Lab 7 Report - Evaporation and Intermolecular Forces
Tucker Marshall
10/29/2019

Abstract

The objective of this experiment was to find the delta T of three alcohols and relate it to their molar mass. In this experiment, a temperature probe was covered in filter paper and dipped in an alcoholic solution. Then, the probe was removed from the solution and the change in temp was measured. This information was then graphed and used to find the alcohol's intermolecular forces strength. It was hypothesized that solutions that contained more London dispersion would have a stronger intermolecular force.

Introduction

In this experiment, the intermolecular strength of three alcohols was investigated. Intermolecular forces are the forces of attraction and repulsion between molecules. There are 4 types of intermolecular forces, and they are: dipole-dipole interactions, London dispersion forces, hydrogen bonds, and ion-dipole. The strength of intermolecular forces is important because it determines the melting point, boiling point, and reactivity of the solution. To find the delta T that was necessary to calculate the strength of intermolecular forces, a temperature probe was covered in filter paper and then put in a solution. It was then removed from the solution and the temperature was recorded. The data was then used to find the delta T value of each solution.

Experimental

The equipment used in this experiment was: a Vernier temperature probe, a computer, filter paper, rubberbands, beakers filled with 1-pentanol, n-pentane, 2-pentanone, 1-butanol, and 1-propanol. In this experiment, a temperature probe was covered in filter paper. It was then put in alcohol and the temperature began to be recorded. After several seconds, the probe was removed from the solution and place on the edge of the table. After the 120 timer ran out, data collection stopped. The Tmin and Tmax were then used to determine the Delta T of each alcohol.

Results and Discussion

Table 1

	Delta T

n-pentane	26.908
1-propanol	6.51
1-butanol	5.6
1-pentanol	2.59
2-pentanone	7.46

At the end of the lab, the delta T value was calculated for each alcohol. The delta T values were 26.908 for n-pentane, 6.51 for 1-propanol, 5.6 for 1-butanol, 2.59 for 1-pentanol, and 7.46 for 2-pentanone. Using the change in delta T, the strengths of the intermolecular forces were found. 1-pentanol was the strongest, 1-butanol was in the middle, and 1-propanol was the weakest. The two solutions, n-pentane and 1-butanol, have similar molar masses of 72.15 and 24.12; however, they largely different delta T values. This is because of the types of bonds in each of the molecule. In this study, it was found that 1-pentanol had the strongest intermolecular forces of attraction, this can be seen through the delta T value. The higher the delta T value, the faster the liquid evaporates and the weaker the bonds and intermolecular forces of them. Since 1-pentanol has the lowest of the delta T values (2.59), it has the strongest bonds. The liquid with the weakest intermolecular forces of attraction was found to be n-pentane, because it had the highest delta T value of 26.908. It was also found that 1-pentanol had the strongest intermolecular forces, 2-pentanone was in the middle, and n-pentane had the weakest intermolecular forces.

Figure 1

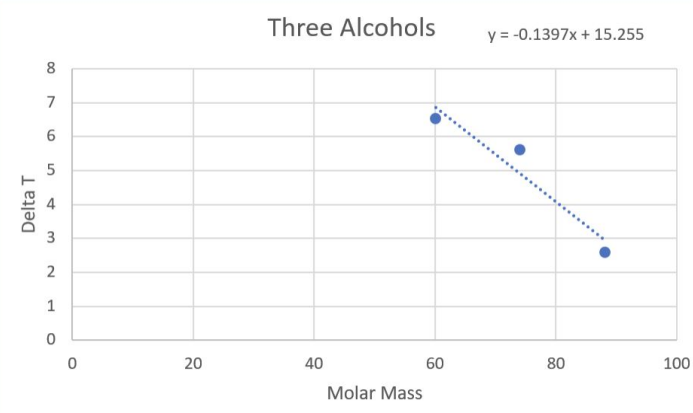

Table 2

	deltaT	mm

1-propanol	6.51	60.095
1-butanol	5.6	74.12
1-pentanol	2.59	88.15

Conclusion

The results of this experiment were, delta T values were 26.908 for n-pentane, 6.51 for 1-propanol, 5.6 for 1-butanol, 2.59 for 1-pentanol, and 7.46 for 2-pentanone. With the solutions intermolecular force strength from strongest to weakest being: 1-pentanol, 1-butanol, 1-propanol, 2-pentanone, and n-pentane. The hypothesis was correct, in that solutions that contained more London dispersion had a stronger intermolecular force.