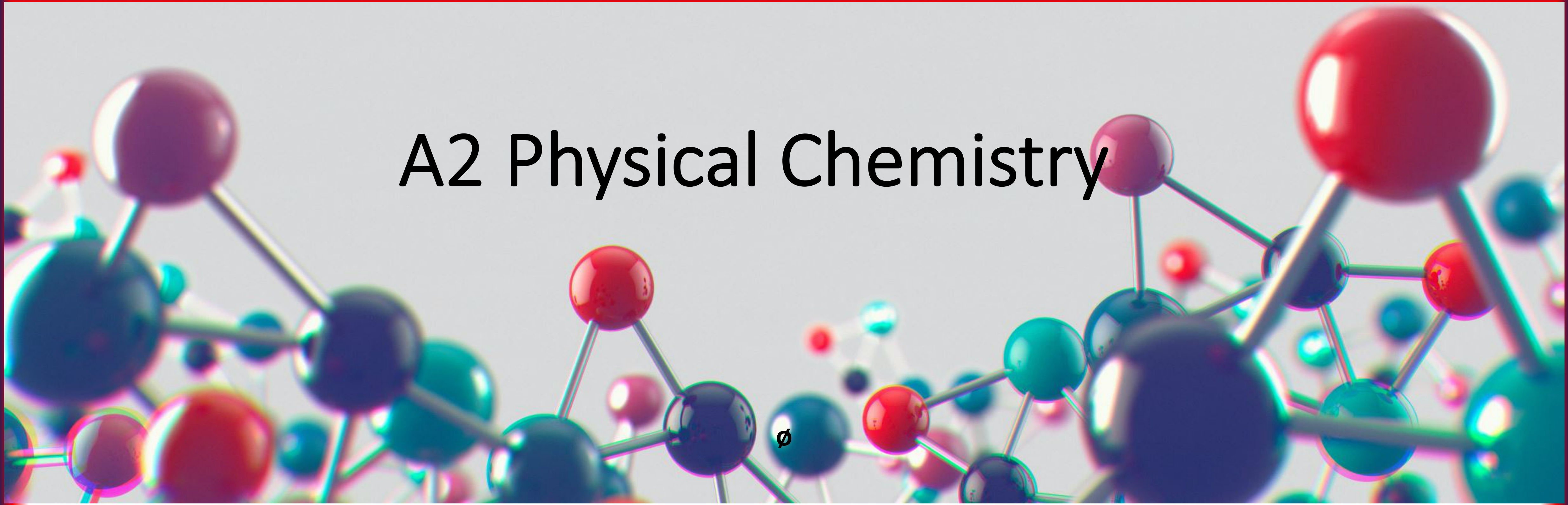
A2 Physical Chemistry



Calculating the pH of Strong Bases

K_w may be used to calculate the pH of alkalis

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Then the pH may be calculated using pH = $-\log[H^+]$

Example 1 - pH of 0.200 mol dm^{-3} NaOH?

$1 \times 10^{-14} = [H^+][OH^-]$

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$pH = -\log(5 \times 10^{-14})$

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$1 \times 10^{-14} = [H^+](0.200)$

$[H^+] = 5 \times 10^{-14}$

$pH = -\log(5 \times 10^{-14})$

pH = 13.30

Example 2 - pH of 0.0500 mol dm^{-3} $Sr(OH)_2$

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$pH = -\log (1 \times 10^{-13})$

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$1 \times 10^{-14} = [H^+](0.100)$

$[H^+] = 1.00 \times 10^{-13}$

$pH = -\log(1 \times 10^{-13})$

pH = 13.00

Example 3 - Calculate the pH of the solution formed when 50 cm^3 of water is added to 100 cm^3 of 0.200 mol dm^{-3} NaOH.

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Original $[OH^-]$ = 0.200

Diluted $[OH^-] = 0.200 \times \frac{\text{original vol}}{\text{diluted vol}}$

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Original $[OH^-]$ = 0.200

Diluted $[OH^-] = 0.200 \times \frac{100}{150}$

Example 3 - Calculate the pH of the solution formed when 50 cm^3 of water is added to 100 cm^3 of 0.200 mol dm^{-3} NaOH.

Original $[OH^-]$ = 0.200

Diluted $[OH^-] = 0.200 \times \dfrac{100}{150}$

Diluted $[OH^-]$ = 0.133

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$1 \times 10^{-14} = [H^+](0.133)$

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Diluted $[OH^-]$ = 0.133

$1 \times 10^{-14} = [H^+](0.133)$

$[H^+] = 7.50 \times 10^{-14}$

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$1 \times 10^{-14} = [H^+](0.133)$

$[H^+] = 7.50 \times 10^{-14}$

$pH = -\log(7.50 \times 10^{-14})$

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Diluted $[OH^-] = 0.133$

$1 \times 10^{-14} = [H^+](0.133)$

$[H^+] = 7.50 \times 10^{-14}$

pH = 13.12

Online Teaching and Learning Resources for Chemistry Students

ChemistryTuition.Net