

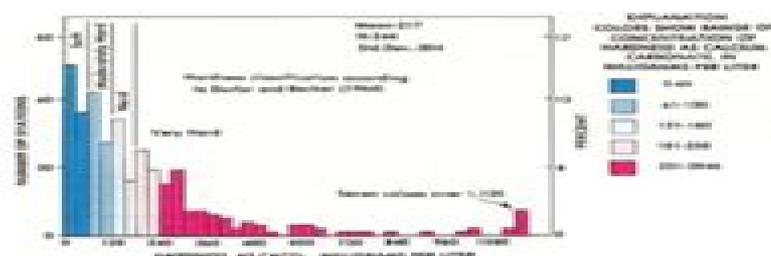
# EDTA Titration for Determination of Calcium and Magnesium

Before attempting this experiment, you may need to consult the section in the textbook dealing with complexometric titrations. In this procedure a stock solution of EDTA will be standardized against primary standard  $\text{CaCO}_3$ . This standardized EDTA solution is then used to determine water "hardness" – the total calcium and magnesium content, typically expressed as equivalent calcium carbonate mass concentration. While both metals are nutrients that are needed for good human health, high concentrations of these cations ( $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$ ) in water can cause deposits to form in bathrooms and kitchens, and cause the formation of "soap scum" – clogging pipes and decreasing the effectiveness of the cleanser. Therefore, very hard water is undesirable for use as tap water. Guidelines for classification of water as provided by the U.S. Geologic Survey are listed in the table below. The USGS website has more information about water hardness and alkalinity if you are interested. We're fortunate in that most of the water in the Portland area is soft.

**Table 1 U.S. Geological Survey Classification of Water Hardness**

(Source: <http://water.usgs.gov/wmg/hardness-alkalinity.html>)

$\text{CaCO}_3$ (mg/L)	Hardness
0-60	soft
61-120	moderately hard
121-180	hard
>180	very hard



**Figure 1 Hardness classification from Briggs et al. 1977**

Briggs, J.C., and Ficke, J.F., 1977, Quality of Rivers of the United States, 1975 Water Year -- Based on the National Stream Quality Accounting Network (NASQAN): U.S. Geological Survey Open-File Report 78-200, 436 p.

# Calcium Analysis By Edta Titration

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