Essential Pre-Uni Chemistry J2.4

A Level

Part A **(a)**

Calculate the pH of a $0.012\,\mathrm{mol\,dm^{-3}}$ solution of HCl.

Part B **(b)**

Calculate the pH of a $0.030\,\mathrm{mol\,dm^{-3}}$ solution of sulfuric acid.

Part C **(c)**

Calculate the concentration of a solution of nitric acid with $\mathrm{pH} = 2.1$.

Part D **(d)**

Calculate the concentration of a solution of sulfuric acid with a pH of 4.7.

Essential Pre-Uni Chemistry J2.5

A Level

Part A **(a)**

Calculate the concentration of a solution of barium hydroxide with a pH of 9.5.

Part B **(b)**

Calculate the pH of a $0.0800\,\mathrm{mol\,dm^{-3}}$ solution of KOH.

Essential Pre-Uni Chemistry J2.7

A Level

$14\,\mathrm{g}$ of sulfuric acid is dissolved in $500\,\mathrm{m}^3$ of water. Calculate the pH of the resulting solution.

Essential Pre-Uni Chemistry J2.8

A Level

$100\,\mathrm{cm}^3$ of a solution of $0.750\,\mathrm{mol\,dm}^{-3}$ sulfuric acid is mixed with $400\,\mathrm{cm}^3$ of a solution of $0.300\,\mathrm{mol\,dm}^{-3}$ sodium hydroxide. Calculate the pH of the resulting mixture.

Essential Pre-Uni Chemistry J2.9

A Level

$50.0\,\mathrm{cm}^3$ of a solution of $0.200\,\mathrm{mol\,dm}^{-3}$ nitric acid is mixed with $200\,\mathrm{cm}^3$ of a solution of $0.160\,\mathrm{mol\,dm}^{-3}$ potassium hydroxide. Calculate the pH of the resulting mixture.

Essential Pre-Uni Chemistry J3.2

A Level

Species	$K_a \,/\, \mathrm{mol\,dm^{-3}}$
Benzoic acid	6.3×10^{-5}
Hydrogen sulfide	8.9×10^{-8}
Iron(III)	6.0×10^{-3}
Methanoic acid	1.6×10^{-4}
Sulfuric(IV) acid	1.5×10^{-2}
Boric acid	5.8×10^{-10}

Calculate the concentration of a solution of benzoic acid with a pH of 3.2.

Essential Pre-Uni Chemistry J3.4

A Level

The $\mathrm{p}K_\mathrm{a}$ of ethanoic acid is 4.8. Calculate its K_a.

Essential Pre-Uni Chemistry J3.6

A Level

Calculate the K_a of an acid, HA, with a pH of 5.0 when its concentration is $0.20\,\mathrm{mol\,dm^{-3}}$.

Essential Pre-Uni Chemistry J3.7

A Level

Species	K_a / mol dm^{-3}
Benzoic acid	6.3×10^{-5}
Hydrogen sulfide	8.9×10^{-8}
Iron(III)	6.0×10^{-3}
Methanoic acid	1.6×10^{-4}
Sulfuric(IV) acid	1.5×10^{-2}
Boric acid	5.8×10^{-10}

Part A **(a)**

Calculate the pH of a $13.8\,\mathrm{g\,dm^{-3}}$ solution of methanoic acid.

Part B **(b)**

$240\,\mathrm{cm^3}$ of hydrogen sulfide gas is dissolved $500\,\mathrm{cm^3}$ of water. Calculate the pH of the resulting solution.

Essential Pre-Uni Chemistry J3.9

A Level

Species	$K_a \,/\, \mathrm{mol\,dm^{-3}}$
Benzoic acid	6.3×10^{-5}
Hydrogen sulfide	8.9×10^{-8}
Iron(III)	6.0×10^{-3}
Methanoic acid	1.6×10^{-4}
Sulfuric(IV) acid	1.5×10^{-2}
Boric acid	5.8×10^{-10}

Sulfur(IV) oxide dissolves in water to give sulfuric(IV) acid: $\mathrm{SO_2\,(g) + H_2O\,(l) \rightleftharpoons H_2SO_3\,(aq)}$. Calculate the RTP volume of sulfur(IV) oxide required to reduce the pH of a lake of volume $0.40\,\mathrm{km^3}$ from 7.0 to 6.0.