



Physics. *You work it out.*

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Essential Pre-Uni Chemistry J2.4

A Level



Part A (a)

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

Part B (b)

Calculate the pH of a $0.030 \text{ mol dm}^{-3}$ solution of sulfuric acid. (For the purpose of this question, assume that sulfuric acid dissociates fully.)

Part C (c)

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

Part D (d)

Calculate the concentration of a solution of sulfuric acid with a pH of 4.7. (For the purpose of this question, assume that sulfuric acid dissociates fully.)

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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 $0.0800 \text{ mol dm}^{-3}$ solution of KOH.

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Essential Pre-Uni Chemistry J2.7



14 g of sulfuric acid is dissolved in 500 m³ of water. Calculate the pH of the resulting solution. (For the purpose of this question, assume that sulfuric acid dissociates fully.)

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Essential Pre-Uni Chemistry J2.8

A Level



100 cm^3 of a solution of 0.750 mol dm^{-3} sulfuric acid is mixed with 400 cm^3 of a solution of 0.300 mol dm^{-3} sodium hydroxide. Calculate the pH of the resulting mixture. Give your answer to 2 significant figures. (For the purpose of this question, assume that sulfuric acid dissociates fully.)

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Essential Pre-Uni Chemistry J2.9



50.0 cm³ of a solution of 0.200 mol dm⁻³ nitric acid is mixed with 200 cm³ of a solution of 0.160 mol dm⁻³ potassium hydroxide. Calculate the pH of the resulting mixture.

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Essential Pre-Uni Chemistry J3.2

A Level



Species	$K_a / \text{mol dm}^{-3}$
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.

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Essential Pre-Uni Chemistry J3.4



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

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Essential Pre-Uni Chemistry J3.6



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

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Essential Pre-Uni Chemistry J3.7

A Level



Species	$K_a / \text{mol dm}^{-3}$
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 g dm^{-3} solution of methanoic acid.

Part B (b)

240 cm^3 of hydrogen sulfide gas (at RTP) is dissolved in 500 cm^3 of water. Calculate the pH of the resulting solution.

Essential Pre-Uni Chemistry J3.9

A Level



Species	$K_a / \text{mol dm}^{-3}$
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 dioxide dissolves in water to give sulfuric(IV) acid: $\text{SO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l}) \rightleftharpoons \text{H}_2\text{SO}_3 (\text{aq})$. Calculate the RTP volume of sulfur dioxide required to reduce the pH of a lake of volume 0.40 km^3 from 7.0 to 6.0.