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Fast Identification for Evidences in Crime Scene with Macroscopic Properties and Portable Techniques

Aseel M. Aljeboree[1], Baraa Kasim Mohamed[2], Firas H. Abdulrazzak[2], Tariq H. Al Mgheer[3], Ayad F. Alkaim[1], Takialdin A. Himdan[4] , Falah H. Hussein[5]

[1]College of science for women, University of Babylon, Iraq

[2]Forensic Department, College of Science, University of Al-Karkh, Iraq

[3]College of Medicine, University of Babylon, Iraq.

[4]Department of Pharmacy, Al-Esraa University College, Baghdad, Iraq

[5]College of Pharmacy, University of Babylon, Iraq

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Abstract: In this work we concern with identification Visible evidence that can only be observed with the naked eye and required for experiment of forensic scientist. the search details include many visible of physical properties that could be depend to explained many unknowns in crime scene which means critical truth for different cases. The details include appearance phenomena such color, smell, general shape, size, nature of material and predicted properties depending on general form. The properties which mentions in the total work were reported here that could be enhance by using specific portable apparatus that could give very important information about the structure and nature with properties of evidence in crime scene.

Keywords: Physical properties, Chemical properties, Nature of material, Evidence, Portable apparatuses.

I. Introduction:

As mentions before in our previous work, the chemical compound can be used for identified the identities of persons by modifying fingerprint [1]. In the other site Chemical and microscopic identification for various organic and inorganic materials, simple or mix in composition, is an essential component of identifying unknown materials and constitutes a fundamental unit of forensic science. This review will mention some of chemical and microscopic properties that together constitute the comprehensive identification of materials in visible quantities which mostly accorded in crime scene [2].

Identify the macroscopic properties that can be taken as a basis for knowing the apparent properties of matter, regardless of its types and physical states. the characterize a material with the best performance, that will need to consider the properties of the available materials. Figure 1, shown different evidence that required identified the properties of observed characteristics and chemicals properties that responsible for determine the identities [3]. In this sections properties which could be identified include two parts: the first was physical and chemical properties, while the second part include smells and nature with enhance by portable apparatuses.

Figure 1: Skim for different evidence in crime scene

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Physical and Chemical properties

Physical properties

Part of physical properties describe responds an object to mechanical forces. Hardness as example for a mechanical property, abilities of knife blade made from steel to drag a hard object, which is unchanged, while drag a soft object with the blade across, causing scratched. The response to force depends on the material's structure, shape and size, however a flexible object such nylon can easily bend, while polyethylene needed for more force to bend. The elastic refers to behavior of an object to returns for its original shape and size when removed the force. An object that breaks rather than bending is brittle. All of this behavior for different materials can be depend primary to identify the identities of materials but it is still required for more instruments to test physical properties which could be decided the name of unknown evidence [3-4].

A nylon windbreaker is strong, since pulling on it does not change its length. Sometimes the manner of applying a force makes a difference to the *strength* of an object. Ceramics can bear a lot of weight, but will break if stretched or bent. Nylon survives compression, pulling and twisting [4].

shining light on surface of sample responsible to shown Color, texture, and reflectivity of evidence that could be found it in criminal scene such mirrors are colorless, smooth, and shiny. Applying heat to a sample reveals its ability to conduct heat, led to melting point, and boiling point respectively [5]. The highlight will concern with the nature of properties and the abilities to depend on it to make final decision for the identities of materials and that include intensive and extensive properties [6]. Some properties are independent of the amount of sample such melting point does not change if a sample is divided to small volume, mass and volume, increase with the amount of sample being studied.

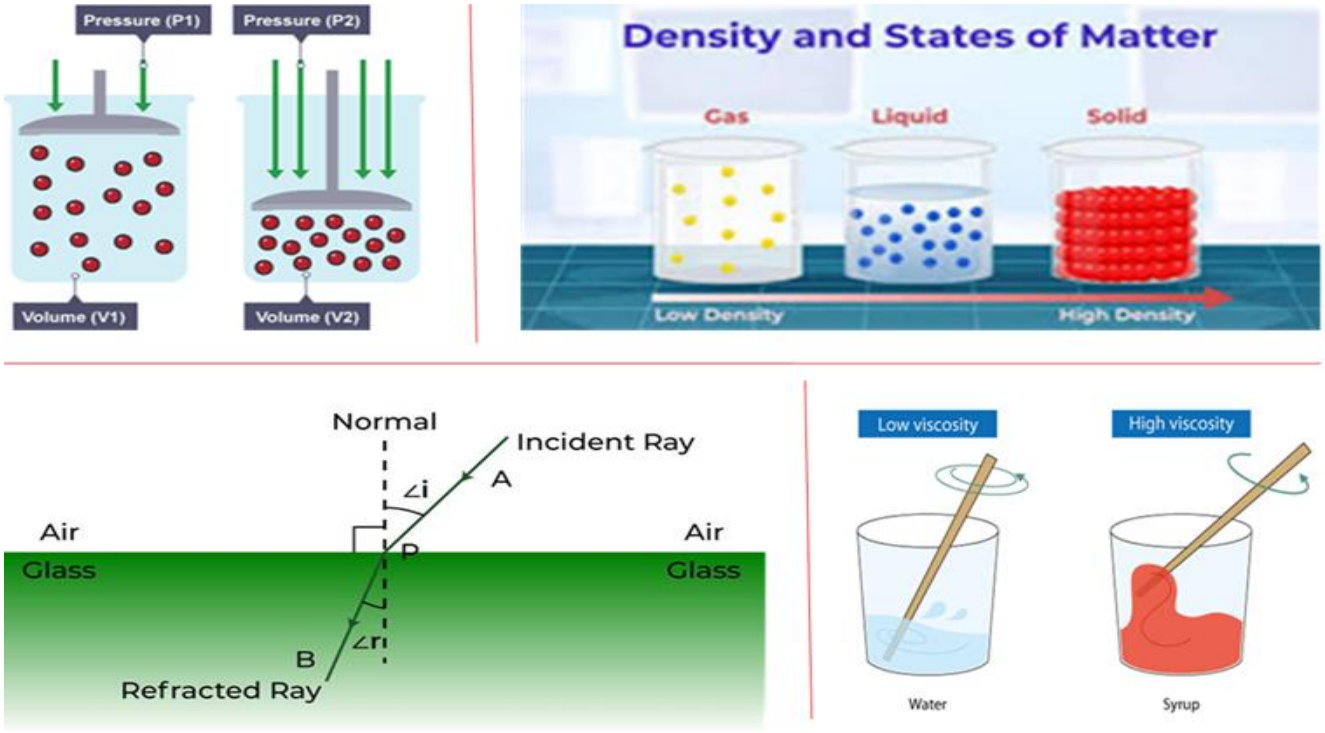

Figure 2: Skim for some physical properties from up to the left pressure, right density, down, to the left refractive index, right viscosity.

Intensive Property

When the properties of matter that did not depend on the size or quantity of matter in any way that we called it intensive property of matter, such temperatures, density, color, melting and boiling point, etc. they will not change with a change in size or quantity of matter. As mentions this property we can use it to identified at least primary identification which mostly used firstly in crime scene before transfer the evidence to forensic labs.

Extensive property

All the property that required for other properties to give complete description which means needed for size or the amount to give the identities of evidence in crime scene such Volume, energy, and mass. The extensive properties can be forming intensive properties such as density when required for mass and volume (two is extensive), however some properties are not measured directly, but can be determined by combining measurements of other properties.

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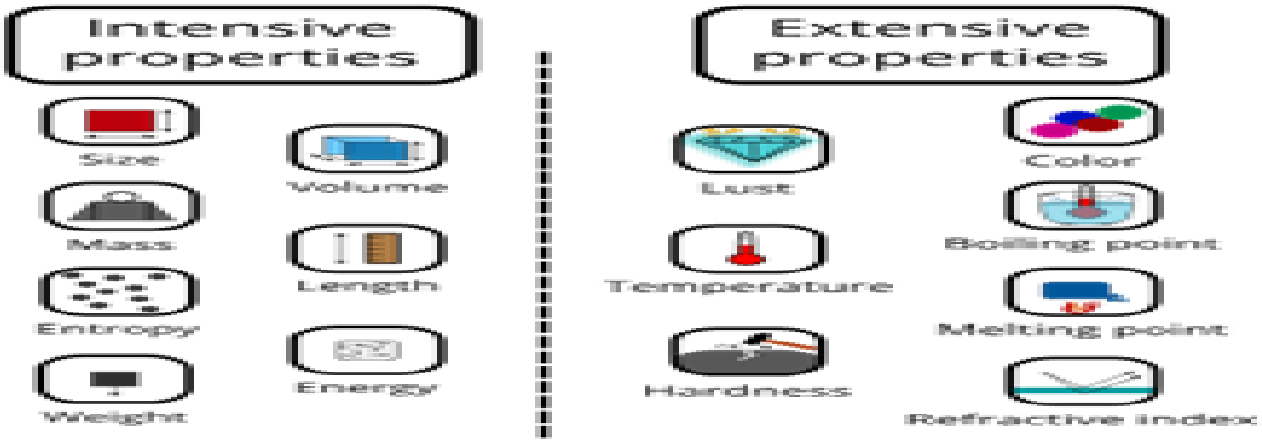

Figure 3: Skim for some intensive and expensive properties

Chemical properties

These terms refer to very large and complicated terms which started with reaction by nature and ended with many indirect reactions by peoples, the aims in this section include the common conditions that could be used to identified the identities of materials according to chemical properties. These describe include at first what mentions above about the reactivity of Azide, Perchlorate or Fulminate salts when crashing due to abilities to explosion at room temperature by this action not more [7]. The common example which could be seen in crime scene is existed of sodium hydride, sodium hydrosulfite and sodium metal with water not more and that causing explosive reaction, spontaneous ignition, and directly flammable respectively [8].

The disadvantage of chemical reaction in crime scene not only include the safety for the worker in forensic science which could be done by safety equipment but the damage which absolutely accord for the evidence in crime scene. This scientific opinion depends on simple role which is a chemical reaction involves a transformation of the sample into a different substance, and it may be difficult to reverse the process and prove existence many materials or it is at least complicated the looking for evidence. For example, flammable such wood, after burns it react with oxygen from the air and produces ashes and smoke it cannot be reversed in addition to loosening most if not all evidence [9].

Senses and portable apparatuses

Sense of Smell and Touch

Mostly the worker in chemical labs (Including those working in forensic sciences) used smell to identified different gases, liquids, and solid evidence. Sometimes know and in times ago but these was lifted or at least was reduced in higher value because of toxicity behavior for many compounds, if we know that we working with unknown [10-11].

Table 1 ; Physical properties (shape, color, smell, and existence) for identified common drags.

Marijuana	Crack Cocaine	Cocaine	Heroin
			
➢ Unique aroma has been likened to a mix of herbal, earthy, and skunky smells. ➢ When it's fresh or unburnt, it can smell a lot like a skunk, pine, or even citrus. ➢ when it's smoked, the scent becomes more pungent and can linger on clothing, furniture, or even in the room for hours.	➢ When smoked, these rocks produce a vapor that has a sweet, almost ether-like smell. ➢ chemical makeup and the substances often mixed with it, crack can also produce an odor similar to burnt plastic or rubber. ➢ The smell can be quite strong and, like marijuana, can stick to fabrics.	➢ Cocaine in its powdered form has a scent that can be hard to detect unless in larger volumes. ➢ Often, it's compared to gasoline, ether, or even laundry detergent. ➢ This smell isn't usually detectable when the drug is snorted or ingested in small amounts.	➢ smell is significantly influenced by its form and purity. ➢ When smoked, heroin emits a scent that can be described as sweet, tar-like, or even reminiscent of burning rubber. ➢ If it's mixed with other substances, the smell might vary based on those additives.

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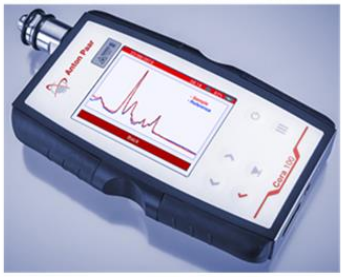
The other macroscopic properties that can be used to distinguish between ionic and non-ionic compounds is “crunchiness” when crushed with a spatula most ionic compounds will feel crunchy, while non-ionic compounds will not. In this section it should be care crime scene ((should not be tried with Azide, perchlorate or fulminate salts because these tend to be explosive)) [12-13].

In this part it is important to concern with two complementary terms which is State functions and path function. In the forensic sciences the first terms which is state functions refers to evidence that could be depend as it is without dealing with the history of evidence. The second terms path functions include all the evidence that found in crime scene which should looking for the history of it and that starting from the place where it found because it needed for more information to give clear images for the event [12-13]. According to physical chemistry the existence of properties as state function required only the final and initial conditions in crime scene to be understood from forensic scantest, while the other required more steps to be completely understood.

Apparatuses for measuring properties:

The information which mentions above concern with using experiments for scantest in forensic field to observation, locating, identification, and at least primary identities by macroscopic properties before go to lab [14]. The third eye for forensic scientist represent by portable apparatuses that able to give many information about the evidence in few second or in few minutes. Table 2 include several portable types which is: density meter, viscometer, refractometer, UV-visible spectroscopy, Raman spectroscopy, and IR spectroscopy. All of these techniques and other [15-16] able to enhance the primary identification for evidences with good confidence. the most important advantage for this apparatuses represent by: (1) Abilities to use in different conditions without initial preparation or complicated for dong the analysis. (2) The other benefit was the high speed for getting analysis with good agreements. (3) high Safety without remaining or produce any waste. (4) Most of these apparatuses provided with memory capacity able to save huge amount of testes for the evidence without needed for accessories parts.

Table 2: Skim for portable apparatuses used in crime scene for identify many properties

Portable Density Meter	Portable Viscometer	Portable Refractometer
		
Portable Raman Spectroscopy	Portable IR Spectroscopy	UV-Visible Spectroscopy
		

Assessment of evidence identification

The process of estimation the results of identification required specific terms for evaluation which is The limiting concentration (L. C.), identification (L. I.) and proportions (L. P.) respectively. The first refers to the lowest concentration of substance which always produces a positive test. The second (L. I.) is the smallest absolute quantity which always gives a positive test, while (L. P.) are the smallest mass ratios which still always permit to get a positive test [17]. The value of L.C. absolutely, depend upon the absolute size of the sample or the volume of solution taken for the test and may be improved by reducing the scale of work. According to that L.P are less favorable than L.I or L.C. which required isolated the properties to be more detected by method [18].

Limiting concentrations, limits of identification, and limiting proportions cannot be determined with high accuracy since the conditions which always give a positive test and those which always lead to a negative result have no sharp borderline. They are separated by a range of conditions, which produces uncertainty as to the outcome: some trials give positive and some' negative results. This implies that the limiting conditions "always" leading to a positive result must be established by a sufficient number of experiments.

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II. Conclusion:

Through this work, the focus was on the specific aspect of uncovering evidence at the crime scene. This relied on the forensic scientist's ability to recover evidence, describe it, and make an initial decision. As mention the decision was done depending on the skills and value of information/experiments accumulation for workers in forensic field. All of information able to give initial judgment for the cases in crime scene with acceptable confidence. In this section it should be refer to important of macroscopic properties that could be notes and characterized to convert it from the state of unknown to known state which critical parameter to explain many interferences in crime scene with variance in circumstance. The supplement enhances for accuracy and confidence of the initial examination can be done with using portable apparatuses that able to shown necessary information with short time in addition to be this results can be assessment with high confidence.

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