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Recovery of Acetone and Application to Determine the Dinitrobenzene Content In Nitrobenzene without Affecting the Accuracy of Results

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ABSTRACT

Acetone is the organic compound with the formula $(CH_3)_2CO$. It is a colorless, volatile, flammable liquid, and is the simplest ketone. Acetone is miscible with water and serves as an important solvent in its own right, typically for cleaning purposes in the laboratory. To overcome the scarcity of acetone it was decided to recycle the used acetone in laboratory and reuse it again for determination of dinitrobenzene content in nitro benzene samples. The recycled acetone was checked for purity by gas chromatographic analysis before using it in day to day analysis in laboratory work. It was observed that the results obtained using recycled acetone was at par with those obtained using A.R. grade acetone.

Keywords: Acetone, Dinitrobenzene, Nitrobenzene, Recovery.

INTRODUCTION

Acetone is regular chemical which is used to day to day analytical work in laboratory [1]. Due to its wide application, acetone has to be procured in large quantities on regular basis. However, sometimes it may not be readily available over the counter in stores and this can lead to stoppage work in laboratories [2]. To overcome this problem it was decided to recycle the acetone and check whether analysis carried out using recycled acetone without affecting the accuracy or results. Various techniques are applied to recover laboratory reagents such as acetone [3]. This leads to cost cutting as recycled ofAcetone was an cheap alternative, it also helped to prevent water pollution as previous used Acetone was washed down to drain. It also ensured availability and continuous supply of acetone in the laboratory. However care has to be taken while the recovery process as acetone is highly flammable compound [4].

MATERIALS AND METHODS

The acetone that was used for analysis of dinitrobenzene in Nitrobenzene was collected in reservoir [5]. After collection of sufficient quantity, this acetone was transferred in a distillation flask. The distillation was carried out with at most care @ 56.4 °C, The distillation unit was placed in a well ventilated place to ensure that there was no foul smell in the laboratory .The distilled acetone was collected in a clean and dry beaker and its parameter were compared to that of A. R. Grade Acetone, to ensure the purity of acetone, a

gas chromatograph analysis was done. It was observed that the purity of recycled acetone was equivalent to that of A.R. grade acetone. The specifications or A. R. Grade acetone are as follows

Table 1: Specifications of AR grade acetone

Appearance	Clear colourless liquid
Specific Gravity	0.784 to 0.786
Boiling Point	56.4 °C
pH	7.0
Distillation Range	56.0 to 56.5 °C
Assay	99.5 %

The recovered acetone was analyzed as per the specifications of A.R. Grade acetone and it was found that specifications of the recovered acetone were well within the limits of A.R. Grade acetone.

Table 2: Test results of recovered acetone

Appearance	Clear colourless liquid
Specific Gravity	0.785
Boiling Point	56.4 °C
pH	6.9
Distillation Range	55.9 to 56.4 °C
Assay	99.62 %

The recovered acetone was then used to determine the DNB content and the results were compared with those obtained by using A.R. Grade acetone. The results of DNB from both the acetones are listed in table.3. The DNB content was measured on Visiscan 167 and Assay of recovered acetone was analyzed on Perkin Elmer Gas chromatograph.

Table 3: DNB % using A.R. Grade acetone and recovered acetone

Sr. No.	DNB % using A.R. Grade Acetone	DNB % using A.R. Grade Acetone
01	0.08	0.09
02	0.09	0.09
03	0.10	0.11
04	0.10	0.09
05	0.09	0.08
06	0.08	0.09
07	0.06	0.07
08	0.08	0.07
09	0.10	0.09
10	0.09	0.08
11	0.08	0.07
12	0.06	0.07
13	0.07	0.08
14	0.06	0.07
15	0.09	0.10
16	0.09	0.08

17	0.08	0.08
18	0.07	0.07
19	0.06	0.05
20	0.05	0.07
21	0.07	0.06
22	0.09	0.10
23	0.10	0.10
24	0.06	0.08
25	0.08	0.09
26	0.07	0.08
27	0.05	0.07
28	0.07	0.08
29	0.08	0.09
30	0.09	0.10

RESULTS AND DISCUSSION

The t-test assesses whether the means of two groups are statistically different from each other. In this case, t-test was applied to the generated data find out whether the use of recovered acetone had compromised on the accuracy of the results. It was observed that the p value at 0.05 level of significance was 0.321464 for a two-tailed test. A p-value > 0.05 suggests no significant difference between the means of our sample populations. This means we can safely say that there was no compromise on the accuracy of the results even if we used recovered acetone instead of A.R. Grade acetone.

APPLICATIONS

This study provides evidence for safe use of recovered acetone in analysis of di-nitrobenzene content in the samples of nitrobenzene without compromising on the accuracy of the results.

CONCLUSIONS

1. Results obtained from t-test showed that the acetone which was recovered in laboratory can be used for analysis of DNB content in NB samples without affecting the accuracy of the results
2. The use of recovered acetone in place of A.R. grade acetone can bring down the analysis cost.
3. Recycling of used acetone will help in prevention of water pollution.
4. This recovery process can ensure continuous supply of acetone for daily use in laboratory.

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