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Spectroscopic, Visual Test Techniques and Optical Sensors for Determination of Hydrazine and Its Derivatives

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Hydrazine and its analogues are widely used in agriculture and industry for the manufacture of metal films, photographic chemicals, antioxidants, preservatives, insecticides and blowing agents for plastics. It is also found in tobacco. It is used as a scavenger to remove traces of oxygen in boiler feed water system, as antioxidant in nuclear reactor, in military fuel cells and in electrical power plants. Hydrazine and its methyl substituted analogues and unsymmetrical dimethylhydrazine are commonly used as hypergolic propellants in space vehicles, intercontinental ballistic and in other military applications. In addition, hydrazine and its derivatives are considered to be carcinogens. Even low concentration of these substances results in toxic effects in humans. Therefore, there is a strong need in sensors for monitoring of hydrazines to ensure that they are below hazardous levels in order to minimize the risk of exposure.

In this paper a brief review of recent spectrophotometric techniques and optical sensors for the determination of hydrazine and its analogues is presented. Kinetic and flow methods are discussed and compared as a part of spectrophotometric method. The review of optical sensors is divided into subsections based on application of nanoparticles, colorimetric and fluorescent sensors. The techniques of synthesis of new fluorescent reagents, their application for hydrazine detection by visual test method are described and compared. Indicator reactions and main techniques for the visual testing are described. This review comprises the results obtained after 2009.

Keywords: hydrazine, determination, spectrophotometry, fluorescence, sensors