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Research Article

Forensic Analysis of Newly Introduced Disinfectant Floor Cleaners by Using Thin Layer Chromatography

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Abstract

Disinfectant floor cleaner is a type of chemical that is commonly used in houses. Due to high demand, these chemicals are commonly available in the market at very reasonable price. They are corrosive in nature and may cause accidental poisoning especially amongst children. Forensic chemical analysis also deals with such types of case. Thin Layer Chromatography (TLC) may be used for further analysis of these types of chemicals. Therefore TLC is performed to generate a suitable solvent system to separate disinfectant floor cleaner available in the local market of Rohtak district of Haryana.

Keywords: Disinfectant floor cleaner; Thin layer chromatography; Forensic analysis

Introduction

Forensic science is an applied science which deals in chemical, biological and physical evidences. Household cleaning products is one such chemical evidence that may rarely encountered in forensic science laboratory for analysis. Household cleaning products can do more harm than good because the ingredients used in these products are harmful to our health. Household cleaning products called disinfectants contain antimicrobial ingredients to kill germs on contaminated surfaces. Disinfectants are antimicrobial agents that are applied to non-living objects to destroy microorganisms that are living on the objects. Disinfection not necessarily kills all microorganisms, especially are resistant to bacterial spores. Modern household cleaning disinfectants contain bitrex, a bitter substance added to discourage ingestion. Indoor floor cleaner disinfectants should never be mixed with other cleaning products as they produce poisonous gases by reacting chemically. Common household products containing disinfectants include pine cleaners. As their name indicate, pine cleaner contains the disinfectants that are derived from pine oil. Pine oil can be obtained from waste wood by destructive distillation or by distillation with superheated stream.

Most of disinfectants are harmful and even toxic in nature for humans and animals. Cases of accidental or deliberate poisoning by

Table 1: Details of disinfectant floor cleaner.

Product			
Sample code & Brand name	S 1 Lizol disinfectant surface cleaner	S 2 Easy max floor Cleaner	S 3 Expertz phenolic cleaner
Manufacturer	Reckitt benckiser pvt. Ltd.	Bharti retail ltd.	
Product			
Sample code & Brand name	S 4 Jet white cleaner	S 5 Action floor cleaner	S 6 Floor cleaner
Manufacturer	International chemical indsturies Yamuna nagar	Pegion	Pegion

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Table 2: Solvent tried for separation systems.

Serial no.	Solvent system	Ratio
1	Benzene: Acetone	50:50
2	Toluene: Acetone	50:50
3	Benzene: Toluene	50:50
4	Benzene: Toluene: Acetic acid: Acetone	65:65:5:15
5	Benzene: Toluene: Methanol	40:40:20
6	Benzene: Toluene: Acetone	45:45:10

Table 3: hRf values of spots observed in iodine fumes using solvent system benzene, toluene, and acetone in ratio 45:45:10.

Sample code	Number of spots	hRf values
S1	8	15, 26, 29, 36, 54, 62, 76, 82
S2	3	8, 23, 63
S3	5	6, 17, 29, 36, 67
S4	7	8, 15, 19, 26, 68, 86, 94
S5	7	11, 15, 38, 63, 68, 83, 94
S6	5	11, 26, 43, 54, 78

ingestion, injection or inhalation of different chemicals are common. Disinfectants are one of most common chemical form them. Now a day these chemicals become necessity of our daily life. Containers of these usually stored under bathroom or kitchen sinks where children can reach easily. These products become leading cause of unintentional poisoning mainly among children of age group below 10 years. Phenol, phenyl, pine oil are main constituent of floor cleaners. Accidental intake of these chemicals causes various injuries to our body and sometime even death. We have tried to develop a new solvent system in the present study to develop a common TLC solvent system for newly introduced disinfectant floor cleaners.

Materials and Methods

Six disinfectant floor cleaners brands namely Lizol, Easy Max. Floor Cleaner, Phenolic Cleaner, Jet White Cleaner, RCM Action Floor Cleaner, RCM Floor Cleaner were purchased from local market of Rohtak city. These were available in liquid form encased in different plastic bottles and marked as sample 1 to 6 in laboratory respectively. Details of each disinfectant floor cleaner have been given in Table 1.

TLC plate was prepared by pouring Silica Gel-G slurry onto glass plate (20 X 15 centimeters), slurry was allowed to dry at room temperature (36°C). TLC plate was activated at 110° for 30 minutes. Samples were spotted on TLC plate using fine capillary tubes. TLC solvent chamber was prepared using different solvent systems. TLC plate was placed vertically in solvent chamber. The plate was removed from developing chamber after making a solvent run of 10cm and solvent front run time was 40 minutes. Developed plate was dried at room temperature and observed in sunlight, UV light (long and short) and in iodine fumes. The HRf values of spots for each sample were noted and evaluated (Table 2). Similar process was repeated for every solvent system.

Observation and Results

Six samples of different types of disinfectant floor cleaner were subjected to TLC analysis. Samples were run in different solvent systems as given in Table 2.

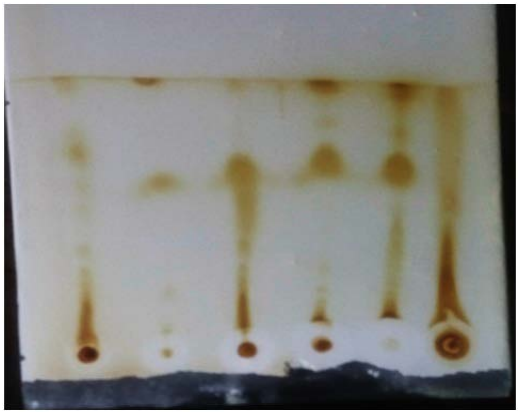

Figure 1: Showing result in iodine fuming in solvent system Benzene: Toluene: Acetone in 45: 45: 10.

The best separation was observed in solvent system comprising of Benzene: Toluene: Acetone in 45:45:10 in iodine fumes as shown on Plate-1. All samples of disinfectant floor cleaner get separated in this solvent system. Most of samples produced one signature spot at HRf value 60-70 (Table 3) (Figure 1).

Discussion

Disinfectants are among most commonly used chemical these days and are widely available in market at very cheap rate all over the country. Forensic analysis of disinfectant floor cleaners was done by using Thin Layer Chromatography. Earlier published solvent system (Methanol: Benzene: Toluene) was also tried to separate the samples collected in the present study but more satisfactory results have been obtained using solvent system Benzene: Toluene: Acetone (45:45:10) that was developed in this study. Results were obtained in iodine fuming method only. The results indicate that separation in this solvent system could be better useful for forensic expert dealing with cases involving identification of disinfectant floor cleaner with minimum expense.

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