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Safe Handling of Chemicals: A Study of the Practice in Cosmetics Industry in Aba, Abia State, Nigeria.

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Abstract
This survey study on the safe handling of chemicals was carried out in a cosmetics industry in Aba, Abia State. Variables studied focused on selection of chemicals; issuance of SHOC cards; storage; Transportation; Safety Education; Shelf-life of Chemicals; Chemical Emergency Plans; Protective Equipment and Safety Supervision. Significance of the study include benefits which employers, employees, plus Technical and Vocational Education students will derive from it, regarding safety from the negative impacts of chemical exposure. Data was elicited from 50 subjects, using a validated nine-item questionnaire whose reliability was 0.74. Findings showed that the industry still had a lot to do to improve on their present practices in the safe handling of chemicals. Nine recommendations were made, as shown at the end of this paper.
Key Words: Chemicals; Technical and Vocational Education; Supervision; SHOC Cards

Introduction

Graduates of Technical and Vocation Education could secure jobs in workplaces in which some of them may be exposed to hazardous substances, like chemicals. Chemicals are solid, liquid or gaseous substances that could be acids or alkalis/hydroxides. They are everywhere in the home, the school and industries. Chemicals could be part of raw-materials for production, or components of finished industrial products for consumption/utilization. Examples of everyday chemicals. or chemical products include petrol, fertilizer, pesticides, dyes in textile industries, cosmetics, etc.

Different classes of chemicals include corrosive chemicals, inflammable chemicals, biological/carcinogenic chemicals and Toxic/asphyxiating chemicals, among others.

Sources of chemical hazards in and outside industries are petrochemical industries; improper storage; accidental spills; mixing processes; chemical wastes from industries; equipment failure; unexpected run-away/exothermic reactions; electroplating etc. (Tse and Lai, 2002)

According to Halton (2005) and Peate (2002), a number of factors determine the degree of risks associated with chemical substances. These are:

(A) The Routes of entry:

(i) This could be by absorption through the skin, causing chemical-induced skin dermatitis. As solvents for fats and oils, chemicals dissolve out the fat deposits under the skin making the skin dry and rough/scally in workers concerned.

(ii) Chemicals in particulate or gaseous forms enter the body by the process of inhalation, precipitating respiratory problems like asphyxiation; and triggering off feats in asthmatic employees.

(iii) Ingestion through the mouth is another route of entry into the alimentary canal, leading to possible damage to the liver and kidneys.

(B) Duration of Exposure

This is another determinant of the level of damage which chemicals can inflict on a worker. Longer periods of exposure to chemical hazards cause greater harm to a workman than limited periods (American Conference of Govt/Industrial Hygienists, 2009). Workers exposed to a number of hazards at the same time cause much greater damage to the health of such employees, because of the synergistic effects of the combination of chemicals impacting on him/her.

Altogether, the overall effects of chemicals on the health of our workmen in different vocations whose work processes involve the use or production of chemical substances could be Acute, or chronic. **Acute effects** of chemicals last for a short period; could also be severe, but are entirely reversible. That is their damaging effects on a worker could be stopped when the offending chemical and the exposed worker are separated, by removing one of them completely from the site of contact (Leun, 2007). On the other hand, the **chronic effects** of chemicals on workmen exposed to them are long lasting and irreversible. Any health damage done to a worker is permanent.

Statement of Problem

From the foregoing, it has become evident that employees in various vocations where they are exposed to hazardous chemicals face the high risk of suffering from chemical-induced health problems that could be minor, major or fatalistic. There is great need to prevent this, and keep our endangered workmen safe from hazardous chemicals.

This study was, therefore, focused on investigating the following variables, as they relate to the topic of this paper:

i) Selection of chemicals for use in the industry
ii) The place of SHOC cards in chemical handling
iii) Storage of hazardous chemicals
iv) Transportation of chemicals
v) Information on hazardous chemicals
vi) The shelf-life of chemicals
vii) Chemical emergency plans
viii) Personal protective equipment
ix) Safety supervision

Purpose of the Study

The study was aimed at eliciting relevant information on each of the variables in the statements of problem from respondents; with a view to making suggestions, where necessary, for the enhancement of the safe-handling of chemicals.

Significance of the Study

It is hoped that the findings of the study will be beneficial to employees of the industry investigated, and others in similar industries, regarding the measures to take in preventing, or eliminating the negative effects of hazardous chemicals on their health. Employers/management of the industry studied, and those of similar companies will befit from the findings of the study by knowing the measures to take in reducing the medical bills/compensation costs they may have to pay for chemical-induced injuries. The study will equally be beneficial to technical and vocational students who may seek employment in petro-chemical establishments. Finally, researchers/scholars in the area of chemical health hazards will benefit from this study by having access to an empirical study on the safe handling of chemicals which have so far been largely absent in technical and vocational institutions of learning in the country.

Research Design

This was a survey study involving a total population of fifty (50) workers in the production, storage and transportation departments of the industry. By the nature of their jobs, workers in these units were the group of employers most exposed to chemical risks. All 50 were taken as respondents for the study, because of the small size of the population.

Closed-ended questionnaire was used as the tool for data-collection. Its validity was ascertained by occupational hygienists in three different chemical industries. The reliability test of the data instrument conducted in a similar chemical industry in Port Harcourt gave a reliability coefficient score of 0.74.

Working with two trained research assistants, copies of the questionnaire were administered on the 50 respondents; and retrieved after completion, the same day. This was to prevent possible questionnaire mortality.

Elicited data were analysed, using simple percentages as the statistical process; and the response with the highest percentage score for each variable tested was used for decision-making.

Findings

S/N	Test Items/Variables	Optional Responses		
		Always	Sometimes	Never
1.	Selection of chemicals purchased for cosmetics products in your own section are the SAFEST ones.	15(30%)	30(60%)	5(10%)
2.	Authorisation paper known as SHOC (Safe Handling of Chemicals) cards are issued to workers in your unit before they purchase or make use of any chemical	10(20%)	15(30%)	25(50%)
3.	To prevent the storage of excess chemicals in the factory, suppliers come to carry back all surplus chemicals in your own unit (Buy-Back-Arrangement)	8(16%)	14(28%)	28(56%)
4.	Vehicles for transporting chemicals in your department are authorized vehicles for which TREM (Transport Emergency) cards have been issued	13(26%)	27(54%)	10(20%)
5.	Workers in your section are given full information on every chemical purchased before they make use of such chemicals	32(64%)	12(24%)	6(12%)
6.	The shelf-life of chemicals (i.e. the length of time chemicals have been in storage) is considered before use where you operate	8(16%)	26(52%)	16(32%)
7.	In your own department, chemical emergency plans are put in place before handling, or transporting chemicals in this company	16(32%)	25(50%)	9(18%)
8.	Personal Protective Equipment (PPEs) against chemical hazards are available for workers, (especially, Nose-masks, Hand-gloves, coverall all and Hard shoes)	38(76%)	12(24%)	0(0%)
9.	The safety supervisor goes round to ensure that workers make use of their Personal Protective Equipment, and comply with other safety Rules/Regulations	15(30%)	26(52%)	9(18%)

Discussion of Findings

In the Table of findings, majority of the respondents (60%) indicated that in their own units the chemicals they use for making cosmetics products is 'sometimes' the safest ones. This is not acceptable. Huygens and Goosens (2001) stressed that before opting to purchase, or make use of any chemical, a company must establish a justification for its use. If a less hazardous chemical could serve the same purpose as a highly hazardous one, the later should be substituted for the former; And final approval must come from the "Chemicals Approval Panel" of that Company. The company should, therefore ensure that only the safest chemicals are utilized "always", not 'sometimes'; not to talk of 'never at all, as stated by 10% of the respondents.

According to the Nigerian Institute of Safety Professionals-NISP (2010) Authorisation Paper, known as SHOC (Safe Handling of Chemicals) Cards must be issued to workers before such employees can make use of any chemical. This is to ensure that the workers know the characteristics of the chemical, and the safest ways to handle them; to be free from the health hazards associated with such chemicals. Unfortunately, majority of the respondents (50%) indicated that SHOC cards were never issued before they could make use of chemicals. This is certainly a great risk that the company is taking, for which the management could be charged for legal liability, if such workers suffer chemical accidents (NISP, 2010).

To prevent the storage of unduly large quantities of hazardous chemicals in any company, Nwankwo (2003) stated that no excess quantity of any chemical must be left to be redundant in the workplace. So, contract terms with the supplier should include an undertaking that surplus chemicals will be returned to the contractor when the need arises. Again, majority of the respondents (56%) indicated that such agreement is not entered into in their own sections. That situation is condemnable, because the company runs the risk of keeping chemicals beyond their expiry dates. Olojoba (2009) warned that expired chemicals become even more difficult and hazardous to handle as "Chemical Wastes"; and raise the danger of environmental pollution to a higher level.

Asked if vehicles for transporting chemicals are authorized vehicles for which TREM (Transport Emergency) cards have been issued, 54% indicated that this was their practice. Sadly enough, the practice was applied only 'sometimes', rather than 'always'. According to Lucas and Gilles (2003) the movement of chemicals from one location to another must be done only in authorised vehicles with TREM cards. Such

vehicles must meet the minimum standards stipulated in the Transport Standards Manual concerned with the movement of Hazardous Substances. This ensures that all vessels in which chemicals have been packaged for transportation are certified "Leak-Proof", after inspection by the receiving officer; before taking delivery of the commodity from the supplier.

In the Table of findings also, majority of the respondents (64%) showed that they were given full information on every chemical purchased before they make use of such chemicals. This practice is plausible. It is really in consonance with some of the laws and regulations in the FGN Factories Acts and Ordinances, (2010) that information and Training on hazardous chemicals in anye workplace must be made known to employees. Such information, which must be comprehensive include: the names of the different chemicals which must be shown on their Labels; their characteristics (inflammable, corrosive, hygroscopic etc); concentration levels; their health effects; safe methods of use; limitation of exposure periods; required Personal Protective Equipment, personal hygiene practices and contingency plans for managing chemical accidents, if they occur. All such information are usually contained in a document referred to as "Materials Safety Data Sheets – MSDS (Uwalaka, 2009). It is praise-worthy that majority of the subjects (64%) indicated that they were always given full information on every chemical purchased for use in the company. Management should see to it that this practice is enforced on others who said they received such information, either 'sometimes', or at no time at all.

Regarding the shelf-life of chemicals, 52% of the respondents disclosed that they considered the length of time chemicals have been in storage, before, use, only 'sometimes'. As high as 32% said they 'never' made such consideration. This situation is clearly unacceptable. Gbalahan (2006) pointed out that the labels/ information on containers of long-staying chemicals may begin to wear off, vessels holding them may begin to deteriorate causing leakage or emissions that may precipitate environmental pollution, or even greater risks to health. Gbalahan (2006) therefore advocated the "**first-in-first-out**" (FIFO) principle where the FIRST consignment of chemicals received must be put to use, BEFORE the later ones. This eliminates the risk of having to deal with 'Expired Chemicals'.

On the issue of Chemical Emergency Plans, the indication by most of the subjects (50%) that they 'sometimes' made chemical emergency plans before handling or transporting chemicals is not good enough. Such plans should be made 'always', not 'sometimes', or 'never'. Nwankwo (2003) emphasised that chemical emergency plans must be put in place for handling emergency situations like chemical spillage/ emissions during transportation, or storage. This calls for the setting up of an Emergency Response Team (ERT) for handling such cases. Hygens and Goosens (2001) added that this Team should be assisted through a Transport Management Plan (TMP) which must be embedded in the Transport Emergency (TREM) card issued to drivers of vehicles involved.

Personal protective equipment, according to Onuzulike (2003) and Nwachukwu (2000) play the role of preventing, or ameliorating the negative impacts which occupational health hazards/hazardous substance could have on workers exposed to them. In the case of chemicals, personal protective outfits like nose-masks, hand-gloves and cover-alls, as well as mouth-masks prevent their inhalation into the lungs, absorption into the skin, or ingestion into the alimentary canal, respectively. It is therefore, commendable that majority of the subjective (76%) stated that they were always provided with personal protective equipment against chemical hazards in the company.

Regarding supervision, it was unfortunate that most of the respondents disclosed that in the process of carrying out their tasks, safety officers supervised them only some of the times. This should not be so because, according to Oluwagbemi and Chirolu (2004) monitoring/supervision of workmen constitute a vital medium for enforcing strict adherence to safety rules and regulations; especially the use of Personal Protective Equipment for the protection of the health of workmen.

Summary

In this study, the review of related literature showed that chemicals exists in solid, liquid or gaseous forms, and enter the body by inhalation, absorption or ingestion. As a result of their varying characteristics, chemicals cause skin damage, asphyxiation or tissue poisoning. Workers, however, can be protected from these health problems, through the safe handling of chemicals. In the cosmetics industry studied, efforts were made to find out the safety measures put in place for the handling of chemicals.

Conclusion

From the findings made in this study, the management of the cosmetics industry investigated still has a lot to do to improve on the measures currently practiced in the handling of chemicals in that workplace.

Recommendations

Specifically, it is recommended that:

(i) Only the least hazardous chemicals should be purchased for use.
(ii) A buy –back agreement should be reached with suppliers.
(iii) There should be no usage of chemicals, without SHOC cards.
(iv) Only authorised vehicles with TREM cards should be used for the transportation of chemicals.
(v) Full information to workers on the safe use of chemicals should be sustained.
(vi) The First-In-First-Out (FIFO) principle in the use of chemicals should be enforced.
(vii) Chemical emergency plans must be paramount.
(viii) Personal protective equipment must always be provided.
(ix) Safety supervision should be given top priority.

Reference

American Conference of Government/ Industrial Hygienists ACGIH (2009) TLS and BELS Threshold Limit Values for chemical substance, and physical Agent. Biological Exposure Indices. Cincinnati, Ohio.

Federal Government of Nigeria- FGN (2000). The laws of the Federation of Nigeria. Chapter 66 Factories. Fed. Government, Printers, Lagos.

Gbalahan, M. (2006). "Functions of a Safety Officer" Safety Record. Port- Harcourt. General Safety Services.

Halton, D.M.(2005). "How workplace chemicals Enter the Body." Canadian Centre for Occupational Health and Safety - CCOHS. Hamilton, Ontario. Canada.

Hygens, S. and Goosens, A. (2001). An update on Airborne contact Dermatitis. Munksgaard, Denmark. ISSN: 0105-1873.

Leun, D. (2007). Allergic and Immunologic Skin Disorders. Journal of the American Medical Association, Vol. 278(22), 1914-23.

Nigerian Institute of Safety Professionals – NISP (2010). Contractor Employee HSE Training Manual Warri, Delta State. Pp. 37-51.

Nwachukwu, A.E. (2000). Industrial and Occupational Health and Safety. TOTAN Publishers, Owerri, Nigeria. Pp. 128-131.

Nwankwo, O.B. (2003). Occupational Health and Industrial Safety. Concepts and Principles. J. Emeka Njoku Enterprises, Owerri.

Olojoba, A.O. (2009). Occupational Safety Services and Public Health. ISBN 978-238-94-0.

Oluwagbemi, B.F. and Chirolu, D.O. (2004). Relevance of Safety Practice in Supervised Industrial Work Experience Scheme (SIWES). Nigerian Institute of Safety Professionals, Warri, Delta State.

Onuzulike, N.M. (2003). Safety Education. EL Adona Network Co. Benin- City.

Peate, W.F.(2002). Occupational Skin Diseases. American Family Physician, Vol. 6 American Academy of family physicians. wwwaafp.org/afp.

Tse, S.W. and Lai, G. (2002). A Review of (OSHH) Essentials, Process Safety and Environmental Protection.

Uwalaka, E.U. (2003) Safety: Everyone's Responsibility for a Secured Future. ISBN: 987-675. Gateway Printing Company Ltd., Abeokuta, Nigeria.