

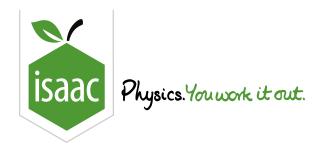
Essential Pre-Uni Chemistry J2.4



Part A (a)
Calculate the $\rm pH$ of a $0.012\rm moldm^{-3}$ solution of $HCl.$
Part B (b)
Calculate the pH of a $0.030\mathrm{moldm^{-3}}$ 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 $\mathrm{pH}=2.1.$

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.)

Part D (d)



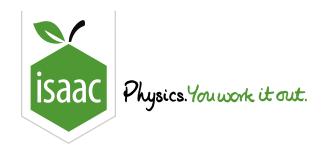
Essential Pre-Uni Chemistry J2.5



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 $0.0800\mathrm{moldm^{-3}}$ solution of $KOH.$

Gameboard:

STEM SMART Chemistry Week 22



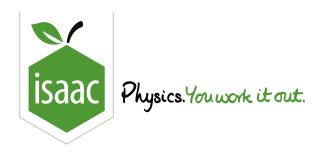
Essential Pre-Uni Chemistry J2.7



 $14\,\mathrm{g}$ of sulfuric acid is dissolved in $500\,\mathrm{m}^3$ of water. Calculate the pH of the resulting solution. (For the purpose of this question, assume that sulfuric acid dissociates fully.)

Gameboard:

STEM SMART Chemistry Week 22



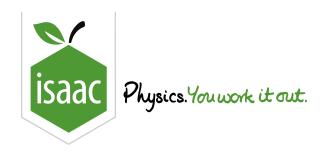
Essential Pre-Uni Chemistry J2.8



 $100\,\mathrm{cm^3}$ 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. Give your answer to 2 significant figures. (For the purpose of this question, assume that sulfuric acid dissociates fully.)

Gameboard:

STEM SMART Chemistry Week 22



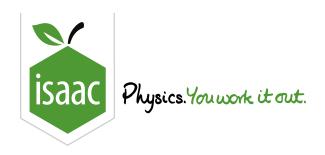
Essential Pre-Uni Chemistry J2.9



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

Gameboard:

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Essential Pre-Uni Chemistry J3.2

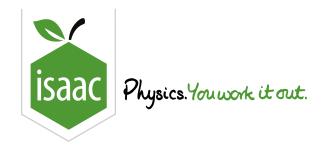


Species	$K_{\sf a}/{ m moldm^{-3}}$
Benzoic acid	$6.3 imes10^{-5}$
Hydrogen sulfide	$8.9 imes 10^{-8}$
Iron(III)	$6.0 imes10^{-3}$
Methanoic acid	$1.6 imes10^{-4}$
Sulfuric(IV) acid	$1.5 imes10^{-2}$
Boric acid	$5.8 imes10^{-10}$

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

Gameboard:

STEM SMART Chemistry Week 22



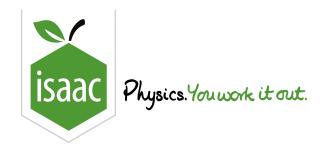
Essential Pre-Uni Chemistry J3.4



The pK_a of ethanoic acid is 4.8. Calculate its K_a .

Gameboard:

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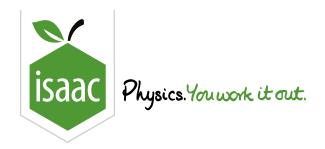
Essential Pre-Uni Chemistry J3.6



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

Gameboard:

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Physical Acids & Bases Essential Pre-Uni Chemistry J3.7

Essential Pre-Uni Chemistry J3.7



Species	$K_{\sf a}/{ m moldm^{-3}}$
Benzoic acid	$6.3 imes10^{-5}$
Hydrogen sulfide	$8.9 imes 10^{-8}$
Iron(III)	$6.0 imes10^{-3}$
Methanoic acid	$1.6 imes10^{-4}$
Sulfuric(IV) acid	$1.5 imes10^{-2}$
Boric acid	$5.8 imes10^{-10}$

(a) Part A

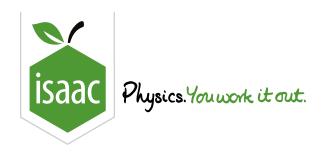
Calculate the pH of a $13.8\,\mathrm{g\,dm^{-3}}$ solution of methanoic acid.

Part B (b)

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

Gameboard:

STEM SMART Chemistry Week 22



Essential Pre-Uni Chemistry J3.9



Species	$K_{\sf a}/{ m moldm^{-3}}$
Benzoic acid	$6.3 imes10^{-5}$
Hydrogen sulfide	$8.9 imes 10^{-8}$
Iron(III)	$6.0 imes10^{-3}$
Methanoic acid	$1.6 imes10^{-4}$
Sulfuric(IV) acid	$1.5 imes10^{-2}$
Boric acid	$5.8 imes10^{-10}$

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