ANSWER KEY.

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8.2 pH and pOH of Strong Acids and Bases

AP Chemistry | ANSWER KEY

Show your work. Use $K_w = 1.0 \times 10^{-14}$ at 25 °C. Report pH to the correct number of decimal places.

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1. Circle every strong acid and underline every strong base.

HF HNO_3 CH_3COOH HBr H_2SO_4 H_2CO_3 $HClO_4$

KOH NH_3 $Ca(OH)_2$ CH_3NH_2 $NaOH$

Strong acids: HNO_3, HBr, H_2SO_4, $HClO_4$. (HF, CH_3COOH, and H_2CO_3 are weak.)

Strong bases: KOH, $Ca(OH)_2$, NaOH. (NH_3 and CH_3NH_2 are weak.)

2. Calculate the pH of a 0.0075 *M* HBr solution.

HBr is a strong acid: $[H_3O^+] = [HBr] = 0.0075\ M$

$pH = -\log(0.0075) =$ **2.12**

3. Calculate the pH of a 0.0032 *M* $Ca(OH)_2$ solution at 25 °C.

$Ca(OH)_2 \rightarrow Ca^{2+} + 2\ OH^-$, so $[OH^-] = 2 \times 0.0032\ M = 0.0064\ M$

$pOH = -\log(0.0064) = 2.19$

$pH = 14.00 - 2.19 =$ **11.81**

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4. A KOH solution has a pH of 12.40 at 25 °C. What is the molar concentration of KOH?

pOH = 14.00 − 12.40 = 1.60

$[OH^-] = 10^{-1.60}$ = 0.025 *M*. KOH is a Group 1 hydroxide (1 OH^- each).

[KOH] = 0.025 *M*

5. A 25.0 mL sample of 0.100 *M* HCl is diluted with water to a final volume of 500.0 mL. Calculate the pH of the diluted solution.

$M_2 = M_1V_1 / V_2$ = (0.100 *M*)(25.0 mL) / (500.0 mL) = 0.00500 *M* = $[H_3O^+]$

pH = −log(0.00500) = **2.30**

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