

ANALYTICAL METHODS USED TO IDENTIFY UNKNOWN SUBSTANCES FROM A FIRE SCENE

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The fire-technical expertise in the field of fire detection is a highly sophisticated analysis of all available information related to the fire. By evaluating all the information and knowledge, one of the possible versions of the causes of a fire can be confirmed, and often can explain a course and spread of fire. Except for information from a fire scene, photographic and technical documentation, the facts about substances and materials found in the fire focus and its surroundings in terms of chemical composition and presence of flammable substances must be known. The analytical methods used in the Technical Institute of Fire Protection for identifying a substance of an unknown substance from a fire scene, either for a solid, liquid or gaseous mixture, are as follows: gas chromatography, X-ray fluorescence spectroscopy, Fourier transforms infrared (spectroscopy), Raman spectroscopy and optical emission spectrometry. Gas chromatography is able to confirm the presence of small amounts of organic matter trapped in solid samples from fires. Analysis of volatile substances is widely used to demonstrate the presence of traces of combustible liquids used as substances supporting flame (flame accelerants). The presence of gasoline or diesel fuel traces can significantly support the hypothesis of intentional

fire. FTIR and Raman spectroscopy can be used to determine the molecular composition of an unknown sample. The methods are especially suitable for the identification of organic and inorganic substances, plastics, paints, building and construction materials. We can use X-ray fluorescence analysis method to determine elemental composition of inorganic materials in solid and liquid state, e.g. in metallic alloys, ash or carbonaceous residues. The analysis of the elements is supplemented by the classical elemental analysis performed on the elemental analyzer to determine the representation of carbon, hydrogen and nitrogen elements. Using optical emission spectrometry, it is possible to determine the exact composition of an unknown metal alloy found on a fire scene.

Biography

Romana Friedrichová has completed her PhD in Chemistry and Technology of Materials from the University of Chemistry and Technology, Prague in Czech Republic. The focus is on the using analytical method for the investigation of fire cause.

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