



**Coordinating Group for the Harmonization of Chemical
Classification Systems**

**Working Group on Harmonization of
Chemical Hazard Communication**

**REPORT ON THE RESPONSES TO THE CALL
ON CHEMICAL HAZARD COMMUNICATION**

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I. INTRODUCTION

1. This report is an overview and analysis of the responses to calls for information on chemical hazard communication systems as well as the responses to a more specific questionnaire. The calls were sent in May and July 1995 to about 270 relevant national and international institutions and the questionnaire to a few selected organizations. The requests were sent by the Working Group on Harmonization of Chemical Hazard Communication through the International Occupational Safety and Health Information Centre (CIS) of the ILO.

2. Background material on the different aspects of chemical hazard communication was asked for. It was noted that of special interest would be scientific studies, in particular comprehensibility studies, and procedures used in the implementation of chemical hazard communication systems at the national level as well as by industry. The information collected was intended to serve as background information for proposals for a harmonized chemical hazard communication system.

3. The work with harmonization is based on a number of international resolutions, conventions and reports. In June 1992 the United Nations Conference on Environment and Development (UNCED) called for "a globally harmonized hazard classification and compatible labelling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000". Part B of Chapter 19 of UNCED's Agenda 21 is devoted to harmonization of classification and labelling.

4. The Working Group on Harmonization of Hazard Communication was established by the Coordinating Group for the Harmonization of Chemical Classification Systems of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC). Six intergovernmental organizations, namely the WHO, ILO, UNEP, FAO, UNIDO and OECD, participate in IOMC.

5. The Working Group on Harmonization of Hazard Communication addresses issues regarding hazard symbols, colours and written information used on labels, the preparation of chemical safety data sheets and instructions, the comprehensibility of precautionary statements used on both labels and in chemical safety data sheets and training related to these areas.

6. The Coordinating Group for the Harmonization of Chemical Classification Systems brings together experts representing existing national, regional and international systems of classification and labelling of chemicals, as well as representatives of interested international organizations of suppliers, employers, workers, consumers and environmental groups. The objectives by the work are a finalized proposal for harmonized classification criteria by 1997 and possible implementation of a globally harmonized system at the national level by the year 2000.

II. OUTLINE OF THIS REPORT

7. In part III of this report the regulatory documents received from each country have been summarized with a focus on chemical hazard communication systems. Special attention has been given to the following items:

- (i) labelling symbols
- (ii) label graphic and textual contents
- (iii) risk and precautionary statements
- (iv) chemical safety data sheets
- (v) information dissemination systems
- (iv) provisions for relevant training

8. The research reports concern mainly the comprehensibility of the different chemical hazard communication systems. Major findings have been described.

9. In part IV the similarities and divergences among the different chemical hazard communication systems have been illustrated in a table.

10. Only documents received in response to the calls for information are included in this report, and therefore important factors regarding chemical hazard communication systems might be missing. Some of the received documents do not concern workplaces specifically but they provide important information on the aspect of comprehensibility.

III. OVERVIEW OF RECEIVED DOCUMENTS BY COUNTRY

Australia

Regulations

11. There are a number of labelling systems in use in Australia. These include two national systems, namely the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code) and the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

12. The Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)⁽²⁾ is based on recommendations prepared by the United Nations Committee of Experts on the Transport of Dangerous Goods. It also conforms to the provisions of the International Maritime Dangerous Goods Code (MDG Code).

13. The labelling of drugs and poisons is in a transition phase in which requirements are changing to a new system, the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP)⁽¹³⁾. It is designed to harmonize the requirements of Australia and New Zealand. The view is to promote uniform scheduling of substances and uniform labelling and packaging requirements. For the most part the States and Territories have adopted SUSDP. It gives recommendations for the classification of drugs and poisons into Schedules. It includes model provisions about labels. It also presents the revised signal words recommended by the Trans-Tasman Harmonization Working Party⁽¹²⁾ established to advance harmonization of Australian and New Zealand labelling and packaging requirements.

14. Poisons are classified in the Schedules on the basis of toxicity and other criteria. There are nine Schedules with different degrees of control recommended. Before drafting a label for any preparation it is necessary to determine the poison schedule classification for the preparation. Home garden and domestic pest control products, agricultural chemical products and veterinary chemical products are also classified according to the nine schedules.

15. A guide to labelling drugs and poisons in accordance with the SUSDP⁽¹⁾ describes the requirements of the different parts of the label: general requirements; signal words; cautionary statements; declaration of the contents; directions for use; safety directions; warning statements; first-aid; manufacture or distributor. No symbol is required. The labels must be written in the English language in characters that: are durable; distinctly contrasts with the background; are 1.5 mm or more in height (measured on capital letters). Particular attendance should also be given to the legibility of labels.

16. Other labelling systems in use in Australia include the Code of Practice for the Safe Transport of Radioactive Substances, the Code of Practice for Labelling Agricultural Chemical Products⁽³⁾, the Code of Practice for Labelling Veterinary Chemical Products⁽⁹⁾, Therapeutic Good Order 48 - General Requirements for Labels for Drug Products⁽⁷⁾, and State and Territory legislation covering the labelling of explosives.

17. The National Model Regulations for the Control of Workplace Hazardous Substances⁽⁵⁾ require that hazardous substances used at work be provided with labels and material safety data sheets (MSDS). They also require the employees with potential exposure to hazardous substances be provided with information and training. The supplier shall produce the MSDS and label the containers. The employer shall ensure that the MSDSs are readily accessible to employees, keep a register for all hazardous

substances used in the workplace and provide induction and ongoing training to employees.

18. The National Code of Practice for the Labelling of Workplace Substances⁽¹¹⁾ describes labelling for hazardous substances used at work. It has been designed to be complementary to existing labelling systems. The information required on labels (depending on the size of containers) is: signal words and/or dangerous goods class and subsidiary risk labels; identification information (product name, chemical name, United Nations number, ingredients and formulation details); risk phrases; directions for use; safety phrases; first-aid procedures; emergency procedures; details of manufacturer or importer; expiry date and reference to the material safety data sheet. No symbol is required. The risk phrases, safety phrases and first-aid phrases are selected from the Commission of the European Communities. All the information on the labels should be: in the English language; in durable print; in lettering of a size and style which is easily legible. The labels should be printed in colours which provide a distinct contrast to the background colour.

19. If a substance is not defined as hazardous the label should include, defined in reference⁽⁵⁾, as a minimum: product name; supplier's name; the statement "This substance has been assessed against the criteria of Worksafe Australia and does not require a Material Safety Data Sheet".

20. The completion of material safety data sheet is described in a guidance note⁽⁸⁾. The following information is required: company details; identification (use, physical description/properties, other properties, ingredients); health hazard information (health effects, first-aid, advice to doctor); precautions for use (exposure standards, engineering controls, personal protection, flammability); safe handling information (storage and transport, spills and disposal, fire/explosion hazard); other information; contact point. The language used to express the information should be simple, clear and precise.

Research Report

21. The effectiveness of label statements as described in the SUSDP has been analysed in a research report⁽¹⁰⁾. There are several factors affecting the success of warnings and safety directions. For each factor the report identifies the properties required to make the label effective. The following are the major factors: noticeability (seven properties); legibility (ten); reading the warning (eight); comprehensibility (four); belief in the warning (five); recall of warnings (five); compliance with warnings and safety advice (ten); compliance with warnings and safety directions (nine).

22. Signal words not understood include: combustible, corrosive, flammable, hazardous, irritant, lethal and toxic. Potential signal words understood by school students and other groups are given. Factors increasing the effectiveness of signal words are discussed. First-aid instructions, warnings, safety directions and signal headings are analysed as well as revised sets of statements.

Canada

Regulations

23. The Workplace Hazardous Material Information System (WHMIS)⁽²⁴⁾ is a national information system designed to protect workers by providing safety and health information about hazardous workplace chemicals. The requirements were enabled through amendments to the Hazardous Products Act (HPA)⁽²⁰⁾, the Canada Labour Code, and the establishment of the Hazardous Materials Information Review Act (HMIRA), which provides a mechanism for balancing the worker's right to know with industry's right to protect specific confidential business information.

24. The Hazardous Products Act (HPA) prohibits the advertising, sale and importation of hazardous products (the WHMIS requirements of the HPA exclude items such as manufactured articles, tobacco and consumer products). It requires suppliers of hazardous workplace chemicals ("controlled products") to label containers and provide detailed hazard information through material safety data sheets.

25. The Controlled Products Regulations (CPR) ⁽¹⁸⁾ under the HPA require suppliers to label containers and provide material safety data sheets for controlled products. The required information for labels include: product identifier; supplier identifier; reference to the material safety data sheet; hazard symbols; risk phrases; precautionary measures; first-aid measures; emergency telephone number (for laboratory samples). The label shall be applied within a border (specified design) that is in a colour that contrasts with the background. The information on the label shall be easily legible and contrast with other information on the product. The label shall be disclosed in English and French.

26. The WHMIS requires suppliers to convey hazard information to purchasers by means of labelling on controlled products or containers of controlled products and prescribed information on material safety data sheets (MSDSs). Employers are required to develop appropriate workplace labelling and other forms of warning about controlled products produced in their workplace processes, make MSDSs available to their employees, and provide for worker education on the safe use of hazardous materials.

27. The material safety data sheet requirements include nine general categories of information: hazardous ingredients; preparation information; product information; physical data; fire or explosion hazard; reactivity data; toxicological properties; preventive measures; first-aid. The design is performance-based, which means that any design is accepted as long as all the required information is addressed. The ILO 16-heading format is also accepted. The information should be disclosed in English or French as requested or both.

28. The Consumer Chemicals and Containers Regulations (CCCR)⁽¹⁶⁾ under the HPA require labelling and child-resistant packaging of consumer chemical products. The criteria for coverage and the labelling and packaging requirements of these regulations are being revised^(22, 23).

29. The response by Health Canada, Health Protection Branch, to the more specific questionnaire⁽²¹⁾ includes detailed information about chemical hazard communication systems in Canada.

Research Reports

30. The following items have been analysed in a consumer survey on labelling and packaging⁽¹⁷⁾ as described in the Consumer Chemicals and Containers Regulations: awareness of hazard symbols; awareness of degree of hazard frames; salience of hazard symbols in purchasing hazardous products; the impact of labelling on use of hazardous products; comparison of current and alternative label design; use of precautionary and first-aid statements; awareness and perceived effectiveness of child-resistant packaging. Recommendations on improving the awareness and effectiveness are given such as: the explosive and corrosive symbols should be focus on to improve the understanding of symbols; awareness building should focus on senior citizens, less educated and those whose first language is neither English nor French; the use of frames and words to distinguish between degree of hazard; design of labels.

31. A study⁽¹⁵⁾ including quantitative and qualitative components has been made on proposed changes to the Consumer Chemicals and Containers Regulations. The following items were tested: toxicity glyph; corrosive glyph; frames around the glyphs; front label format; borders around the label; sizes of glyphs and fonts; words and statements. Recommendations on the tested items are given.

32. A case study on flammable contact adhesives used by consumers⁽¹⁹⁾ gives recommendations for the improvement of the labelling of these products. The solvent-based adhesives are extremely flammable due to their low flash point and rapid evaporation rate, and have caused a number of household fires.

Japan

Regulations

33. The Industrial Safety and Health Law requires the labelling of 91 types of chemical substances. Their ingredients, precautions for their use and other necessary information for proper handling should be provided on their labels.

34. At the same time the Guidelines on Labelling Dangers and Toxicity of Chemical Substances^(26, 27) (issued to conform to ILO Convention No. 170, Safety in the use of Chemicals at Work) apply to all chemical substances used at workplaces, and require information necessary for their proper management and handling.

35. These guidelines require those who transfer or provide dangerous or toxic chemical substances to provide safety data sheets. The data sheets can have any form including the following information: name; contents and concentration; physical and chemical nature; type of dangers or toxicity; nature and degree of dangers or toxicity; precautions applicable to storage and handling; emergency procedures for accidents; name of person who prepared the safety data sheet, other items.

36. These guidelines also require labels on dangerous and toxic chemical substances including: name; contents and their amounts; type of dangers or toxicity; effects on human body; precautions on storage and handling; name of person providing the label; other items. Other chemical substances than dangerous and toxic substances should be labelled with the names of the chemicals.

37. The guidelines also require employers to educate workers in handling the substances in order to prevent industrial accidents.

38. Two responses^(29,30) to the more specific questionnaire on chemical hazard communication systems includes more details.

Korea

Regulations

39. According to the response of the Korea Industrial Safety Corporation to the more specific questionnaire⁽³¹⁾, there are several regulations regarding labelling of chemicals: the Toxic Chemical Control Law, the Industrial Safety and Health Law, agrochemical Management Law, the Fire Prevention Law and the Pharmaceutical Chemicals Law.

40. The label requirements according to the Industrial Safety and Health Law, which regulates 103 hazardous chemicals used in industry, include: name of the product; ingredients and concentration; effects on human; storage, handling and fire fighting measures; name and address of the supplier; symbol. The size, design and colours are specified.

41. The Toxic Chemical Control Law, which regulates 673 chemicals with toxic effects on humans and the environment, requires: address and name of manufacturer or importer; serial number and date of manufacturing; quantity; ingredients and concentration; usage; permit number and expiration date; antidote or counteracting method; handling consideration; symbol. The size, design and colours are specified.

42. The other mentioned laws have other labelling requirements. Size, design and colours are specified. If a chemical is controlled by two or more laws, a compromise label format is defined.

43. The Industrial Safety and Health Law gives provisions regarding material safety data sheets. The law has been revised to conform to ILO Recommendation No. 177 as to the contents of material safety data sheets.

Mexico

Regulations

44. The standards received cover the packaging, labelling and storage of pesticides for domestic use and for use in various occupational settings. The provisions on labelling are user-oriented; labelling for transport is covered in other standards. Standard NOM-044-SSA1-1993⁽³²⁾ defines the requirements for the labelling of cartons and other packaging that contains one or more individual containers of a product, while NOM-045-SSA1-1993⁽³³⁾ covers the labelling of the individual containers for non-domestic use. Observance of the standards is mandatory.

45. The labelling requirements for the packaging in standard 044 include: name and type of product; number of containers in the package; name and address of manufacturer; serial number; date of manufacture; instructions for storage and transport; any symbols required by regulations; country of origin. The label format is supposed to conform to reference 33 or 34.

46. Reference 33 lays down very detailed provisions regarding the size, design, colour and text of labels on pesticide containers. Pesticides must be classified according to the WHO's four-level scale of acute toxicity and corresponding information presented on their labels. Colours are defined in terms of the Pantone system used by printers. Specific phrases are given for certain circumstances. Where additional text must be used, the standard requires that the language be clear, simple, brief and free of any interpretation that would give an exaggerated idea of the qualities of the product. Everyday words should be used and technical jargon avoided. Spanish must be used, and the language of the country of destination may also be used on products for export.

Portugal

Regulations

47. Portaria No. 1164/92⁽³⁵⁾ (amendment 396/94⁽³⁶⁾) is the basic regulation on the classification, packaging and labelling of hazardous products, except for pesticides and certain other categories. It requires labels to use European standard symbols and R- and S-phrases (set forth in annexes to Decreto-Lei No. 280-A/87). Complementary safety and health information may be added. Minimum sizes are specified, but there are no requirements regarding colours. Amendment 396/94 sets forth 16 items of information to be included in the data sheets that are to accompany hazardous products; they correspond to the 16 headings recommended by the ILO and the European Union. The amendment also includes a guide to the composition of data sheets, which says that the wording should be clear and succinct; in the case of first-aid information, it should be understandable by victims and bystanders as well as by emergency-response personnel.

48. Pesticides are covered by Decreto-Lei 294/88⁽³⁷⁾ (amendments 303/91⁽³⁸⁾ and 385/93⁽³⁹⁾). This gives the specific symbols and R- and S-phrases to be used in various cases.

49. Decreto-Lei No. 441/91⁽⁴⁰⁾ (amendment 390/93⁽⁴¹⁾) implements ILO Convention No. 155 and European Union Directive No. 89/391/EEC. Articles 9 and 16 state the need for worker information and training.

50. Decreto-Lei No. 28/87⁽⁴²⁾ specifies the design of labels to be affixed to asbestos and asbestos-containing products. It gives specific phrases to be used, and requires that all products commercialized in Portugal be labelled in Portuguese.

51. Decreto-Lei No. 284/89⁽⁴³⁾ (amendment 389/93⁽⁴⁴⁾) covers asbestos as a carcinogenic agent under Decreto-Lei 479/85 (not received). The article on information of workers specifies content but not form. Decreto-Lei 273/89⁽⁴⁵⁾, for vinyl chloride monomer, and Decreto-Lei No. 275/91⁽⁴⁶⁾, for some aromatic nitro and amino compounds and their salts, are similar.

52. Decreto-Lei No. 221/88⁽⁴⁷⁾ (amendment 232/94⁽⁴⁸⁾) specifies the warning symbol and phrases to be used on products containing polychlorinated biphenyls and terphenyls.

53. Portaria No. 281/95⁽⁴⁹⁾ is for environmental protection rather than occupational safety and health, but is interesting for the pictogramme that it specifies for batteries containing dangerous materials such as cadmium: a garbage can/dust bin with a superimposed "X".

Sweden

Regulations

54. The knowledge and attitudes to warning symbols and risk and safety phrases have been studied among workers in different industrial sectors⁽⁵⁰⁾. The present regulations on classification and marking of chemical products have been effective since 1986. The purpose of the system is to give the persons handling the chemical products knowledge of the hazards to handle the products in a safe way.

55. The results show that many of the symbols are well known. Knowledge among managers and workers is at the same level. Workplaces handling marked products frequently are perceived as hazardous but, at the same time the workers are less satisfied with the information the marking provides. The marking system is well established, is well understood in general and marked products are recognized as hazardous. However, the meanings of some of the symbols used are not well understood nor the different levels of hazards. Recommendations to improve training and education and areas for further research are given.

United Kingdom

Regulations

56. Two principal hazard communication systems are used. The system for providing information on dangerous goods for transport/carriage purposes is based on the United Nations Recommendations (Recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods). The system for providing information on dangerous chemicals supplied to industry and consumers is based on the European Union directives on the Classification, Packaging and Labelling of Dangerous Chemicals (67/548/EEC and 88/379/EEC). These directives are implemented in The Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 (CHIP 2)^(53, 56).

57. A system of combined supply and carriage labelling is provided to allow for a single label on a package that would otherwise require both forms of labelling.

58. Certain classes of chemicals are subject to their own hazard communication systems, mainly for supply purposes. These include pesticides, cosmetics, medicines, explosives and hazardous wastes. Chemicals representing special hazards, such as ionizing radiation, are also subject to additional or alternative hazard communication requirements.

59. The safety data sheets, regulated in CHIP 2, contain 16 obligatory headings: identification of the substance/preparation and company; composition/information on ingredients; hazards identification; first-aid measures; fire fighting 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; the presentation of the information should be clear, brief and understandable.

60. The Approved Code on safety data sheets⁽⁵⁷⁾ gives practical guidance to manufacturers and suppliers. It explains the circumstances in which safety data sheets should be provided, to whom and the information they should contain.

61. The label, regulated in CHIP 2, should contain the following information: name or names of the substances or preparation; name, address and telephone number of the person responsible for placing the substance or preparation on the market; symbols and indication of danger; phrases indicating particular hazards (fixed R-phrases); phrases indicating safety advice (fixed S-phrases); the EEC number for substances (for substances appearing in the Approved Supply List⁽⁵²⁾ the words “EEC label” should be included); the nominal quantity of preparations intended for sale to the public.

62. A label should be: clear and have impact; clearly and indelibly printed; designed so that the information on it can be easily read and the symbols stand out and are easily noticed. The minimum size of the label is specified depending on the size of the package. The size of the symbol should be at least 10 % of the minimum size of the label. The colours of the symbols are specified (black on orange/yellow background, no specific shade). The label layout is not specified.

63. The Approved Guide on classification and labelling⁽⁵¹⁾ sets out the general principles of classification and labelling for supply as required by CHIP 2.

64. Training is not considered as an integral part of the hazard communication system. The system requires those operating to be competent, but it does not prescribe the type of training that must be undertaken.

65. Further details are provided in the response to the more specific questionnaire⁽⁵⁵⁾.

Research Report

66. A draft internal report⁽⁵⁴⁾ presents a review of the literature on warning labels as they apply to chemical labelling, discussion of the implications for effective labelling of chemicals and some suggestions for research.

67. The first part of the report gives a brief history of research into warning label effectiveness. The findings of articles published by the US Human Factors Society (authors: McCarthy, Finnegan, Krumm-Scott, DeJoy, Host, Robinson) as well as a paper by Lehto and Papastavrou are summarized. The conclusions are that many questions remain unanswered. Many researchers have used memory technics in their investigation of the understanding of warning labels but are unlikely to tell us much about good and bad label design. The second part gives considerations of label design based on research findings such as font, weight and size. The authors Viscusi and Magat’s suggestions for chemical hazard warning labelling is discussed. The problems associated with self referencing is also discussed.

USA

Regulations

68. The Hazard Communication Standard (HCS), commonly known as “the Workers Right to Know Law”^(60, 61), requires employers to establish hazard communication programmes to transmit information on the hazards of chemicals to their employees by means of labels on containers, material safety data sheets (MSDSs) and training programmes. The following is required:

Chemical manufacturers/importers

- determine the hazard of each product

Chemical manufacturers/importers/distributors

- communicate the hazard information and associated protective measures downstream to customers through labels and MSDSs

Employers

- identify and list hazardous chemicals in their workplace
- obtain MSDSs and labels for each hazardous chemical
- develop and implement a written hazard communication programme including labels, MSDSs, and employee training on the list of chemicals, MSDSs and label information
- communicate hazard information to their employees through labels, MSDSs and ~~formal~~ training programmes.

69. Manufacturers, importers and distributors of hazardous chemicals must label containers with the following information: identity; appropriate hazard warnings; name and address of the manufacturer or other responsible party. The hazard warning can be any type of message, words, pictures or symbols that provide at least general information regarding the hazards. Labels must be legible, in English (plus other languages, if desired), and prominently displayed.

70. MSDSs must be in English and include the following information: specific chemical identity of the hazardous chemicals and their common names; physical and chemical characteristics; known acute and chronic health effects and related health information; exposure limits; whether the chemical is considered to be a carcinogen by NTP, IARC or OSHA; precautionary measures; emergency and first-aid procedures; identification of the organization responsible for preparing the sheet. MSDSs have no prescribed format. ANSI standard no. Z400.1, Material Safety Data Sheets Preparation, may be used. The non-mandatory MSDS form, OSHA 174, may also be used as a guide.

71. The employee training plan must consist of the following elements:

- how the hazard communication programme is implemented in that workplace, how to read and interpret information on labels and MSDSs and how employees can obtain and use the available hazard information;
- the hazards of the chemicals in the work area;
- measures employees can take to protect themselves from the hazards;
- specific procedures put into effect by the employer to provide protection such as engineering controls, work practices and the use of personal protective equipment;
- methods and observations workers can use to detect the presence of hazardous chemical to which they may be exposed.

72. The American Standard for the Preparation of Material Safety Data Sheets, ANSI Z400.1⁽⁶⁷⁾, presents 16 headings which should appear in the prescribed order on all MSDSs. The standard also recommends that certain types of information be placed within certain sections. The standard recognizes that MSDSs may be prepared for non-hazardous chemicals as well as hazardous chemicals used at workplaces. The headings are: chemical product and company identification; composition/information on ingredients; hazard identification; first-aid measures; fire fighting 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. The headings are the same as in ILO Recommendation No. 177.

Research Reports

73. In the process of developing ANSI Z400.1 standard, a study to measure the comprehension of hazard communication phrases among chemical workers in the USA has been carried out⁽⁶³⁾. A summary of the data for all tested phrases is provided as well as the subjects' self-reports and the weighted average understandability, stratified by demographic factors.

74. The results show that average self-rated worker comprehension of hazard communication phrases is high. 75 % of the hazard communication phrases were correctly interpreted as to the type of information present in the phrase. As the level of education increases, so does the level of comprehension; however, experience working with chemicals or fighting fires does not increase phrase rating. Four phrase-specific factors were found to affect the comprehension ratings: jargon, uncommon words; severity of hazard and contextual dependency.

75. Another study⁽⁶²⁾ examines the comprehensibility of a sample of MSDSs to a group of about 100 unionized workers in manufacturing factories. On average, the information on the MSDSs was found to be about one-third incomprehensible. This is a clear indication that MSDSs need to be improved if workers must rely on them for health and safety information.

76. The work of the Chemical Manufacturers Association in developing the ANSI Z400.1 standard for MSDSs is described in reference⁽⁶⁴⁾.

77. In an effort to improve the Hazard Communication Standard (HCS), the Occupational Safety and Health Administration has in a report⁽⁶⁶⁾ given recommendations related to: material safety data sheets; labelling; employee training; the enforcement of the HCS; harmonization of hazard communication requirements; recommendations related to misinformation about the HCS.

Zimbabwe

Research Report

78. A survey has been done⁽⁶⁸⁾ on the comprehensibility of the triangular symbols developed in Zimbabwe and the European symbols as well as a set of words/phrases used on the International Chemical Safety Cards. About 100 persons in various workplaces in agriculture, chemical and hotel and catering industry were interviewed.

79. The four coloured warning triangles have been developed in Zimbabwe for pesticides. The colours (green, yellow, red and purple) indicate different levels of danger. Globally, 21 % of the workers put all four triangles in the proper order, 17 % put them partly correct while 63 % did it incorrectly. The agricultural workers had best knowledge of these symbols.

80. Of the European symbols, the skull-and-crossbones "toxic" symbol had the highest level of recognition (90 %), followed by "flammable" (69 %) and the "harmful" X having the lowest recognition (15 %).

81. Regarding the set of words/phrases, it was found that the words used in the headings of the International Chemical Safety Cards were more widely understood than the words used in the text boxes of the cards. It was also found that the chemical workers had a better understanding of the meaning of the words. The best understood heading was "first-aid".

IV. SIMILARITIES AND DIVERGENCES

82. The following table has been compiled to illustrate similarities and divergences among the different chemical hazard communication systems for workplaces.

Table 1: Similarities and divergences among the different chemical hazard communication systems for workplaces

	Australia	Canada	Japan	Korea	Mexico	Portugal	Sweden	United Kingdom	USA	Zimbabwe
LABELS	yes	yes	yes	yes	yes	yes	yes	yes	yes	?
Text	yes	yes	yes	yes	yes	yes	yes	yes	yes	?
Symbols	no	yes	no	yes	yes	yes	yes	yes	no	yes
Colours	no (no)	no (no)	no (no)	yes (yes)	yes (yes)	no (yes)	no (yes)	no (yes)	no (no)	? (yes)
Format	no	yes	no	yes	yes	yes	yes	yes	no	?
SAFETY DATA SHEETS										
SAFETY DATA SHEETS	yes	yes	yes	yes	?	yes	yes	yes	yes	?
Headings	yes	yes	yes	?	?	yes	yes	yes	yes	?
Symbols	no	no	no	?	?	no	no	no	no	?
TRAINING										
TRAINING	yes	yes	yes	?	?	?	yes	no	yes	?

Labels: If labels are required by regulations or recommended. Text: If any specific written information is required or recommended on the label. Symbol: If any specific symbols are required or recommended on the label. Colours: If the label is required or recommended to have specific colours; if symbols are required or recommended to have specific colours are indicated within the parentheses). Format: If the label is required or recommended to have a specific size, shape or design.

Safety Data Sheets: If data sheets are required by regulations or recommended. Headings: If standardized headings are required or recommended on the data sheet. Symbols: If specified symbols are required or recommended on the data sheet.

Training: If training is required or recommended.

?: No indication in the document received.

Appendix

LIST OF RECEIVED DOCUMENTS BY COUNTRY

Australia

1. A guide to labelling drugs and poisons in accordance with the standard for the uniform scheduling of drugs and poisons, 1995, 27 p.
2. Australian dangerous goods code, Australian code for the transport of dangerous goods by road and rail (ADG code), fifth edition 1992, Australian Transport Advisory Council, the Ministerial Council on Road Transport, Australian Government Publishing Service, GPO Box 84, Canberra ACT 2601, 562 p., ISBN 0-644-25610-9.
3. Code of practice for labelling agricultural chemical products, first edition 1989, Australian Agricultural and Veterinary Chemicals Council, Australian Government Publishing Service, GPO Box 84, Canberra ACT 2601, 60 p., ISBN 0-644-10875 4.
4. Code of practice for labelling home garden and domestic pest control products, Appendix to Code of practice for labelling agricultural chemical products (1989), first edition 1992, Australian Agricultural and Veterinary Chemicals Council, Australian Government Publishing Service, GPO Box 84, Canberra ACT 2601, 27 p., ISBN-0-644-25105-0.
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