 2022 · 28 Jul · Shift 1 · Numerical

K_a for butyric acid C_3H_7COOH is 2×10^{-5}. ThepH of $0.2M$ solution of butyric acid is _____ $\times 10^{-1}$. (Nearest integer) [Given log2 = 0.30]

Numerical value type: the answer is a number.

Answer: 27. · Key from source paper

Q55 JEE Main 2022 · 27 Jul · Shift 1 · Numerical

At 310 K, the solubility of CaF_2 in water is 2.34×10^{-3} g/100 mL. The solubility product of CaF_2 is _____ $\times 10^{-8}$ $(mol\ /L)^3$ (nearest integer). (Given molar mass : CaF_2 = 78 g mol^{-1})

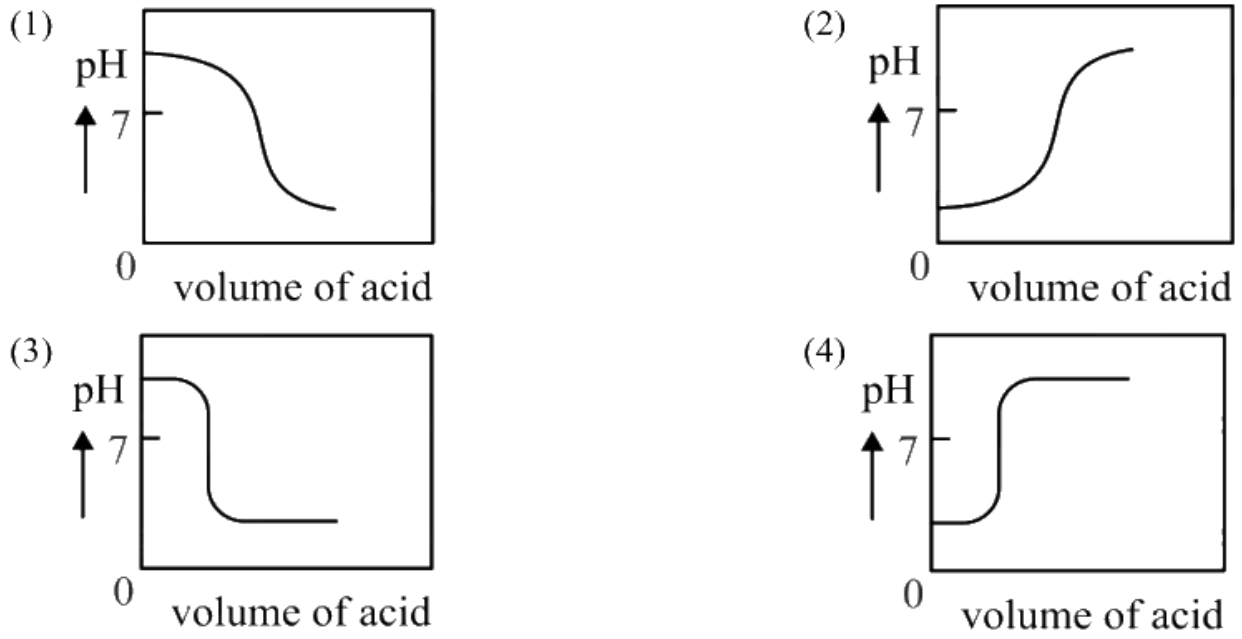
Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q56 JEE Main 2022 · 27 Jul · Shift 2 MCQ

The Plot of pH-metric titration of weak base NH_4OH vs strong acid HCl looks like
(see the figure above)

Q34. The Plot of pH-metric titration of weak base NH_4OH vs strong acid HCl looks like



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (A) · Key from source paper

Q57 JEE Main 2022 · 26 Jul · Shift 2 MCQ

Class XII students were asked to prepare one litre of buffer solution of pH 8.26 by their chemistry teacher. The amount of ammonium chloride to be dissolved by the student in 0.2M ammonia solution to make one litre of the buffer is (Given $pK_bNH_3 = 4.74$; Molar mass of $NH_3 = 17\ g\ mol^{-1}$. Molar mass of $NH_4Cl = 53.5\ g\ mol^{-1}$)

(A) 53.5 g
(B) 72.3 g
(C) 107 g
(D) 126g

Answer: (C) 107 g · Key from source paper

Q58 JEE Main 2022 · 26 Jul · Shift 2 MCQ

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A :Phenolphthalein is a pH dependent indicator, remains colourless in acidic solution and

gives pink colour in basic medium
Reason R : Phenolphthalein is a weak acid. It doesn't dissociate in basic medium.
In the light of the above statements, choose the most appropriate answer from the options given below

(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is NOT the correct explanation of A.
(C) A is true but R is false
(D) A is false but R is true

Answer: (C) A is true but R is false · Key from source paper

Q59 JEE Main 2022 · 25 Jul · Shift 1 MCQ

20 mL of 0.1M $\mathrm{NH_4OH}$ is mixed with 40 mL of 0.05 M HCl. The pH of the mixture is nearest to:
(Given: $\mathrm{K_bNH_4OH} = 1 \times 10^{-5}$, $\log 2 = 0.30$, $\log 3 = 0.48$, $\log 5 = 0.69$, $\log 7 = 0.84$, $\log 11 = 1.04$)

(A) 3.2
(B) 4.2
(C) 5.2
(D) 6.2

Answer: (C) 5.2 · Key from source paper

Q60 JEE Main 2022 · 25 Jul · Shift 2 MCQ

$\mathrm{K_{a_1}}$, $\mathrm{K_{a_2}}$ and $\mathrm{K_{a_3}}$ are the respective ionization constants for the following reactions (a), (b) and (c).
(a) $\mathrm{H_2C_2O_4} \rightleftharpoons \mathrm{H^+ + HC_2O_4^-}$
(b) $\mathrm{HC_2O_4^-} \rightleftharpoons \mathrm{H^+ + C_2O_4^{2-}}$
(c) $\mathrm{H_2C_2O_4} \rightleftharpoons \mathrm{2H^+ + C_2O_4^{2-}}$
The relationship between $\mathrm{K_{a_1}}$, $\mathrm{K_{a_2}}$ and $\mathrm{K_{a_3}}$ is given as

(A) $\mathrm{K_{a_3} = K_{a_1} + K_{a_2}}$
(B) $\mathrm{K_{a_3} = \frac{K_{a_1}}{K_{a_2}}}$
(C) $\mathrm{K_{a_3} = K_{a_1} - K_{a_2}}$
(D) $\mathrm{K_{a_3} = K_{a_1} \times K_{a_2}}$

Answer: (D) $\mathrm{K_{a_3} = K_{a_1} \times K_{a_2}}$ · Key from source paper

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Q61 JEE Main 2022 · 25 Jul · Shift 2 MCQ

In base vs. Acid titration, at the end point methyl orange is present as

(A) quinonoid form
(B) heterocyclic form
(C) phenolic form
(D) benzenoid form

Answer: (A) quinonoid form · Key from source paper

Q62 JEE Main 2022 · 29 Jun · Shift 1 MCQ

The solubility of AgCl will be maximum in which of the following?

(A) $0.01\ \mathrm{M\ HCl}$
(B) $0.01\ \mathrm{M\ KCl}$
(C) Deionised water
(D) $0.01\mathrm{M\ AgNO_3}$

Answer: (C) Deionised water · Key from source paper

Q63 JEE Main 2022 · 28 Jun · Shift 2 MCQ

A student needs to prepare a buffer solution of propanoic acid and its sodium salt with pH 4. The ratio of $\frac{[\mathrm{CH_3\ CH_2\ COO^-}]}{[\mathrm{CH_3\ CH_2\ COOH}]}$ required to make buffer is Given : $\mathrm{K_a(CH_3\ CH_2\ COOH)} = 1.3 \times 10^{-5}$

(A) 0.03
(B) 0.13
(C) 0.23
(D) 0.33

Answer: (B) 0.13 · Key from source paper

Q64 JEE Main 2022 · 27 Jun · Shift 2 Numerical

$\mathrm{p^H}$ value of $0.001\ \mathrm{M NaOH}$ solution is

Numerical value type: the answer is a number.

Answer: 11. · Key from source paper

Q65 JEE Main 2022 · 26 Jun · Shift 1 Numerical

$50\ \mathrm{mL}$ of $0.1\ \mathrm{M}\ \mathrm{CH_3COOH}$ is being titrated against $0.1\ \mathrm{M}$ NaOH. When $25\ \mathrm{mL}$ of NaOH has been added, the pH of the solution will be _____ $\times 10^{-2}$. (Nearest integer)
(Given : $\mathrm{pK_a(CH_3COOH)} = 4.76$)
$\log 2 = 0.30$
$\log 3 = 0.48$
$\log 5 = 0.69$
$\log 7 = 0.84$
$\log 11 = 1.04$

Numerical value type: the answer is a number.

Answer: 476. · Key from source paper

Q66 JEE Main 2022 · 25 Jun · Shift 2 MCQ

The K_{sp} for bismuth sulphide Bi_2S_3 is 1.08×10^{-73}. The solubility of Bi_2S_3 in $mol L^{-1}$ at $298\ K$ is

(A) 1.0×10^{-15}
(B) 2.7×10^{-12}
(C) 3.2×10^{-10}
(D) 4.2×10^{-8}

Answer: (A) 1.0×10^{-15} · Key from source paper

Q67 JEE Main 2022 · 25 Jun · Shift 2 MCQ

Assertion: The amphoteric behaviour of water is explained by Lewis acid base theory
Reason: water acts as acid with NH_3 and base with H_2S

(A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(B) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion.
(C) Assertion is true but Reason is false.
(D) Assertion is false but Reason is true.

Answer: (D) Assertion is false but Reason is true. · Key from source paper

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Q68 JEE Main 2021 · 1 Sep · Shift 2 Numerical

The molar solubility of $Zn(OH)_2$ in 0.1M NaOH solution is $x \times 10^{-18}$M. The value of x is _____. (Nearest integer)
Given : The solubility product of $Zn(OH)_2$ is 2×10^{-20}

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q69 JEE Main 2021 · 31 Aug · Shift 1 Numerical

A_3B_2 is a sparingly soluble salt of molar mass M(g mol^{-1}) and solubility x g L^{-1}. The solubility product satisfies $K_{sp} = a\left(\frac{x}{M}\right)^5$. The value of a is _____. (Integer answer)

Numerical value type: the answer is a number.

Answer: 108. · Key from source paper

Q70 JEE Main 2021 · 31 Aug · Shift 2 Numerical

The pH of a solution obtained by mixing 50 mL of 1 M HCl and 30 mL of 1 M NaOH is x $\times 10^{-4}$. The value of x is (Nearest integer)
$\log 2.5 = 0.3979$

Numerical value type: the answer is a number.

Answer: 6021. · Key from source paper

Q71 JEE Main 2021 · 26 Aug · Shift 1 MCQ

Given below are two statements:
Statement I : In the titration between strong acid and weak base methyl orange is suitable as an indicator.
Statement II : For titration of acetic acid with NaOH phenolphthalein is not a suitable indicator.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is false 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 true but Statement II is false

Answer: (D) Statement I is true but Statement II is false · Key from source paper

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Q72 JEE Main 2021 · 26 Aug · Shift 1 Numerical

The OH^- concentration in a mixture of $5.0\ \mathrm{mL}$ of $0.0504\ \mathrm{M}\ \mathrm{NH_4Cl}$ and $2\ \mathrm{mL}$ of $0.0210\ \mathrm{M}\ \mathrm{NH_3}$ solution is $x \times 10^{-6}\ \mathrm{M}$. The value of x is (Nearest integer) [Given $K_w = 1 \times 10^{-14}$ and $K_b = 1.8 \times 10^{-5}$]

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q73 JEE Main 2021 · 25 Jul · Shift 2 Numerical

Assuming that $\mathrm{Ba(OH)_2}$ is completely ionised in aqueous solution under the given conditions the concentration of $\mathrm{H_3O^+}$ ions in $0.005\mathrm{M}$ aqueous solution of $\mathrm{Ba(OH)_2}$ at $298\ \mathrm{K}$ is _____ $\times 10^{-12}\ \mathrm{mol\ L^{-1}}$. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q74 JEE Main 2021 · 20 Jul · Shift 2 MCQ

A solution is $0.1\mathrm{M}$ in Cl^- and $0.001\mathrm{M}$ in $\mathrm{CrO_4^{2-}}$.
Solid $\mathrm{AgNO_3}$ is gradually added to it Assuming that the addition does not change in volume and $\mathrm{K_{sp}(AgCl)} = 1.7 \times 10^{-10}\mathrm{M}^2$ and $\mathrm{K_{sp}(Ag_2\,CrO_4)} = 1.9 \times 10^{-12}\mathrm{M}^3$.
Select correct statement from the following:

(A) $AgCl$ precipitates first because its K_{sp} is high.
(B) Ag_2CrO_4 precipitates first as its K_{sp} is low.
(C) Ag_2CrO_4 precipitates first because the amount of Ag^+ needed is low.
(D) $AgCl$ will precipitate first as the amount of Ag^+ needed to precipitate is low.

Answer: (D) $AgCl$ will precipitate first as the amount of Ag^+ needed to precipitate is low. · Key from source paper

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Q75 JEE Main 2021 · 18 Mar · Shift 1 Numerical

In order to prepare a buffer solution of pH 5.74, sodium acetate is added to acetic acid. If the concentration of acetic acid in the buffer is $1.0\ M$, the concentration of sodium acetate in the buffer is _____ M. (Round off to the Nearest Integer). [Given : pKa(acetic acid) $= 4.74$]

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q76 JEE Main 2021 · 18 Mar · Shift 2 Numerical

The solubility of $CdSO_4$ in water is $8.0 \times 10^{-4}\ mol\ L^{-1}$. Its solubility in $0.01M\ H_2SO_4$ solution is _____ $\times 10^{-6}\ mol\ L^{-1}$ (Round off to the Nearest integer) (Assume that solubility is much less than $0.01\ M$)

Numerical value type: the answer is a number.

Answer: 64. · Key from source paper

Q77 JEE Main 2021 · 17 Mar · Shift 1 Numerical

0.01 moles of a weak acid HA $\left(K_a = 2.0 \times 10^{-6}\right)$ is dissolved in 1.0 L of 0.1M HCl solution. The degree of dissociation of HA is _____ $\times 10^{-5}$ (Round off to the Nearest Integer). [Neglect volume change on adding HA and assume degree of dissociation $<< 1$]

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q78 JEE Main 2021 · 16 Mar · Shift 1 Numerical

Two salts A_2X and MX have the same value of solubility product of 4.0×10^{-12}. The ratio of their molar solubilizes i.e. $\frac{S(A_2X)}{S(MX)}$ = _____.
(Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 50. · Key from source paper

Q79 JEE Main 2021 · 16 Mar · Shift 2 Numerical

Sulphurous acid (H_2SO_3) has $Ka_1 = 1.7 \times 10^{-2}$ and $Ka_2 = 6.4 \times 10^{-8}$. The pH of $0.588\ M\ H_2SO_3$ is _____ (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q80 JEE Main 2021 · 26 Feb · Shift 2 Numerical

The pH of ammonium phosphate solution, if $\mathrm{pk_a}$ of phosphoric acid and $\mathrm{pk_b}$ of ammonium hydroxide are 5.23 and 4.75 respectively, is

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q81 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The solubility of AgCN in a buffer solution of pH = 3 is x. The value of x is: [Assume : No cyano complex is formed ; $\mathrm{K_{sp}(AgCN)} = 2.2 \times 10^{-16}$ and $\mathrm{K_a(HCN)} = 6.2 \times 10^{-10}$]

(A) 1.9×10^{-5}

(B) 2.2×10^{-16}

(C) 0.625×10^{-6}

(D) 1.6×10^{-6}

Answer: (A) 1.9×10^{-5} · Key from source paper

Q82 JEE Main 2021 · 25 Feb · Shift 2 MCQ

The solubility of $\mathrm{Ca(OH)_2}$ in water is :
[Given : The solubility product of $\mathrm{Ca(OH)_2}$ in water $= 5.5 \times 10^{-6}$]

(A) 1.77×10^{-2}

(B) 1.77×10^{-6}

(C) 1.11×10^{-2}

(D) 1.11×10^{-6}

Answer: (C) 1.11×10^{-2} · Key from source paper

Q83 JEE Main 2021 · 24 Feb · Shift 2 Numerical

The solubility product of $\mathrm{PbI_2}$ is 8.0×10^{-9}. The solubility of lead iodide in 0.1 molar solution of lead nitrate is $x \times 10^{-6}\ \mathrm{mol/L}$. The value of x is _____ (Rounded off to the nearest integer)
[Given $\sqrt{2} = 1.41$]

Numerical value type: the answer is a number.

Answer: 141. · Key from source paper

Q84 JEE Main 2020 · 6 Sep · Shift 1 MCQ

Arrange the following solutions in the decreasing order of pOH :
(A) $0.01\ \mathrm{M\ HCl}$

(B) $0.01\ \mathrm{M\ NaOH}$
(C) $0.01\ \mathrm{M\ CH_3\ COONa}$
(D) $0.01\ \mathrm{M\ NaCl}$

(A) (A) > (C) > (D) > (B)
(B) (A) > (D) > (C) > (B)
(C) (B) > (C) > (D) > (A)
(D) (B) > (D) > (C) > (A)

Answer: (B) (A) > (D) > (C) > (B) · Key from source paper

Q85 JEE Main 2020 · 6 Sep · Shift 2 Numerical

If the solubility product of $\mathrm{AB_2}$ is $3.20 \times 10^{-11}\ \mathrm{M^3}$, then the solubility of $\mathrm{AB_2}$ in pure water is _____ $\times 10^{-4}\ \mathrm{mol\ L^{-1}}$
[Assuming that neither kind of ion reacts with water]

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q86 JEE Main 2020 · 5 Sep · Shift 1 Numerical

A soft drink was bottled with a partial pressure of $\mathrm{CO_2}$ of 3 bar over the liquid at room temperature. The partial pressure of $\mathrm{CO_2}$ over the solution approaches a value of 30 bar when 44 g of $\mathrm{CO_2}$ is dissolved in 1 kg of water at room temperature. The approximate pH of the soft drink is _____ $\times 10^{-1}$.
(First dissociation constant of $\mathrm{H_2CO_3}$ = 4. 0 $\times 10^{-7}$; log 2 = 0. 3; density of the soft drink = 1 g $\mathrm{mL^{-1}}$)

Numerical value type: the answer is a number.

Answer: 37. · Key from source paper

Q87 JEE Main 2020 · 3 Sep · Shift 1 MCQ

An acidic buffer is obtained on mixing:

(A) $100\ \mathrm{mL}$ of $0.1\ \mathrm{M\ CH_3\ COOH}$ and $100\ \mathrm{mL}$ of $0.1\ \mathrm{M\ NaOH}$
(B) $100\ \mathrm{mL}$ of $0.1\ \mathrm{M\ HCl}$ and $200\ \mathrm{mL}$ of $0.1\ \mathrm{M\ NaCl}$
(C) $100\ \mathrm{mL}$ of $0.1\ \mathrm{M\ CH_3COOH}$ and $200\ \mathrm{mL}$ of $0.1\ \mathrm{M\ NaOH}$
(D) $100\ \mathrm{mL}$ of $0.1\ \mathrm{M\ HCl}$ and $200\ \mathrm{mL}$ of $0.1\ \mathrm{M\ CH_3\ COONa}$

Answer: (D) $100\ \mathrm{mL}$ **of** $0.1\ \mathrm{M\ HCl}$ **and** $200\ \mathrm{mL}$ **of** $0.1\ \mathrm{M\ CH_3\ COONa}$ · Key from source paper

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Q88 JEE Main 2020 · 2 Sep · Shift 1 MCQ

For the following Assertion and Reason, the correct option is
Assertion (A) : When Cu (II) and sulphide ions are mixed, they react together extremely quickly to give a solid.

Reason (R) : The equilibrium constant of $\mathrm{Cu^{2+}(aq) + S^{2-}(aq) \rightleftharpoons Cus(s)}$ is high because the solubility product is low.

(A) (A) is false and (R) is true.
(B) Both (A) and (R) are false.
(C) Both (A) and (R) are true but (R) is not the explanation for (A).
(D) Both (A) and (R) are true and (R) is the explanation for (A).

Answer: (C) Both (A) and (R) are true but (R) is not the explanation for (A). · Key from source paper

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Q89 JEE Main 2020 · 2 Sep · Shift 2 MCQ

If you spill a chemical toilet cleaning liquid on your hand, your first aid would be:

(A) vinegar
(B) aqueous NaOH
(C) aqueous $\mathrm{NaHCO_3}$
(D) aqueous $\mathrm{NH_3}$

Answer: (C) aqueous $\mathrm{NaHCO_3}$ · Key from source paper

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Q90 JEE Main 2020 · 9 Jan · Shift 1 MCQ

The $\mathrm{K_{sp}}$ for the following dissociation is 1.6×10^{-5}

$\mathrm{PbCl_{2(s)} \rightleftharpoons Pb^{2+}_{(aq)} + 2Cl^{-}_{(aq)}}$

Which of the following choices is correct for a mixture of 300 mL 0.134 M $\mathrm{Pb(NO_3)_2}$ and 100 mL 0.4 M NaCl?

(A) Not enough data provided
(B) $\mathrm{Q < K_{sp}}$
(C) $\mathrm{Q > K_{sp}}$
(D) $\mathrm{Q = K_{sp}}$

Answer: (C) $\mathrm{Q > K_{sp}}$ · Key from source paper

Q91 JEE Main 2020 · 9 Jan · Shift 2 MCQ

The solubility product of $\mathrm{Cr(OH)_3}$ at 298K is 6.0×10^{-31}. The concentration of hydroxide ions in a saturated solution of $\mathrm{Cr(OH)_3}$ will be

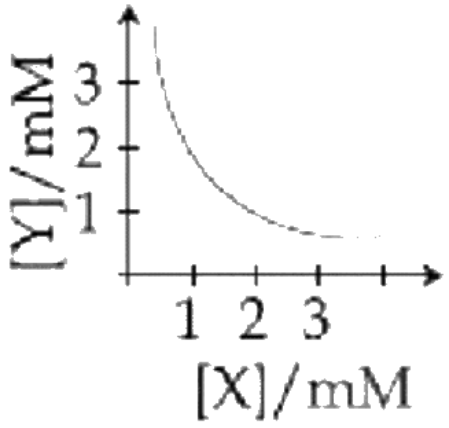
(A) $\left(2.22 \times 10^{-31}\right)^{\frac{1}{4}}$
(B) $\left(18 \times 10^{-31}\right)^{\frac{1}{4}}$
(C) $\left(18 \times 10^{-31}\right)^{\frac{1}{2}}$
(D) $\left(4.86 \times 10^{-29}\right)^{\frac{1}{4}}$

Answer: (B) $\left(18 \times 10^{-31}\right)^{\frac{1}{4}}$ · Key from source paper

Q92 JEE Main 2020 · 8 Jan · Shift 1 MCQ

The stoichiometry and solubility product of a salt with the solubility curve given below is, respectively:
(see the figure above)

Q30. The stoichiometry and solubility product of a salt with the solubility curve given below is, respectively:



(1) $X_2Y, 2 \times 10^{-9}M^3$
(2) $XY_2, 4 \times 10^{-9}M^3$
(3) $XY_2, 1 \times 10^{-9}M^3$
(4) $XY, 2 \times 10^{-6}M^3$

(A) $X_2Y, 2 \times 10^{-9}M^3$
(B) $XY_2, 4 \times 10^{-9}M^3$
(C) $XY_2, 1 \times 10^{-9}M^3$
(D) $XY, 2 \times 10^{-6}M^3$

Answer: (B) $XY_2, 4 \times 10^{-9}M^3$ · Key from source paper

Q93 JEE Main 2020 · 8 Jan · Shift 2 MCQ

For the following Assertion and Reason, the correct option is:
Assertion: The pH of water increases with increase in temperature.
Reason: The dissociation of water into H^+ and OH^- is an exothermic reaction.

(A) Both assertion and reason are true, and the reason is the correct explanation for the assertion.
(B) Both assertion and reason are false.
(C) Both assertion and reason are true, but the reason is not the correct explanation for the assertion.
(D) Assertion is not true, but reason is true.

Answer: (B) Both assertion and reason are false. · Key from source paper

Q94 JEE Main 2020 · 7 Jan · Shift 1 Numerical

Two solutions, A and B, each of $100L$ was made by dissolving $4g$ of $NaOH$ and $9.8g$ of H_2SO_4 in water, respectively. The pH of the resultant solution obtained from mixing $40L$ of solution A and $10L$ of solution B is _____ . $(\log 2 = 0.3)$

Numerical value type: the answer is a number.

Answer: 10.6. · Key from source paper

Q95 JEE Main 2020 · 7 Jan · Shift 2 Numerical

$3\ \mathrm{g}$ of acetic acid is added to $250\ \mathrm{mL}$ of $0.1\ \mathrm{M\ HCl}$ and the solution made up to $500\ \mathrm{mL}$. To $20\ \mathrm{mL}$ of this solution $\frac{1}{2}\mathrm{mL}$ of $5\mathrm{M\ NaOH}$ is added. The pH of the solution is _____

[Given: pKa of acetic acid $= 4.75$, molar mass of acetic acid $60\ \mathrm{g/mol}$, $\log 3 = 0.4771$, Neglect any changes in volume]

Numerical value type: the answer is a number.

Accepted answers: 5.22 or 5.23. · Key from source paper

Q96 JEE Main 2019 · 12 Apr · Shift 1 MCQ

What is the molar solubility of $\mathrm{AlOH_3}$ in 0.2 M NaOH solution? Given that, solubility product of $\mathrm{AlOH_3} = 2.4 \times 10^{-24}$:

(A) 3×10^{-19}

(B) 12×10^{-21}

(C) 12×10^{-23}

(D) 3×10^{-22}

Answer: (D) 3×10^{-22} · Key from source paper

Q97 JEE Main 2019 · 12 Apr · Shift 2 MCQ

The molar solubility of $\mathrm{Cd(OH)_2}$ is $1.84 \times 10^{-5}\mathrm{M}$ in water. The expectes solunility of $\mathrm{Cd(OH)_2}$ in a buffer solution of $\mathrm{pH} = 12$ is:

(A) $2.49 \times 10^{-10}\mathrm{M}$

(B) $\frac{2.49}{1.84} \times 10^{-9}\mathrm{M}$

(C) $1.84 \times 10^{-9}\mathrm{M}$

(D) $6.23 \times 10^{-11}\mathrm{M}$

Answer: (A) $2.49 \times 10^{-10}\mathrm{M}$ · Key from source paper

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Q98 JEE Main 2019 · 10 Apr · Shift 1 MCQ

Consider the following statements

(a) The pH of a mixture containing 400 mL of 0.1 M $\mathrm{H_2SO_4}$ and 400 mL of 0.1 M NaOH will be approximately 1.3.

(b) Ionic product of water is temperature dependent.

(c) A monobasic acid with $K_a = 10^{-5}$ has a pH = 5 . The degree of dissociation of this acid is 50% .

(d) The Le Chatelier's principle is not applicable to common-ion effect.

The correct statements are:

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(A) (b) and (c)
(B) (a), (b) and (d)
(C) (a) and (b)
(D) (a), (b) and (c)

Answer: (D) (a), (b) and (c) · Key from source paper

Q99 JEE Main 2019 · 10 Apr · Shift 2 MCQ

The pH of a 0.02 M NH_4Cl solution will be [Given: $K_b NH_4OH = 10^{-5}$ and $\log 2 = 0.301$]

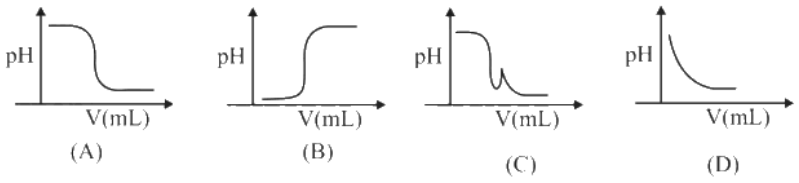
(A) 4.65
(B) 2.65
(C) 4.35
(D) 5.35

Answer: (D) 5.35 · Key from source paper

Q100 JEE Main 2019 · 9 Apr · Shift 2 MCQ

In an acid-base titration, 0.1 M HCl solution was added to the NaOH solution of unknown strength. Which of the following correctly shown the change of pH of the titration mixture in this experiment? *(see the figure above)*

Q36. In an acid-base titration, 0.1 M HCl solution was added to the NaOH solution of unknown strength. Which of the following correctly shown the change of pH of the titration mixture in this experiment?



(1) A
(2) B
(3) D
(4) C

(A) A
(B) B
(C) D
(D) C

Answer: (A) A · Key from source paper

Q101 JEE Main 2019 · 8 Apr · Shift 1 MCQ

If solubility product of $Zr_3(PO_4)_4$ is denoted by K_{sp} and its molar solubility is denoted by S , then which of the following relation between S and K_{sp} is correct?

(A) $S = \left(\frac{K_{sp}}{144}\right)^{\frac{1}{6}}$

(B) $S = \left(\frac{K_{sp}}{6912}\right)^{\frac{1}{7}}$

(C) $S = \left(\frac{K_{sp}}{929}\right)^{\frac{1}{9}}$

(D) $S = \left(\frac{K_{sp}}{216}\right)^{\frac{1}{7}}$

Answer: (B) $S = \left(\frac{K_{sp}}{6912}\right)^{\frac{1}{7}}$ · Key from source paper

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Q102

JEE Main 2019 · 12 Jan · Shift 2 · MCQ

If K_{sp} of Ag_2CO_3 is 8×10^{-12}, the molar solubility of Ag_2CO_3 in 0.1 M $AgNO_3$ is:

(A) $8 \text{ x } 10^{-13} M$

(B) $8 \text{ x } 10^{-11} M$

(C) $8 \text{ x } 10^{-12} M$

(D) $8 \text{ x } 10^{-10} M$

Answer: (D) $8 \text{ x } 10^{-10} M$ · Key from source paper

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Q103

JEE Main 2019 · 9 Jan · Shift 1 · MCQ

20 ml of 0.1 M H_2SO_4 solution is added to 30 mL of 0.2 M NH_4OH solution. The pH of the resultant mixture is: pk_b of $NH_4OH = 4.7$

(A) 5.0

(B) 5.2

(C) 9.4

(D) 9.0

Answer: (D) 9.0 · Key from source paper

Q104

JEE Main 2018 · 15 Apr · Shift 1 · MCQ

Which of the following is a Lewis acid?

(A) PH_3

(B) NF_3

(C) NaH

(D) $B(CH_3)_3$

Answer: (D) $B(CH_3)_3$ · Key from source paper

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Q105 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The minimum volume of water required to dissolve $0.1\ \mathrm{g}$ lead (II) chloride to get a saturated solution (K_{SP} of $PbCl_2 = 3.2 \times 10^{-8}$; atomic mass of Pb $= 207\ \mathrm{u}$) is :

(A) $1.798\ \mathrm{L}$
(B) $0.36\ \mathrm{L}$
(C) $17.95\ \mathrm{L}$
(D) $0.18\ \mathrm{L}$

Answer: (D) $0.18\ \mathrm{L}$ · Key from source paper

Q106 JEE Main 2018 · 15 Apr · Shift 2 MCQ

Following four solutions are prepared by mixing different volumes of NaOH and HCl of different concentrations, pH of which one of them will be equal to 1 ?

(A) $55\ \mathrm{mL}\ \frac{\mathrm{M}}{10}\mathrm{HCl} + 45\ \mathrm{mL}\ \frac{\mathrm{M}}{10}\mathrm{NaOH}$
(B) $75\ \mathrm{mL}\ \frac{\mathrm{M}}{5}\mathrm{HCl} + 25\ \mathrm{mL}\ \frac{\mathrm{M}}{5}\mathrm{NaOH}$
(C) $100\ \mathrm{mL}\ \frac{\mathrm{M}}{10}\mathrm{HCl} + 100\ \mathrm{mL}\ \frac{\mathrm{M}}{10}\mathrm{NaOH}$
(D) $60\ \mathrm{mL}\ \frac{\mathrm{M}}{10}\mathrm{HCl} + 40\ \mathrm{mL}\ \frac{\mathrm{M}}{10}\mathrm{NaOH}$

Answer: (B) $75\ \mathrm{mL}\ \frac{\mathrm{M}}{5}\mathrm{HCl} + 25\ \mathrm{mL}\ \frac{\mathrm{M}}{5}\mathrm{NaOH}$ · Key from source paper

Q107 JEE Main 2018 · 8 Apr · Offline MCQ

An aqueous solution contains $0.10\ \mathrm{M}\ H_2S$ and $0.20\ \mathrm{M}\ HCl$. If the equilibrium constant for the formation of HS^- from H_2S is 1.0×10^{-7} and that of S^{2-} from HS^- ions is 1.2×10^{-13}, then, the concentration of S^{2-} ions in the aqueous solution is:

(A) 5×10^{-19}
(B) 5×10^{-8}
(C) 3×10^{-20}
(D) 6×10^{-21}

Answer: (C) 3×10^{-20} · Key from source paper

Q108 JEE Main 2018 · 8 Apr · Offline MCQ

An aqueous solution contains an unknown concentration of Ba^{2+}. When $50\ \mathrm{mL}$ of a $1\ \mathrm{M}$ solution of Na_2SO_4 is added, $BaSO_4$ just begins to precipitate. The final volume is $500\ \mathrm{mL}$. The solubility product of $BaSO_4$ is 1×10^{-10}. What is the original concentration of Ba^{2+}?

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(A) $1.0 \times 10^{-10}\mathrm{M}$
(B) $5 \times 10^{-9}\mathrm{M}$
(C) $2 \times 10^{-9}\mathrm{M}$
(D) $1.1 \times 10^{-9}\mathrm{M}$

Answer: (D) $1.1 \times 10^{-9}\mathrm{M}$ · Key from source paper

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Q109 JEE Main 2018 · 8 Apr · Offline MCQ

Which of the following are Lewis acids?

(A) $\mathrm{BCl_3}$ and $\mathrm{AlCl_3}$
(B) $\mathrm{PH_3}$ and $\mathrm{BCl_3}$
(C) $\mathrm{AlCl_3}$ and $\mathrm{CCl_4}$
(D) $\mathrm{PH_3}$ and $\mathrm{CCl_4}$

Answer: (A) $\mathrm{BCl_3}$ and $\mathrm{AlCl_3}$ · Key from source paper

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Q110 JEE Main 2018 · 8 Apr · Offline MCQ

Which of the following salts is the most basic in aqueous solution?

(A) $\mathrm{Pb\,(CH_3\,COO)_2}$
(B) $\mathrm{Al\,(CN)_3}$
(C) $\mathrm{CH_3\,COOK}$
(D) $\mathrm{FeCl_3}$

Answer: (C) $\mathrm{CH_3\,COOK}$ · Key from source paper

Q111 JEE Main 2018 · 8 Apr · Offline MCQ

An alkali is titrated against acid with methyl orange as an indicator, which of the following is a correct combination?

(A) Base: Strong; Acid: Strong; End point: Pink to colourless
(B) Base: Weak; Acid: Srtong (sic); End point: Colourless to pink
(C) Base: Strong; Acid: strong; End point: Pinkish red to yellow
(D) Base: Weak; Acid: Strong; End point: Yellow to pinkish red

Answer: (D) Base: Weak; Acid: Strong; End point: Yellow to pinkish red · Key from source paper

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Q112 JEE Main 2017 · 9 Apr · Online MCQ

50 mL of 0.2 M ammonia solution is treated with 25 mL of 0.2 M HCl. If $\mathrm{pK_b}$ of ammonia solution is 4.75, the pH of the mixture will be:

(A) 8.25
(B) 9.25
(C) 3.75
(D) 4.75

Answer: (B) 9.25 · Key from source paper

Q113 JEE Main 2017 · 8 Apr · Online MCQ

Addition of sodium hydroxide solution to a weak acid (HA) results in a buffer of pH 6. If ionization constant of HA is 10^{-5}, the ratio of salt to acid concentration in the buffer solution will be:

(A) 10 : 1
(B) 4 : 5
(C) 5 : 4
(D) 1 : 10

Answer: (A) 10 : 1 · Key from source paper

Q114 JEE Main 2017 · 2 Apr · Offline MCQ

$\mathrm{pK_a}$ of a weak acid HA and $\mathrm{pK_b}$ of a weak base BOH are 3.2 and 3.4 respectively. The pH of their salt AB solution at $25^{\circ}\mathrm{C}$ is

(A) 6.9
(B) 7.0
(C) 1.0
(D) 7.2

Answer: (A) 6.9 · Key from source paper

Q115 JEE Main 2014 · 19 Apr · Online MCQ

Zirconium phosphate $[\mathrm{Zr_3(PO_4)_4}]$ dissociates into three zirconium cations of charge $+4$ and four phosphate anions of charge -3. If molar solubility of zirconium phosphate is denoted by s and its solubility product by $\mathrm{K_{sp}}$ then which of the following relationship between s and $\mathrm{K_{sp}}$ is correct ?

(A) $\mathrm{S} = \{\mathrm{K_{sp}}/6912\}^{7}$
(B) $\mathrm{S} = \{\mathrm{K_{sp}}/144\}^{1/7}$
(C) $\mathrm{S} = \left\{\mathrm{K_{sp}}/(6912)^{1/7}\right\}$
(D) $\mathrm{S} = (\mathrm{K_{sp}}/6912)^{1/7}$

Answer: (D) $\mathrm{S} = (\mathrm{K_{sp}}/6912)^{1/7}$ · Key from source paper

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Q116 JEE Main 2014 · 12 Apr · Online MCQ

The conjugate base of hydrazoic acid is:

(A) N^{-3}
(B) N_3^-
(C) N_2^-
(D) HN_3^-

Answer: (B) N_3^- · Key from source paper

Q117 JEE Main 2014 · 11 Apr · Online MCQ

Assuming that the degree of hydrolysis is small, the pH of $0.1M$ solution of sodium acetate $(K_a = 1.0 \times 10^{-5})$ will be:

(A) 5.0
(B) 6.0
(C) 8.0
(D) 9.0

Answer: (D) 9.0 · Key from source paper

Q118 JEE Main 2014 · 11 Apr · Online MCQ

In some solutions, the concentration of H_3O^+ remains constant even when small amounts of strong acid or strong base are added to them. These solutions are known as:

(A) Ideal solutions
(B) Colloidal solutions
(C) True solutions
(D) Buffer solutions

Answer: (D) Buffer solutions · Key from source paper

Q119 JEE Main 2013 · 25 Apr · Online MCQ

What would be the pH of a solution obtained by mixing 5 g of acetic acid and 7.5 g of sodium acetate and making the volume equal to 500 mL ? (K_a = 1.75 $\times 10^{-5}$, pK_a = 4.76)

(A) pH = 4.70
(B) pH < 4.70
(C) pH of solution will be equal to pH of acetic acid
(D) 4.76 < pH < 5.0

Answer: (D) 4.76 < pH < 5.0 · Key from source paper

Q120 JEE Main 2013 · 25 Apr · Online MCQ

Which one of the following arrangements represents the correct order of the proton affinity of the given species :

(A) $I^- < F^- < HS^- < NH_2^-$

(B) $HS^- < NH_2^- < F^- < I^-$

(C) $F^- < I^- < NH_2^- < HS^-$

(D) $NH_2^- < HS^- < I^- < F^-$

Answer: (A) $I^- < F^- < HS^- < NH_2^-$ · Key from source paper

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Q121 JEE Main 2013 · 23 Apr · Online MCQ

What is the pH of a 10^{-4}MOH^- solution at 330 K, if K_w at 330 K is $10^{-13.6}$?

(A) 4

(B) 9.0

(C) 10

(D) 9.6

Answer: (D) 9.6 · Key from source paper

Q122 JEE Main 2013 · 22 Apr · Online MCQ

NaOH is a strong base. What will be pH of 5.0×10^{-2}MNaOH solution ? $(\log 2 = 0.3)$

(A) 14.00

(B) 13.70

(C) 13.00

(D) 12.70

Answer: (D) 12.70 · Key from source paper

Q123 JEE Main 2013 · 22 Apr · Online MCQ

Values of dissociation constant, K_a are given as follows :

Acid : K_a

HCN : 6.2×10^{-10}

HF : 7.2×10^{-4}

HNO_2 : 4.0×10^{-4}

Correct order of increasing base strength of the base CN^-, F^- and NO_2^- will be :

(A) $F^- < CN^- < NO_2^-$

(B) $NO_2^- < CN^- < F^-$

(C) $F^- < NO_2^- < CN^-$

(D) $NO_2^- < F^- < CN^-$

Answer: (C) $F^- < NO_2^- < CN^-$ · Key from source paper

Q124 JEE Main 2013 · 9 Apr · Online MCQ

Solid $Ba(NO_3)_2$ is gradually dissolved in a 1.0×10^{-4} M Na_2CO_3 solution. At which concentration of Ba^{2+}, precipitate of $BaCO_3$ begins to form ? (K_{sp} for $BaCO_3 = 5.1 \times 10^{-9}$)

(A) 5.1×10^{-5}M
(B) 7.1×10^{-8}M
(C) 4.1×10^{-5}M
(D) 8.1×10^{-7}M

Answer: (A) 5.1×10^{-5}M · Key from source paper

Q125 JEE Main 2013 · 7 Apr · Offline MCQ

How many litres of water must be added to 1 litre of aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2?

(A) 2.0
(B) 9.0
(C) 0.1
(D) 0.9

Answer: (B) 9.0 · Key from source paper

Q126 AIEEE 2012 · 26 May · Online MCQ

The solubility of PbI_2 at $25^\circ C$ is 0.7 g L^{-1}. The solubility product of PbI_2 at this temperature is (molar mass of PbI_2 = 461.2 g mol^{-1})

(A) 1.40×10^{-9}
(B) 0.14×10^{-9}
(C) 140×10^{-9}
(D) 14.0×10^{-9}

Answer: (D) 14.0×10^{-9} · Key from source paper

Q127 AIEEE 2012 · 19 May · Online MCQ

If K_{sp} of CaF_2 at $25^\circ C$ is 1.7×10^{-10}, the combination amongst the following which gives a precipitate of CaF_2 is

(A) 1×10^{-2}MCa^{2+} and 1×10^{-3}MF^-
(B) 1×10^{-4}MCa^{2+} and 1×10^{-4}MF^-
(C) 1×10^{-2}MCa^{2+} and 1×10^{-5}MF^-
(D) 1×10^{-3}MCa^{2+} and 1×10^{-5}MF^-

Answer: (A) 1×10^{-2}MCa^{2+} **and** 1×10^{-3}MF^- · Key from source paper

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Q128 AIEEE 2012 · 12 May · Online MCQ

Given (i) $\mathrm{HCN}(aq) + \mathrm{H_2O}(l) \rightleftharpoons \mathrm{H_3O^+}(aq) + \mathrm{CN^-}(aq)$ $K_\mathrm{a} = 6.2 \times 10^{-10}$ (ii) $\mathrm{CN^-}(aq) + \mathrm{H_2O(l)} \rightleftharpoons \mathrm{HCN}(aq) + \mathrm{OH^-}(aq)$ $K_\mathrm{b} = 1.6 \times 10^{-5}$. These equilibria show the following order of the relative base strength,

(A) $\mathrm{OH^-} > \mathrm{H_2O} > \mathrm{CN^-}$
(B) $\mathrm{OH^-} > \mathrm{CN^-} > \mathrm{H_2O}$
(C) $\mathrm{H_2O} > \mathrm{CN^-} > \mathrm{OH}$
(D) $\mathrm{CN^-} > \mathrm{H_2O} > \mathrm{OH^-}$

Answer: (B) $\mathrm{OH^-} > \mathrm{CN^-} > \mathrm{H_2O}$ · Key from source paper

Q129 AIEEE 2012 · 7 May · Online MCQ

The solubility (in mol $\mathrm{L^{-1}}$) of AgCl $\left(K_{sp} = 1.0 \times 10^{-10}\right)$ in a 0.1MKCl solution will be

(A) 1.0×10^{-9}
(B) 1.0×10^{-10}
(C) 1.0×10^{-5}
(D) 1.0×10^{-11}

Answer: (A) 1.0×10^{-9} · Key from source paper

Q130 AIEEE 2012 · Offline MCQ

The pH of a 0.1 molar solution of the acid HQ is 3 . The value of the ionization constant, Ka of this acid is :

(A) 3×10^{-1}
(B) 1×10^{-3}
(C) 1×10^{-5}
(D) 1×10^{-7}

Answer: (C) 1×10^{-5} · Key from source paper

Q131 AIEEE 2010 MCQ

In aqueous solution the ionization constants for carbonic acid are $\mathrm{K_1} = 4.2 \times 10^{-7}$ and $\mathrm{K_2} = 4.8 \times 10^{-11}$. Select the correct statement for a saturated 0.034M solution of the carbonic acid.

(A) The concentration of $\mathrm{CO_3^{2-}}$ is 0.034M.
(B) The concentration of $\mathrm{CO_3^{2-}}$ is greater than that of $\mathrm{HCO_3^-}$.
(C) The concentration of $\mathrm{H^+}$ and $\mathrm{HCO_3^-}$ are approximately equal.
(D) The concentration of $\mathrm{H^+}$ is double that of $\mathrm{CO_3^{2-}}$.

Answer: (C) The concentration of $\mathrm{H^+}$ and $\mathrm{HCO_3^-}$ are approximately equal. · Key from source paper

EdLoop JEE

Q132 AIEEE 2010 MCQ

Solubility product of silver bromide is 5.0×10^{-13}. The quantity of potassium bromide (molar mass taken as 120 g mol^{-1}) to be added to 1 litre of 0.05 M solution of silver nitrate to start the precipitation of AgBr is

(A) 1.2×10^{-10} g
(B) 1.2×10^{-9} g
(C) 6.2×10^{-5} g
(D) 5.0×10^{-8} g

Answer: (B) 1.2×10^{-9} g · Key from source paper

Q133 AIEEE 2010 MCQ

At $25^{\circ}C$, the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At which pH, will Mg^{2+} ions start precipitating in the form of $Mg(OH)_2$ from a solution of $0.001M$ Mg^{2+} ions ?

(A) 9
(B) 10
(C) 11
(D) 8

Answer: (B) 10 · Key from source paper

Q134 AIEEE 2010 MCQ

Three reactions involving $H_2PO_4^-$ are given below : (i) $H_3PO_4 + H_2O \rightarrow H_3O^+ + H_2PO_4^-$ (ii) $H_2PO_4^- + H_2O \rightarrow HPO_4^{2-} + H_3O^+$ (iii) $H_2PO_4^- + OH^- \rightarrow H_3PO_4 + O^{2-}$ In which of the above does $H_2PO_4^-$ act as an acid ?

(A) (ii) only
(B) (i) and (ii)
(C) (iii) only
(D) (i) only

Answer: (A) (ii) only · Key from source paper

Q135 AIEEE 2009 MCQ

Solid Ba $(NO_3)_2$ is gradually dissolved in a 1.0×10^{-4} M Na_2CO_3 solution. At what concentration of Ba^{2+} will a precipitate begin to form ? (K_{sp} for $BaCO_3 = 5.1 \times 10^{-9}$).

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(A) $4.1 \times 10^{-5}\mathrm{M}$
(B) $5.1 \times 10^{-5}\mathrm{M}$
(C) $8.1 \times 10^{-8}\mathrm{M}$
(D) $8.1 \times 10^{-7}\mathrm{M}$

Answer: (B) $5.1 \times 10^{-5}\mathrm{M}$ · Key from source paper

Q136 AIEEE 2008 MCQ

Four species are listed below i. $\mathrm{HCO_3^-}$ ii. $\mathrm{H_3O^+}$ iii. $\mathrm{HSO_4^-}$ iv. $\mathrm{HSO_3F}$ Which one of the following is the correct sequence of their acid strength?

(A) iv < ii < iii < i
(B) ii < iii < i < iv
(C) i < iii < ii < iv
(D) iii < i < iv < ii

Answer: (C) i < iii < ii < iv · Key from source paper

Q137 AIEEE 2008 MCQ

The $\mathrm{pK_a}$ of a weak acid, HA, is 4.80. The $\mathrm{pK_b}$ of a weak base, BOH, is 4.78. The pH of an aqueous solution of the corresponding salt, BA, will be

(A) 9.58
(B) 4.79
(C) 7.01
(D) 9.22

Answer: (C) 7.01 · Key from source paper

Q138 AIEEE 2007 MCQ

The pKa of a weak acid (HA) is 4.5. The pOH of an aqueous buffered solution of HA in which 50% of the acid is ionized is

(A) 4.5
(B) 2.5
(C) 9.5
(D) 7.0

Answer: (C) 9.5 · Key from source paper

Q139 AIEEE 2007 MCQ

In a sautrated solution of the sparingly soluble strong electrolyte $\mathrm{AgIO_3}$ (Molecular mass = 283) the equilibrium which sets in is $\mathrm{AgIO_{3(s)} \rightleftharpoons Ag^+_{(aq)} + IO^-_{3(aq)}}$ If the solubility product constant $\mathrm{K_{sp}}$ of

$AgIO_3$ at a given temperature is 1.0×10^{-8}, what is the mass of $AgIO_3$ contained in 100 ml of its saturated solution?

(A) 28.3×10^{-2} g
(B) 2.83×10^{-3} g
(C) 1.0×10^{-7} g
(D) 1.0×10^{-4} g

Answer: (B) 2.83×10^{-3} g · Key from source paper

Q140 AIEEE 2007 MCQ

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) 0.0×10^{5}

Answer: (C) 5.0×10^{-15} · Key from source paper

Q141 AIEEE 2006 MCQ

Which of the following statements is true?

(A) H_3PO_3 is a stronger acid than H_2SO_3
(B) In aqueous medium HF is a stronger acid than HCl
(C) $HClO_4$ is a weaker acid than $HClO_3$
(D) HNO_3 is a stronger acid than HNO_2

Answer: (D) HNO_3 **is a stronger acid than** HNO_2 · Key from source paper

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Q142 AIEEE 2005 MCQ

The solubility product of a salt having general formula MX_2, in water is: 4×10^{-12}. The concentration of M^{2+} ions in the aqueous solution of the salt is

(A) 2.0×10^{-6}M
(B) 1.0×10^{-4}M
(C) 1.6×10^{-4}M
(D) 4.0×10^{-10}M

Answer: (B) 1.0×10^{-4}M · Key from source paper

Q143 AIEEE 2005 MCQ

Hydrogen ion concentration in mol / L in a solution of pH = 5.4 will be

(A) 3.98×10^{8}
(B) 3.88×10^{6}
(C) 3.68×10^{-6}
(D) 3.98×10^{-6}

Answer: (D) 3.98×10^{-6} · Key from source paper

Q144 AIEEE 2005 MCQ

What is the conjugate base of OH^{-} ?

(A) O_2
(B) H_2O
(C) O^{-}
(D) O^{-2}

Answer: (D) O^{-2} · Key from source paper

Q145 AIEEE 2004 MCQ

The conjugate base of $H_2PO_4^{-}$ is

(A) PO_4^{3-}
(B) HPO_4^{2-}
(C) H_3PO_4
(D) P_2O_5

Answer: (B) HPO_4^{2-} · Key from source paper

Q146 AIEEE 2004 MCQ

The molar solubility (in mol L^{-1}) of a sparingly soluble salt MX_4 is ' s '. The corresponding solubility product is K_{sp}. ' s ' is given in terms of K_{sp} by the relation

(A) $s = \left(\frac{K_{sp}}{128}\right)^{1/4}$
(B) $s = \left(\frac{K_{sp}}{256}\right)^{1/5}$
(C) $s = (256\ K_{sp})^{1/5}$
(D) $s = (128\ K_{sp})^{1/4}$

Answer: (B) $s = \left(\frac{K_{sp}}{256}\right)^{1/5}$ · Key from source paper

Q147 AIEEE 2003 MCQ

Which one of the following substances has the highest proton affinity?

(A) H_2S
(B) NH_3
(C) PH_3
(D) H_2O

Answer: (B) NH_3 · Key from source paper

Q148 AIEEE 2003 MCQ

Which one of the following statements is not true?

(A) $pH + pOH = 14$ for all aqueous solutions
(B) The pH of 1×10^{-8} M HCl is 8
(C) 96,500 coulombs of electricity when passed through a $CuSO_4$ solution deposits 1 gram equivalent of copper at the cathode
(D) The conjugate base of $H_2PO_4^-$ is HPO_4^{2-}

Answer: (B) The pH of 1×10^{-8} M HCl is 8 · Key from source paper

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Q149 AIEEE 2003 MCQ

The solubility in water of a sparingly soluble salt AB is 1.0×10^{-5} mol L^{-1}. Its solubility product number will be

(A) 4×10^{-10}
(B) 1×10^{-15}
(C) 1×10^{-10}
(D) 4×10^{-15}

Answer: (C) 1×10^{-10} · Checked by our team

Q150 AIEEE 2002 MCQ

1 M NaCl and 1 M HCl are present in an aqueous solution. The solution is

(A) not a buffer solution with pH < 7
(B) not a buffer solution with pH > 7
(C) a buffer solution with pH < 7
(D) a buffer solution with pH > 7

Answer: (A) not a buffer solution with pH < 7 · Key from source paper

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Q151 AIEEE 2002 MCQ

Species acting as both Bronsted acid and base is

(A) $(HSO_4)^{-1}$
(B) Na_2CO_3
(C) NH_3
(D) OH^{-1}

Answer: (A) $(HSO_4)^{-1}$ · Key from source paper

Q152 AIEEE 2002 MCQ

Let the solubility of an aqueous solution of $Mg(OH)_2$ be x then its k_{sp} is

(A) $4x^3$
(B) $108x^5$
(C) $27x^4$
(D) $9x$

Answer: (A) $4x^3$ · Key from source paper

Q153 AIEEE 2002 MCQ

The solubility of $Mg(OH)_2$ is S moles/litre. The solubility product under the same condition is

(A) $4\ S^3$
(B) $3S^4$
(C) $4\ S^2$
(D) S^3

Answer: (A) $4\ S^3$ · Key from source paper

EdLoop JEE