

EDTA-Metal ion Complexation. Chem 151 Fall 2006.**R. Corn**EDTA is a polyprotic acid - Ethylenediaminetetraacetic Acid. H_4Y . $pK_1 = 1.99$; $pK_2 = 2.67$; $pK_3 = 6.16$; $pK_4 = 10.26$.Alpha fraction for Y^{4-} :

$$\alpha_{Y^{4-}} = \frac{K_1 K_2 K_3 K_4}{[H^+]^4 + K_1 [H^+]^3 + K_1 K_2 [H^+]^2 + K_1 K_2 K_3 [H^+] + K_1 K_2 K_3 K_4}$$

 $\alpha_{Y^{4-}}$ is equal to 0.35 at a pH of 10.Metal complexation reactions with Y^{4-} :

| Metal Ion | $\log K_f$ |
|-----------|------------|
| Ag^+ | 7.32 |
| Mg^{2+} | 8.69 |
| Ca^{2+} | 10.70 |
| Co^{2+} | 16.31 |
| Cd^{2+} | 16.46 |
| Al^{3+} | 15.89 |
| Fe^{3+} | 25.10 |
| V^{3+} | 25.90 |

Conditional formation constant: $K'_f = \alpha_{Y^{4-}} K_f$