Determination of Hardness of water

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**Introduction**

Hard of water is obtained from the contact of water and the soil. Rainwater mixed with soil and carbon dioxide; therefore, it changes the content of water. Hard water mostly is found where limestone is present. And this means that places, where limestones are highly concentrated there, are a high presence of hard water. Hard water determines the suitability of water for domestic use and therefore, several scientific methods are used to determine the presence of hard water. This report, therefore, presents the result of the determination of hard water using ethylenediaminetetracetic acid (EDTA) from various samples of waters.

**Methods and Materials**

In order to determine the hardness of water various samples of water were used, a chemical solution or a buffer solution, an indicator, and titrate. First, 50 mL sample of water from New York City (NYC) tap water, bottled water, unknown A and unknown B were added into a tube or a jug. After that 1 mL of buffer solution was added to each sample of water slowly. As the buffer solution was being added the reaction was watched and recorded as well. After that 1 drop of the indicator was also added to each sample of water and the reaction monitored and recorded as well. Each sample of water was then titrating using ETDA until the reddish tinge disappears and the solution becomes blue at the end. The volume of EDTA was then recorded and calculated to determine the hardness of each sample of water.

**Analysis**

The result indicates that NYC water EDTA volume is 21ml, bottled water 0ml, unknown A 3.5 ml and unknown B 4.0 ml. However, after calculation of the hardness, it is obtained that NYC water has a concentration of 42 mg/c, bottled water 0 mg/c, unknown A 70 mg/c, and unknown B 80mg/c. This means that there are present of little calcium ion and magnesium in unknown B and A while the NYC tap water and bottled water do not have any content of calcium and magnesium ion. The result indicates that NYC tapped water has 42 mg/c of hard water and therefore, this volume is very insignificant and therefore, it is soft water. Result obtained indicates that bottled water has 0gm/c of hardness and therefore, this means that it does not contain any present of calcium and magnesium ion and therefore, the bottled water is very soft. In most cases, calcium and magnesium ion are removed from bottled water duration filtration stage.

However, unknown A is found to be having hardness content of 70 gm/c and unknown B 80gm/c. It means that unknown A and B are hard waters and the level of hardness is what differs. It could be translated that unknown A is hard while unknown B is very had water. The different is based on the concentration of calcium and magnesium ion in both unknown A and B while both samples are hard waters.

**Conclusion**

It is determined that bottled water has 0 gm/c of hardness and NYC tap water has 42gm/c of hardness. In this case, the two samples of water do not contain much magnesium and calcium ion. However, based on the result from the test, it is evident that bottled and NYC tap water is soft water while unknown A and B are hard water. It is, therefore, important to note that NYC and bottled water are good for domestic use or consumption while unknown A and B are not good for domestic use. It is also clear that unknown A and B have a high concentration of magnesium and calcium ion, which is hardness and therefore, they cannot be used for domestic use.