**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 NaOHpOH = -log[OH-](3sgf) |  |
| STEP 2. **Calculate pH**for NaOHpH =  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 HNO3pH = -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.