

# Use of Material Safety Data Sheet in Workplaces

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## ABSTRACT

Employees in workplaces are exposed to physical, chemical, biological, ergonomic, and psychosocial hazards. These hazards affect employees in various ways. Having knowledge of the characteristics of chemicals to which employees are exposed can help minimize the risks of workplace accidents and occupational diseases. "Material Safety Data Sheets for Hazardous Substances and Mixtures" known as MSDS, should be provided in Turkish for chemicals used in workplaces, and employees should receive training. An MSDS for any chemical should contain 16 parameter information. Upon examination of the MSDS, the presence of risk statements (R) indicating the potential risks of the chemical and safety statements (S) outlining actions to be taken when exposed to the harmful effects of the chemical can be observed. Due to the length of MSDS in workplaces, posting them for warning purposes is generally challenging. Therefore, examining the MSDS for chemicals used in production and preparing short MSDS labels containing only necessary information would be more practical. These labels provide information to the staff in areas where chemicals are used in workplaces and assist in interventions during emergencies. This study provides users with concise information on the use of the mentioned MSDS labels, preventing hazards associated with chemicals in workplaces, and reducing risks. Easy access to this summary information could help laboratory users avoid workplace accidents and occupational diseases.

**Keywords:** Hazard, Risk, MSDS

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## Introduction

Human beings, in order to meet their personal needs in the world where they live, become professionals through the education they receive in line with their abilities over time. The professions they engage in can be categorized into different sectors. During the execution of their professions, individuals may face various problems that could ultimately result in casualties (Ünal et al., 2021). In workplaces, situations that have the potential to cause harm to employees or workplaces, either existing or coming from external sources, are defined as hazards. The probability of loss, injury, or other harmful outcomes arising from exposure to hazards is defined as risk. Incidents that occur during the performance of work, resulting from occupational exposure, are referred to as occupational accidents. Diseases that occur as a result of occupational exposure during the performance of work are defined as occupational diseases (Work Health, 2013).

Employees in workplaces are exposed to ergonomic, psychosocial, biological, physical, and chemical risks. The risks categorized here affect employees in different ways. For chemical risks to affect humans, chemicals need to enter the body through specific routes. Chemical intake into the body occurs through respiration, digestion, and skin contact (Ünal et al., 2021; Ateş and Albayrak, 2022; Albayrak, 2019).

Chemical substances to which employees are exposed in different ways react with the chemicals present in their bodies. The chemicals synthesized as a result of these reactions cause changes in the employee's physiological structure. In addition, mutations in genetic material can occur during the renewal of body cells, leading to carcinogenic effects. Knowing the characteristics of the chemicals used by employees during their activities in the workplace can contribute to minimizing the risks of accidents and occupational diseases. This awareness activity can be achieved through the provision of Turkish Material Safety Data Sheets (MSDS), as required by the "Regulation on Safety Data Sheets for Hazardous Substances and Mixtures." Each MSDS for a chemical substance contains information under 16 headings (Harmful Substances, 2014). The 16 headings mentioned here are listed below:

- Identity of the substance/mixture and of the company/undertaking,
- Hazards identification,

- Composition/information on ingredients,
- First-aid measures,
- Firefighting measures,
- Accidental release measures,
- Handling and storage,
- Exposure controls/personal protection,
- Physical and chemical properties,
- Stability and reactivity,
- Toxicological information,
- Ecological information,
- Disposal considerations,
- Transport information,
- Regulatory information,
- Other information (Harmful Substances, 2014; Özdemir, 2021).

The information contained in the mentioned Material Safety Data Sheets (MSDS) can encompass pages of details depending on the types of properties the chemical possesses. Considering that workplaces may have numerous chemicals, having these extensive MSDSs in work environments makes it nearly impossible to review these documents in the event of an accident. This study aims to demonstrate an example application of how a usable MSDS can be created in work environments.

Upon examining Material Safety Data Sheets, one can observe the presence of hazard statements (H) to express the risks associated with the chemical and precautionary statements (P) indicating actions to be taken in case of exposure to the harmful effects of the chemical. Through these hazard statements, the potential dangers we may encounter while working with chemicals are defined, and precautionary statements outline the reactions we should take in the event of harm caused by chemical exposure (Ünal et al., 2021).

Due to the extensive nature of Material Safety Data Sheets (MSDS), which serve as guides for the safe use of chemicals in workplaces, posting them in the workplace for employee use as a warning poses general difficulties.

Therefore, it is more practical to prepare short MSDS labels containing only the necessary information in a format that can be easily understood by employees by examining the MSDS of the chemicals used in production. The MSDS labels prepared in workplaces can be hung on the wall with a file folder holder so that personnel working with the relevant chemical can easily see them. This not only provides information but also assists employees in emergency situations by facilitating intervention (Ünal et al., 2021; Ateş et al., 2022).

### Material and methods

The abundance of chemicals used in both our workplaces and personal lives, in terms of both quantity and types, can lead to differences in the naming and classification of these chemicals worldwide. In order to identify the same chemical produced, exported, or imported globally, a standardization was needed. Therefore, the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) was established by the United Nations. The GHS system has contributed to the systematic classification of chemicals within the framework of international protocols. Thanks to this system, confusion that could arise from different classification systems that could be created in each country around the world has been prevented (SEA Labeling, 2020). With the GHS system, chemicals are classified into three groups based on their hazards: physical and chemical, health-related, and environmental hazards (Substances and Mixtures, 2013). In Figure 1, the warning sign to be included in the MSDS label for the use of sulfuric acid, as exemplified in our study, using the SEA Labeling Packaging Guide, can be seen (Substances and Mixtures, 2013).



**Figure 1.** Skin and metal corrosion (SEA Labeling, 2020).



When examining the contents of Material Safety Data Sheets (MSDS) for chemicals, hazard statements (H) and safety statements (P) are used to define the risks that employees may be exposed to during work with the respective chemical and the safety measures to be taken in case of exposure to the hazards of the chemical. Some examples of risk and safety statements can be seen in Table 1 and Table 2 (Hazardous Substances, 2008). By learning the risk statements before starting their activities, employees can be aware of the hazards they may face when working with chemicals. Similarly, by learning safety statements, they can be conscious of the measures to be taken in case of chemical-related harm.

**Table 1.** Hazard statements and their meanings (Hazardous Substances, 2008).

Hazard Statements	Meanings
H220	Explosive under to flame or in contact with sparks
H301	Toxic if swallowed
H317	May cause an allergic skin reaction upon prolonged exposure
H400	Very toxic to aquatic life long-lasting effect

**Table 2.** Safety statements and their meanings (Hazardous Substances, 2008).

Safety Statements	Meanings
P210	Keep away from heat, sparks, open flames, hot surfaces. No smoking
P280	Wear protective gloves/protective clothing/eye and face protection
P264	Wash thoroughly after handling
P403+P233	Store in a well-ventilation place. Keep container tightly closed

<b>SULPHURIC ACID (H<sub>2</sub>SO<sub>4</sub>)</b>	
	<p><b>H290:</b> May be corrosive to metals.</p> <p><b>H314:</b> Causes severe skin burns and eye damage.</p>
	<p><b>P280:</b> Wear protective gloves/protective clothing/eye protection/face protection.</p> <p><b>P301+P330+P331:</b> IF SWALLOWED: rinse mouth. Do NOT induce vomiting.</p> <p><b>P303+P361+P353:</b> IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].</p> <p><b>P305+P351+P338:</b> IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing</p> <p><b>P308+P311:</b> IF exposed or concerned: Call a POISON CENTER/doctor.</p>
<b>REQUIRED PERSONAL PROTECTIVE EQUIPMENT (PPE)</b>	
	

**Figure 2.** Sulphuric acid MSDS label (Substances and mixtures, 2013; Health and Safety, 2013).

## Results and discussion

The types and levels of hazards that employees may be exposed to in workplaces vary depending on the nature of the activities. In other words, the hazardous chemicals to which employees may be exposed in a workplace classified as highly hazardous can generally pose a high level of danger. Various precautions can be taken to minimize the risks of exposure to different types of hazardous chemicals during industrial activities. Some of the measures that can be taken to eliminate potentially risky situations arising from the use of chemicals in workplaces are outlined below:

- Necessary arrangements and organizations should be implemented in the work area.
- Particularly when working with hazardous chemicals, activities should be conducted with the least number of employees possible.
- The exposure levels and durations to chemicals should be minimized.
- The quantity of chemicals used should be minimized.
- Workplace buildings and extensions should always be kept orderly and clean.

- Suitable and sufficient conditions for personal hygiene should be established.
- Disposal, transportation, and storage of chemical waste and residues should be carried out in the most appropriate manner.
- Preference should be given to chemicals that pose less risk to the health and safety of employees instead of hazardous chemicals.
- Sufficient control, inspection, and supervision should be planned and implemented.
- Regular measurements and analyses of the chemicals used should be carried out to keep the health and safety of employees at the highest level (With Chemical Substances, 2013).

In addition to the methods for mitigating the hazards of the mentioned chemicals, Material Safety Data Sheets (MSDS) for the chemicals used in workplaces should also be available. Through MSDS labels prepared in this study, awareness and knowledge levels regarding the chemicals to be used can significantly increase for those who will handle the chemicals. Similarly, with MSDS labels for all chemicals used in workplaces, employees can react quickly in case of exposure to an emergency. This way, chemical users can minimize the risks of workplace accidents and occupational diseases as much as possible.

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