

Answer on Question #63357 - Chemistry – General Chemistry

For a 0.56 M solution of LiClO, do the following:

Identify the major species in the solution

ClO⁻

H₂O

Li⁺

LiClO

Compute the pH

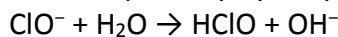
Solution.

- 1) LiClO will fully dissociate to form ions:



$$C(\text{LiClO}) = 0 \text{ mol/l}; C(\text{Li}^+) = 0.56 \text{ mol/l}; C(\text{ClO}^-) = 0.56 \text{ mol/l}$$

ClO⁻ will partially hydrolyze:



$$K_h = \frac{10^{-14}}{K_a}; K_a = 2.9 \cdot 10^{-8}$$

$$h = \sqrt{\frac{K_h}{C_{\text{LiClO}}}} = \sqrt{\frac{10^{-14}}{K_a \cdot C_{\text{LiClO}}}} = \sqrt{\frac{10^{-14}}{2.9 \cdot 10^{-8} \times 0.56}} = 7.85 \cdot 10^{-4}$$

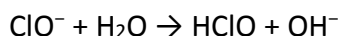
$$C(\text{HClO}) = C(\text{OH}^-) = h \times C(\text{ClO}^-) = 7.85 \cdot 10^{-4} \times 0.56 = 4.41 \cdot 10^{-4} \text{ mol/l}$$

$$C(\text{ClO}^-)_{\text{eq}} = 0.56 - 4.41 \cdot 10^{-4} = 0.55956 \text{ mol/l}$$

H₂O as a solvent is not listed as one of the major species

Major species: Li⁺; ClO⁻

- 2) LiClO → Li⁺ + ClO⁻



$$K_a = 2.9 \cdot 10^{-8}; pK_a = -\lg K_a = 7.54$$

$$pH = 7 + \frac{1}{2} pK_a + \frac{1}{2} \lg C_{\text{LiClO}}$$

$$pH = 7 + 1/2 \times 7.54 + 1/2 \times \lg(0.56) = 10.64$$

Answer: 1) C(Li⁺) = 0.56 mol/l

$$C(\text{ClO}^-) = 0.55956 \text{ mol/l}$$

2) pH = 10.64