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Analysis of Post Blast Residue Material in Soil Sample for Forensic Consideration

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Abstract: *The terrorist activities in recent years have urged the need for rapid and accurate forensic investigation on post-blast evidences. The analysis of explosives and their degradation products in soils are important to enable forensic scientist to identify the explosives used in the explosion and establish possible links to their likely origin. Anions of interest for post-blast identification of low explosives were chemically analyzed. The explosives comprised of the blast residue materials of various samples which are found at suspected crime scene. In residue materials, (ClO_3-, K^+, Al^{3+}, B^{2+},S^{2-})were identified. However, inorganic substance of anion was found present in post-blast soil samples. The anions analysis was indicative that residue materials were being used as post blast soil sample ingredients. It is important to know that the post blast evidences either low or high explosive.*

Keywords*: Anions, homemade low explosives, black powder, post-blast soil samples*

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I. Introduction

Identification of explosives is a topic of considerable interest to forensic scientists and counter-terrorism authorities. The vast area of explosives analysis may be divided into two sub-categories detection and identification of explosives for major ingredients prior to detonation (post-blast for screening analysis),.and identification of explosives for analysis of debris and their residues after detonation (post-blast blast residue detection analysis). In Indian scenario now day so much terrorist activity and bomb explosion cases are happening by the terrorist and social people. Due to increase this type of the activity we cannot easily find out whether it was terrorist activity and anti social activity in case of bomb blast. It is very necessary to know the what kind of the explosive material uses in bomb explosion cases.

II. Methodology

Nine soil samples was collected from different explosion sites in polythene bag after collection it was marked for collection site and date of collection. The sites from sample were collected are like Sample 1- Near Naini Thana , Sample 2- Near Naini Railway Station , Sample 3- Allengunj , Sample 4- Police line , Sample 5- Near Allahabad university , Sample 6- Near Allahabad degree college , Sample 7- civil line Thana , Sample 8- university road , Sample 9- Near Allahabad railway station. Soils were visually examined for their colour, texture etc.further these sample were extracted through water and acetone. Water extract was tested for presence of inorganic anions. Whereas acetone extract were tested for Diphenyl amine. Which is direct test for high explosive. After analysis acetone extract test for Diphenyl amine were negative means absence of high explosive. After that water extract were analysis through general group analysis. For presence of various anions.

III. Result And Discussion

Table 3.1: Tested for Chlorate (ClO_3^-) in suspected soil sample

S.No.	Sample no.	Result	Indicated for	
			Low explosive	High explosive
1.	Sample (S1)	Positive	Positive	Negative
2.	Sample(S2)	Positive	Positive	Negative
3	Sample(S3)	Positive	Positive	Negative
4	Sample(S4)	Positive	Positive	Negative
5	Sample(S5)	Positive	Positive	Negative
6	Sample(S6)	Positive	Positive	Negative
7	Sample(S7)	Positive	Positive	Negative
8	Sample(S8)	Positive	Positive	Negative
9	Sample(S9)	Positive	Positive	Negative

According to the Table 3.1 suspected soil sample (S1 to S9) were tested for chlorate (ClO_3^-) ion. After the analysis it was found that Chlorate (ClO_3^-) ion present in suspected soil sample .it may be indicated for presence of low explosive**.**

Table3.2: Tested for Potassium ion (K^+) in suspected soil sample

S.No.	Sample no.	Result	Indicated for	
			Low explosive	High explosive
1.	Sample (S1)	Positive	Positive	Negative
2.	Sample(S2)	Positive	Positive	Negative
3.	Sample(S3)	Positive	Positive	Negative
4.	Sample(S4)	Positive	Positive	Negative
5.	Sample(S5)	Positive	Positive	Negative
6.	Sample(S6)	Positive	Positive	Negative
7.	Sample(S7)	Positive	Positive	Negative
8.	Sample(S8)	Positive	Positive	Negative
9.	Sample(S9)	Positive	Positive	Negative

According to the Table 3.2: suspected soil sample (S1 to S9) were tested for Potassium (K^+) ion. After the analysis it was found that Potassium (K^+) ion present in suspected soil sample .it may be indicated for the presence low explosive**.**

Table 3.3: Tested for Barium ion (Ba^{2+}) for suspected soil sample

S.No.	Sample no.	Result	Indicated for	
			Low explosive	High explosive
1.	Sample(S1)	Positive	Positive	Negative
2.	Sample(S2)	Positive	Positive	Negative
3.	Sample(S3)	Positive	Positive	Negative
4.	Sample(S4)	Positive	Positive	Negative
5.	Sample(S5)	Positive	Positive	Negative
6.	Sample(S6)	Positive	Positive	Negative
7.	Sample(S7)	Positive	Positive	Negative
8.	Sample(S8)	Positive	Positive	Negative
9.	Sample(S9)	Positive	Positive	Negative

According to the Table 3.3 suspected soil sample (S1 to S9) were tested for Barium (Ba^{2+}) ion. After the analysis it was found that Barium (Ba^{2+}) ion present in suspected soil sample .it may be indicated for the presence low explosive**.**

Table 3.4: Tested for Aluminium (Al^{3+}) suspected soil sample

S.No.	Sample no.	Result	Indicated for	
			Low explosive	High explosive
1.	Sample(S1)	Positive	Positive	Negative
2.	Sample(S2)	Positive	Positive	Negative
3.	Sample(S3)	Positive	Positive	Negative
4.	Sample(S4)	Positive	Positive	Negative
5.	Sample(S5)	Positive	Positive	Negative
6.	Sample(S6)	Positive	Positive	Negative
7.	Sample(S7)	Positive	Positive	Negative
8.	Sample(S8)	Positive	Positive	Negative
9.	Sample(S9)	Positive	Positive	Negative

According to the Table 3.4 suspected soil sample (S1 to S9) were tested for Aluminium (Al^{3+}) ion. After the analysis it was found that Aluminium (Al^{3+}) ion present in suspected soil sample .it may be indicated for the presence of low explosive**.**

Table 3.5: Tested for sulpher for suspected soil sample

S.No	Sample no.	Result	Indicated for	
			Low explosive	High explosive
1.	Sample(S1)	Positive	Positive	Negative
2.	Sample(S2)	Positive	Positive	Negative
3.	Sample(S3)	Positive	Positive	Negative
4.	Sample(S4)	Positive	Positive	Negative
5.	Sample(S5)	Positive	Positive	Negative
6.	Sample(S6)	Positive	Positive	Negative
7.	Sample(S7)	Positive	Positive	Negative
8.	Sample(S8)	Positive	Positive	Negative
9.	Sample(S9)	Positive	Positive	Negative

According to the Table 3.5 suspected soil sample (S1 to S9) were tested for sulpher ion. After the analysis it was found that sulpher ion present in suspected soil sample .it may be indicated for the presence of low explosive**.**

Table3.6: Tested for low and high explosive for various suspected soil sample

S.No.	Sample No.	Tested for low explosive	Tested for high explosive
1.	sample (S1)	Positive	Negative
2.	Sample (S2)	Positive	Negative
3.	Sample (S3)	Positive	Negative
4.	Sample (S4)	Positive	Negative
5.	Sample (S5)	Positive	Negative
6.	Sample (S6)	Positive	Negative
7.	Sample (S7)	Positive	Negative
8.	Sample (S8)	Positive	Negative
9.	Sample (S9)	Positive	Negative

IV. Discussion

All the suspected soil samples was tested by chemical method that is Chlorate ion (ClO_3^-) test , Potassium ion (K^+) test, Barium ion test (Ba^{2+}) , Aluminium (Al^{3+}) test , sulfur test. For the analysis of post blast (soil), collected soil sample were preceded for separation of anion as inorganic substance in water extract. After some part of soil sample were performed for separation of organic substance as explosive materials. Extraction of anions and organic materials were done by using of water extract and acetone extract. After extraction water extract were analyzed for presence of anion by general group analysis method. Side by side acetone extractions were checked for presence of Diphenyl amine. Which are indirect test for presence of high explosive. After testing nine samples (S1-S9) it was found that Chlorate ion (ClO_3^-), Potassium ion (K^+), Barium ion (Ba^{2+}), Aluminium (Al^{3+}) ion, and sulfur is present in all suspected sample. Which can be consider as indirect test for presence of explosive. Similar results were reported by **Ahmad (2011)** and **Fauzi (2011)** during the analysis of post blast residue materials in **Malaysian.**

V. Conclusion

In this study, it was concluded that nine suspected blast residue materials were tested and in all sample from S1 to S9 give the positive result in presence of Chlorate ion (ClO_3^-), Potassium ion (K^+), Barium ion (Ba^{2+}), Aluminium ion (Al^{3+}), and sulfur. On the presence of above ingredient. It may be considered as all explosive material which was exploded were low explosive.

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