Course Title/Name

Determination of Water Hardness

Lab # 7

Your Name

Instructor’s Name

Date of Experiment

1. **Objectives**

The objective of this lab experiment is to determine the total hardness of the tap water acquired from NYC source. As the sample, there was one known bottled water source and two unknown water samples. The samples were categorized as either soft, hard, moderately hard or very hard.

1. **Materials**

For conducting the experiment, following materials were used:

* Buffer solution
* Indicator
* EDTA Liquid
* NYC Tap Water
* 3 different samples from different sources.
	+ Bottled Water
	+ Unknown Sample A and Sample B
* Measuring Cup (50mL)
1. **Methods**

Following steps were followed to conduct the experiment and achieve the derived results:

* Measure 50mL of water for each of the source separately.
* Add 1mL buffer solution in each of the measured sample.
* Add 1 drop of indicator in the measured water samples.
	+ With the addition of indicator, the color of water will change to wine red.
* Gradually titrate with EDTA Titrant until all the reddish tint has disappeared.
	+ Now the water will become blue.
* Record the volume of EDTA which is used for titration.
* Now calculate the Total Hardness for each of the samples separately.
* Repeat above steps for other two samples as well.
1. **Results**

Based on the recorded values and calculations made, following are the acquired values:

|  |  |  |
| --- | --- | --- |
| **Water Samples** | **Volume of EDTA (mL)** | **Hardness (mg/L as CaCO3)** |
| Tap Water (NYC) | 2.1 mL | 42 mg/L (Soft) |
| Bottled Water | 0 mL | 0 mg/L (Very soft) |
| Unknown Sample A | 3.5 mL | 70 mg/L (Soft) |
| Unknown Sample B | 4 mL | 80 mg/L (Moderately hard) |

Based on the above record values, following calculations were made:

**Tap Water (NYC)**:

2.1 mL x 1 x 1000/ 50 mL

= 2100/ 50 mL

= 42 mg/L

**Unknown Sample A:**

3.5 x 1 x 1000/ 50

= 3500/ 50

= 70 mg/L

**Unknown Sample B:**

4 x 1 x 1000

= 4000/ 50

= 80 mg/L

1. **Discussion**

Based on the above derived results, the samples of water were categorized as soft, hard, moderately hard or very hard. The experiment revealed that the Unknown Sample B had significantly higher level of hardness as compared to all other samples. This was because Unknown Sample B had higher amount of chemical traces. This sample also took significantly longer to turn blue because of which a higher volume of indicator was used for this sample as well. This revealed that in certain areas, the chemical traces in water because of lack of or poor filtration have increased the hardness of water.

1. **Conclusion**

Conclusively, it can be stated that the Unknown Sample A and Unknown Sample B along with tap water (NYC Source) had higher number of chemical. This makes these water sources inappropriate for drinking and public use. The experiment also provided an opportunity to identify the characteristics of clean water, the process of water purification and filtration, and understanding of how the chemicals impact the quality of water they are mixed with.