

Quantitative Approach for Assessing Hazards and Hazardous Waste Management Practices

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Introduction

Making decisions about how to manage hazardous waste is made easier when hazards are assessed quantitatively. The physical, human health, environmental, and amenity hazard aspects and risks (in the event of exposure) of waste streams were evaluated using a scoring method in this study. The 15 Hazard Properties (HPs) outlined in the Waste Framework Directive 2008/98/EC of the European Commission and their associated Globally Harmonized System of Classification and Labeling of Chemicals (GHS) hazard statement codes (H-codes) served as the foundation for the strategy. Amenities and other risks, such as the need for space, odor, dust, vermin, visual impact, radioactivity, and physical harm, were also taken into account. Each of the H-codes—amenity and other hazards—received a score between 0 and 3. The scoring strategy included: 1) determining the composition of the waste; 2) utilizing waste composition as a basis for searching H-codes and assigning H-codes to the associated HPs; 3) determining the risk score for each of the four risk factors; determining the total score for each waste, and 4) For 29 hazardous wastes, the total hazard score was determined using two approaches.

Variety of Hazard Assessment Techniques and Indices

The wastes were ranked on a hazard scale to show how dangerous they might be. Prioritizing waste management efforts can be accomplished with the help of the new hazard scoring method. In the 21st century, the rapid expansion of industrialization, urbanization, intensive agriculture, and the exploitation of natural resources has resulted in the production of a large quantity of waste that can be considered benign or extremely hazardous. When improperly stored, treated, transported, or disposed of, hazardous wastes may pose risks to human health and the environment. Wastes are categorized as either hazardous or non-hazardous to guarantee safe handling, transportation, reuse, and disposal; Special regulations and precautions apply to hazardous waste. Although the Environmental Protection Agency (EPA) of the United States coined the term "hazardous waste," there is no universally accepted definition, so the definition of waste as hazardous

varies from country to country. The majority of countries classify hazardous waste either by listing the types of waste that are deemed hazardous or by identifying the characteristics that make a waste hazardous. In the literature, a variety of hazard assessment techniques and indices have been proposed to help prioritize management efforts and rank hazardous chemicals and wastes. By taking into account the potential threats the wastes pose to human health, the environment, and/or physical safety, these assessment techniques generate hazard scores. The scores from each of the hazard classes are then typically combined to produce a single-value score that is used to represent the wastes' overall hazard ranking.

Hazardous Waste Management Efforts and Practices

Amenity hazards like space, odor, dust, vermin, visual impact, radioactivity, and physical injury are not taken into account in any of these approaches. To rank the relative dangers of wastes, a novel hazard scoring method that takes into account physical safety, human health, the environment, and amenities was developed in this study. The total hazard score for the 29 wastes listed as hazardous in Australia was determined using two approaches. By multiplying the exposure by the total hazard scores, the risks posed by the wastes can be determined. The new scoring method for hazards and risks in the event of exposure aims to help put hazardous waste management efforts and practices first. The National Pollutant Inventory (NPI) and Latimer approaches were used to develop the method for calculating scores for ranking hazard attributes. Each hazard attribute received a score between 0 and 3, just like in the NPI and Latimer approaches. Based on the EU hazard property list, a new scoring approach with two alternative calculation methods was developed for evaluating hazards and risks if exposure occurs of waste streams based on their physical, health, environment, amenity, and other hazards. However, this work used the hazard statement codes (H-codes) from the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals instead of the former European risk phrases. The presence or absence of substances in the 29 hazardous wastes that were evaluated was used to demonstrate the applicability of the two approaches.