**Chemistry 2.6 AS 91166** Demonstrate understanding of chemical reactivity



Writing Excellence answers to **pH calculations** questions

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| **pH calculations QUESTION 1** | |
| **Question:**  In a solution of potassium hydroxide, KOH, the pH is found to be 12.8.  **(i)** Calculate the hydronium ion concentration, [H3O+], and the hydroxide ion concentration, [OH–], in the solution. *K*w = 1 × 10–14  **(ii)** Calculate the pH of a 2.25 × 10–4 mol L–1 sodium hydroxide, NaOH, solution. | |
| **ANSWER** | |
| STEP 1.  **Calculate H3O+**for KOH  [H3O+] = 10-pH  (units and 3sgf) |  |
| STEP 2. **Calculate OH-**for KOH  [OH-] = Kw/ [H3O+]  ( *K*w = 1 × 10–14)  (units and 3sgf) |  |
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| STEP 1.  **Calculate pOH**for NaOH  pOH = -log[OH-]  (3sgf) |  |
| STEP 2. **Calculate pH**for NaOH  pH =  14  -  pOH  (3sgf) |  |
| **pH calculations QUESTION 2** | |
| **Question:**  (i) A solution of nitric acid, HNO3(*aq*), has a hydronium ion, H3O+, concentration of 0.0243 mol L–1.  Determine, by calculation, the pH and the concentration of hydroxide ions, OH–, in this solution.  *K*w = 1 × 10–14  (ii) Determine the hydroxide ion concentration, [OH–], of a solution of potassium hydroxide, KOH(aq), with a pH of 11.8. | |
| **ANSWER** | |
| STEP 1.  **Calculate pH** for HNO3  pH = -log[H3O+]  (3sgf) |  |
| STEP 2. **Calculate OH-**for HNO3  [OH-] = Kw/ [H3O+]  ( *K*w = 1 × 10–14)  (units and 3sgf) |  |
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| STEP 1.  **Calculate H3O+**for KOH  [H3O+] = 10-pH  (units and 3sgf) |  |
| STEP 2. **Calculate OH-**for KOH  [OH-] = Kw/ [H3O+]  ( *K*w = 1 × 10–14)  (units and 3sgf) |  |

NOTE: The white column is how your answer would appear on your test paper so make sure you **write out complete sentences**. The grey area is just to help you structure your answer and would not appear in the question.