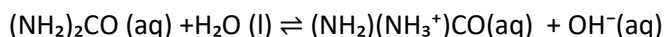


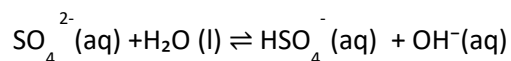
# Video worksheet - weak and strong acids and bases

1. Urea ( $(\text{NH}_2)_2\text{CO}$ ) is a very weak base produced in the body during the breakdown of proteins. It is excreted from the body by the kidneys. Calculate the  $[\text{OH}^-]$  of an 0.10 M urea solution, given that under these conditions, only  $1.00 \times 10^{-5} \%$  of the urea molecules react according to the reaction below.

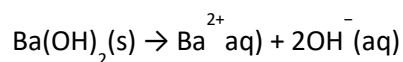


2. Calculate the  $[\text{OH}^-]$  of a 2.50 M  $\text{Ba}(\text{OH})_2$

3. The sulfate ion ( $\text{SO}_4^{2-}$ ) is a very weak base used as a fertiliser. A mass 28.4 g of sodium sulfate ( $\text{Na}_2\text{SO}_4$  molar mass 142 g/mol) fully dissociates in 1.00 litre of water. The sulfate ion reacts with water according to the equation below. Under certain conditions only 0.0055 % of the sulfate ions present will react with water. Find the  $[\text{OH}^-]$



4. A 1.7135 gram pure sample of the highly soluble barium hydroxide ( $\text{Ba}(\text{OH})_2$ ), molar mass 171g/mol, is dissolved in 200 mL of distilled water. The compound dissociates completely according to the equation below. Find the  $[\text{OH}^-]$  expressed to the right number of significant figures.

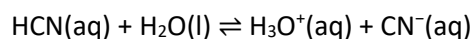


5. A 1.25 g sample of  $\text{Ca}(\text{OH})_2$  (molar mass = 74 g/mol) is dissolved in 250 mL water. Calculate the  $[\text{OH}^-]$  to right number of significant figures?

6. Calculate the  $[\text{H}_3\text{O}^+]$  of a 1.25M  $\text{HCl}$  solution? Explain your reasoning.

7. What is the  $[\text{H}_3\text{O}^+]$  of a 1.200M  $\text{HF}$  solution, assuming 0.11% of  $\text{HF}$  molecules ionise under these conditions.

8. A 200 mL of a 0.100 M hydrocyanic acid (HCN) is tested and found to have a  $[\text{H}_3\text{O}^+]$  of  $1.00 \times 10^{-7}\text{M}$ . The reaction is shown above.



Calculate the percent ionization of hydrocyanic acid under these conditions and classify it as a strong (99-100%), moderately strong (10-50%), weak (1-5%) or extremely weak ( $\ll 0.100\%$ ).

9. 9. The acid concentration and  $[\text{H}_3\text{O}^+]$  of four solutions containing halide acids (HF, HCl, HBr and HI) are given below.

Given that all measurements were taken under the same conditions, identify each solution.

| Solution | [acid] | $[\text{H}_3\text{O}^+]$ |
|----------|--------|--------------------------|
| A        | 1.00   | $1.0 \times 10^{-4}$     |
| B        | 0.100  | $1.0 \times 10^{-1}$     |
| C        | 1.00   | 0.99                     |
| D        | 0.100  | 0.088                    |