

Chemistry 203

Pre-Lab Assignment: Determination of EDTA Content in Shampoo

Exp 2

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Lab Section: -----

1. Answer the following short questions:

a. What is the ligand used in this experiment?

EDTA : ethylene diamine tetraacetic acid ✓

b. What is the indicator?

Eriochrome Black T ✓

c. What is the buffer?

NH<sub>3</sub> / NH<sub>4</sub>Cl ✓

d. What is the pH?

pH = 10 ✓

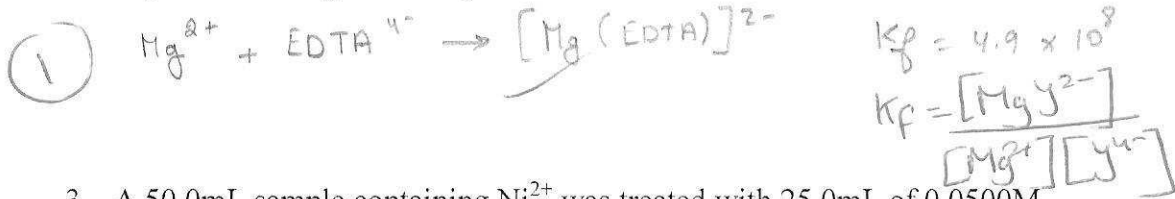
e. What are the predominant forms of the **indicator** and the **ligand** at this pH?

indicator → H E<sup>2-</sup> ✓

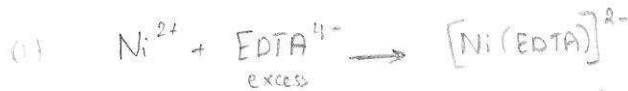
ligand → ~~H(EDTA)<sup>2-</sup>~~ Y<sup>4-</sup>

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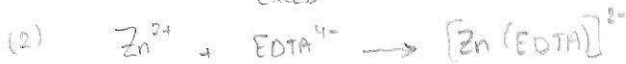
2. Write the equation of the complexation reaction taking place in this experiment and give the expression of the formation constant.



3. A 50.0mL sample containing Ni<sup>2+</sup> was treated with 25.0mL of 0.0500M EDTA to complex all the nickel and leave excess EDTA in solution. The excess EDTA was then back-titrated, requiring 5.00mL of 0.0500M Zn<sup>2+</sup>. What was the concentration of Ni<sup>2+</sup> in the original solution?



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from eq 2;  $n_{Zn^{2+} \text{ react}} = n_{EDTA^{4-} \text{ react}} \Rightarrow n_{EDTA^{4-} \text{ react}} = C_{Zn^{2+}} V_{Zn^{2+}} = 0.0500 \times 5.00 = 0.250 \text{ mmol}$

$n_{EDTA^{4-} \text{ reacted in (2)}} = n_{EDTA^{4-} \text{ excess in (1)}}$

$n_{EDTA^{4-} \text{ in (1) initial}} = CV = 25.0 \times 0.0500 = 1.25 \text{ mmol}$

$\Rightarrow n_{EDTA^{4-} \text{ reacted in (1)}} = n_{\text{initial}} - n_{\text{excess}} = 1.25 - 0.250 = 1.00 \text{ mmol}$

in (1)  $n_{Ni^{2+} \text{ reacted}} = n_{EDTA^{4-} \text{ react}}$

$\Rightarrow [Ni^{2+}] = \frac{n_{EDTA^{4-} \text{ react}}}{V_{Ni^{2+}}} = \frac{1.00}{50.0} = 0.0200 \text{ mol/L}$