A Guide for Safety Committee Members
Ministry of Labour and Employment

Chemical Management

Chemicals such as cleaning agents, glue, paint, fuel, pesticides are very useful for production. Some of those are hazardous properties such as flammable, poisonous, carcinogen (cause cancer) or corrosive.

We may learn from this booklet:

- Responsibilities
- Assessing Risks & Taking Actions: Preparation
- Procedures & Documents
- Training
- Monitoring
- Emergency Preparedness

Department of Inspection for Factories and Establishments
Ministry of Labour and Employment

Importance of Chemical Management:

Chemicals such as cleaning agents, glue, paint, fuel, pesticides are very useful for production. Some of them have hazardous properties such as flammable, poisonous, carcinogen (cause cancer) or corrosive. **The incorrect use of chemicals can cause injuries, diseases, fire, explosion and death**. In some cases the effect is immediate and visible (e.g. acid burn); however in many cases symptoms develop only years after repeated exposure. Because the hazards are known, **management is required to take the necessary actions to protect the workers** (BLA 53, 78).

Scope of the Brochure:

The purpose of this brochure is to support the employer to take the necessary actions. **The target group is factories using simple chemical process during production** (applying chemicals). The brochure would not be sufficient for factories using complex chemical process, for chemical manufacturing plants, oil refinery nor for laboratories.

Managing chemicals to ensure worker safety **functions according to the same principles as the management of health & safety** in the company:

- responsibilities must be assigned
- risk assessment must be conducted, preventive actions must be taken
- factory must prepare for emergency situations
- staff must be trained
- regular monitoring must be conducted

(See Brochure "Managing Health & Safety in the workplace", Brochure "Risk Assessment")

It is therefore recommended to **integrate chemical management in the existing OSH management system of the company**, i.e. to adapt existing organizational chart, risk assessment, annual training plan (instead of creating separate documents).

The brochure is therefore organized according to this structure and has sections on responsibilities, risk assessment, training, emergency preparedness. For each of these general elements, the brochure presents the specificities in the area of chemical management: e.g. additional actions need to be taken for emergency preparedness when the factory uses chemicals in production; risks related to chemical storage, pouring and use, which need to be included in the risk assessment.

To keep the brochure short, it does not cover actions on preventing the negative impact of chemicals on the environment / chemical disposal.

Systematic Management of Chemicals

1) Responsibilities

The company needs to clarify who will manage chemicals in the factory: e.g. manage chemical storage, fill in the inventory, train workers. In small factories, this is the same person as the Safety/OSH officer (BLR 55 (8)). In larger factories, this might be a separate person called the "chemical officer". In the rest of this brochure, we will use the denomination "chemical officer".

Chemical management starts with the acquisition. The chemical officer and the person in charge of procurement need to work closely together. They need to ensure that

- the company purchases only authorized chemicals (e.g. in accordance with the restrictions of the buyers & government)
- the company purchases only the minimum needed / smallest practical amount
- the chemical suppliers provide the Material Safety Data sheet of the chemical, and the MSDS are posted at the required location in the factory (more details in the next section)
- the label on the chemical container has the required information (more details in the next section)

These points should be integral part of the company procurement procedure.

The company needs also to clarify **"access rights"**:

- who are the persons authorized to access the chemical storage
- who is entitled to pour chemicals in smaller recipients & label them
- who is dispatching small quantities from the storage to the work floor
- who is entitled to dissolve / dilute / mix chemicals
- who is checking that the company procedures on chemicals are respected

2) Assessing risks & taking actions: Preparation

The initial steps of the risk assessment focus on the chemicals used during production. They are to

- prepare an inventory of all chemicals used in the factory
- gather the corresponding Material Safety Data Sheets, read them to know the hazards and take the listed preventive actions
- verify that the chemical containers have the corresponding labels.

2.1 Chemical inventory

All chemicals used and stored in the factory need to be listed in an inventory (BLR 80 (1) a). See annex 1 for a sample. The inventory needs to be kept up to date: e.g. when new chemicals are acquired, they must be added to the inventory.

2.2 MSDS

- In principle, there should be one Material Safety Data Sheet (MSDS) for each chemical used in the workplace (BLR 68 (10), 80 (1) b)).
- The MSDS is of primary importance for the risk assessment because it contains information about the hazard (e.g. toxic, corrosive, carcinogen, irritant) and the necessary preventive action. It is a document (about 4 to 10 pages long), specific to one chemical/substance, which gives information on the chemical composition, properties and hazards, storage, PPEs required for the safe use, and first aid measures in case of exposure. It is therefore the starting point for developing safe practices for storage, use and emergency preparedness. **The instructions listed in the MSDS must be implemented**. See annex 2 for a sample.
- When reading the MSDS, particular attention must be given to hazardous properties such as fetotoxic, mutagen, teratogen. These terms mean that the chemical has an **adverse effect on fertility and pregnancy** such as miscarriage and birth defects (e.g. lead, toluene). The MSDS indicates very often that the pregnant or nursing women should not manipulate such products, or require specific measures to protect reproductive health in accordance with the legislation (BLA 45, BLR 37).
- a full version of the MSDS must be **displayed** in the workplace in the various locations where the chemical is stored and used (e.g. in the chemical storage room and in the spot cleaning room). It is not sufficient to have the MSDS in the office (BLR 68 (10), 80 (1) b).
- the MSDS must be available in the **languages** used by the chemical users.
- It is possible to also display in addition a 1 page summary for the workers.
- The manufacturer of the chemical has the responsibility to prepare the MSDS. Factories need to require the supplier to give it to them. They need to verify that the MSDS is exactly for the chemical supplied and that it is accurate (by comparing with MSDS available on the internet). In many cases, it is possible to download the MSDS from the manufacturer website or to request it by e-mail.

2.3 Chemical label

- Each recipient containing a chemical must have a label.
- The label contains at least

1. the name of the chemical product (and concentration if applicable), so that it can be immediately related to the corresponding MSDS
2. the hazards of the chemical (incl. pictogram; see annex 4)
3. main safety instructions

- The label must be translated in the languages of the users in the factory.
- In general the label of the container of the chemical manufacturer contains at least the above information. The Chemical officer needs to verify this when receiving the chemicals from the supplier: It can happen that the supplier has transferred it in another container than the original one of the manufacturer (in a so called "secondary container"). The Chemical officer must require the supplier of the chemical to paste a copy of the label of the primary container on the secondary container.

- In many cases, the transfer from primary container to secondary container is done at the factory by the workers; in such cases, at least the name of the chemical and the hazard pictograms must be put on the label of the new container. The information provided on the label must make it possible to relate the chemical to the corresponding MSDS quickly and without doubt.
- Note: There is a Globally Harmonized System of Classification and Labelling of Chemicals (GHS) developed by the United Nations. See annex 3 for a sample and template of such labels. It is a comprehensive system; it will take several years until all chemicals imported and in use in Bangladesh comply with GHS. In the meantime the rules presented in the precedent paragraphs are the minimum required.

3) Assessing risks & taking actions

The other parts of the risk assessment consist in

- analysing the *specific risks in the cycle of use of the chemical* (storing, pouring, transporting, diluting / mixing, using, drying and disposing) and taking the corresponding control actions

- analysing *dusts, fumes and vapor generated by specific activities during the production process such* as welding, grinding or cutting fabrics (in addition to processes where chemicals are used)

BLA 53, 78; BLR schedule IV 1 (b), 2 III & VI, 4

The goal is to prevent exposure via

- inhalation (e.g. of vapor, dust, fumes)
- skin/eye contact (e.g. manipulating with bare hands, splash of liquid or vapor in the eye)
- ingestion (e.g. eating at the workplace)

As it is not possible to present all scenarios in a short brochure, the following section focuses on storing, pouring and using chemical during production.

3.1 Storage

The key principles of chemical storage are presented below. For more details, please use the checklist provided in annex 6. The MSDS of the specific chemical contains also information on how to properly store the chemical.

3.1.1 Proper storage place

- Chemicals are stored in a chemical storage room away from production area / from the canteen
- Large quantities of chemicals are kept in the storage; only the amount necessary for immediate use is dispatched to the workplace
- The access to the chemical storage room is restricted (door locked)
- Proper signs indicate the storage area (warning signs about hazard; interdiction to smoke)
- the storage room has sufficient ventilation

3.1.2 Arrangement of chemicals

- The containers must have a definite storage place (not be on the way where they can be knocked over, not on the stairwells)
- Acid must be separated from base (e.g. bleaching solutions)
- Corrosive chemicals are stored at the bottom of the shelve
- Chemicals must not accidentally come into contact with each other (e.g. leak)
- Secondary containment must be provided (at least 100%)

3.1.3 Containers

- When pouring chemical to a smaller container, soft drink bottles and coffee cups must not be used as workers might get confused and drink the chemical
- Containers must have proper cap

3.2 Use of chemical

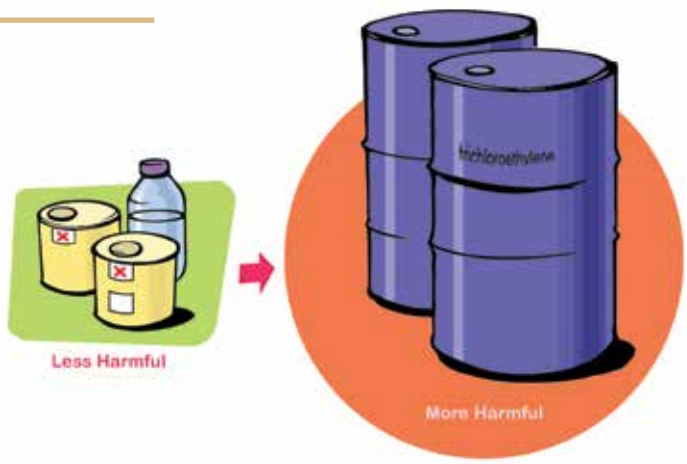
When taking actions to reduce chemical exposure, it would be wrong to believe that the first & only action to take is to require workers to wear PPEs. Actions need be taken upstream in the order presented below. This order is called the "**hierarchy of controls**" and is applicable to any process where chemicals are used/dusts, fumes and vapor generated. To illustrate this, examples from "spot cleaning" in the garment industry and "glue assembling" from shoe industry are used.

3.2.1 Elimination

The first strategy is to eliminate the need to use chemicals at all: e.g. improving machine maintenance or requiring workers to wash hands or wear gloves when they manipulate white fabric can prevent spot on garment in the first place. This eliminates the need for spot cleaning.

3.2.2 Substitution

The Chemical officer must consider whether a less harmful chemical can be used (by comparing the MSDS). In particular chemicals which cause cancer must be avoided (e.g. benzene, perchloroethylene, trichloroethylene). Preference must be given to water based solvents and leadless paints.



3.2.3 3) Limiting exposure by closing containers and using application tools

Exposition to vapor can be reduced by using gravity fed closed containers (picture on the right) or by closing as much as possible the chemical container (on the left).

Various tools such as brush can be used to prevent that hands come in direct contact with the chemical.

3.2.4 Isolating/ enclosing:

It is important to isolate the process, e.g.:

- have a separate room for the process, so that no other worker is exposed (e.g. a spot cleaning room); limiting access rights of other workers to this room (incl. interdiction sign)
- partially enclose the process with a canopy hood (see picture on the right). Note that in some cases it might be necessary to totally enclose the process. See BLA 53.

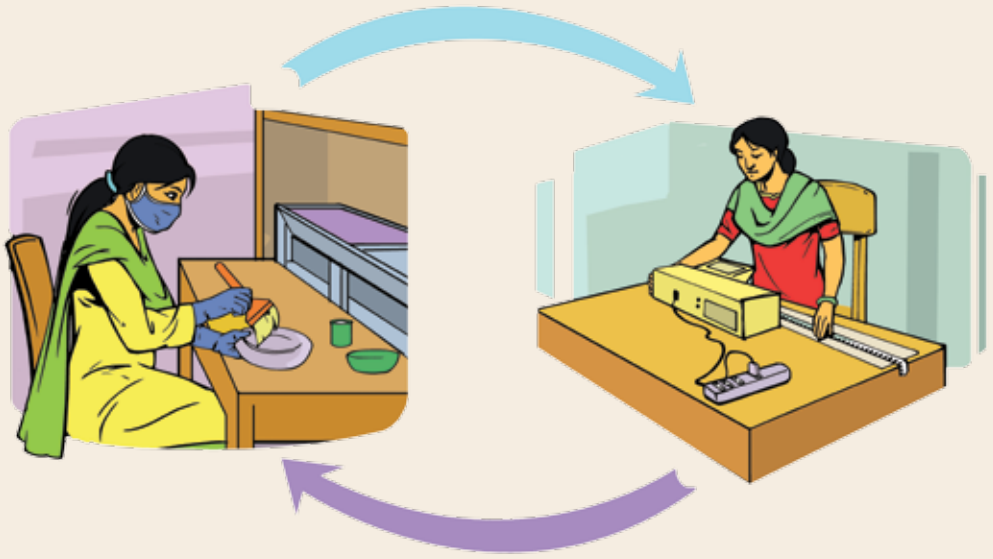
3.2.5 Ventilation / Local exhaust

The room must be well ventilated to avoid concentration of vapor (general ventilation). A local air exhaust is a useful addition. Typical problems encountered in practice which must be avoided are:

- the local exhaust is not connected to the outside, so that the chemicals remain in the room
- the local exhaust does not have sufficient pressure
- the local exhaust is not switched on.

BLA 53, BLR 45-46

3.2.6 Rotation of staff / Limiting duration of exposure



Rotating staff who work with chemicals is another possible action to limit the amount of exposure. However limiting the time of exposure cannot be considered as an action sufficient to replace "enclosing" or "a good air exhaust system"; time limitation is done in addition to other controls. Limiting the time each day /rotating job on a daily basis is better than rotating on a weekly or monthly basis.

3.2.7 Personal protective equipment

The MSDS of the chemical used lists the PPEs which are required (e.g. apron, glasses, respirator, gloves). It is the responsibility of the company to provide them to the workers, free of charge, to renew regularly these PPEs (as described in the PPE instruction leaflet), to train the workers in its correct use. For more information see Brochure on PPEs and BLA 78A, BLR 46, 64, 67.

Note on masks/respirators:

- There are various types of masks and the correct type needs to be provided. Cotton masks do not protect workers from chemical vapors; masks/ respirators equipped with carbon filter are required.
- Masks can in theory protect workers if the chemical concentration is above the threshold value. However they cannot be considered as an alternative to the above listed actions 1 to 6, in particular to a functioning air exhaust system: the practice shows that workers do not wear the masks during the whole day, so that a good air exhaust system is required in all cases to keep chemical concentration low.

The above "**hierarchy of control**" needs to be applied in the same way to other production processes generating dusts, fumes and vapor such as welding, grinding or cutting fabrics.

3.3 Pouring Chemicals

The “hierarchy of controls” presented above needs also be applied when workers pour chemicals from one recipient to another: e.g. **sufficient ventilation; only authorized workers, who know the hazards and can add a label on the new recipient; PPEs.**

- For liquid chemicals, there is a risk to splash when pouring chemicals. This risk can be reduced by taking extra care and by using various supporting devices as illustrated in the five following pictures.
- **When pouring powdered chemicals** into another container, the worker must wear a protective mask because part of the chemical becomes airborne and enter the human body by inhalation.

3.4 Chemicals and Fire safety

Flammable and explosive chemicals require particular attention during risk assessment (BLA 78). If they come into contact with a source of ignition such as **electricity/spark, a cigarette, heating equipment**, this will cause a fire. The chemical will feed the fire, which will spread faster and be difficult to put out.

Storage: It is important to store flammable chemicals away from

- possible sources of ignition
- combustible material
- oxidizing agents.

Examples:
- a recipient containing a flammable chemical must not be stored close to an electrical outlet or below an *electrical panel*; a leak / an electrical spark could cause a serious fire (illustration on the left)

- flammable chemicals must be removed from an area where *welding/grinding* will take place.

Use: There is the same risk of fire when flammable chemicals are used or mixed: no source of ignition is allowed nearby (e.g. smoking), and the area should be ventilated; if an electrical mixer is used, it should be isolated and in perfect condition to prevent sparks (e.g. no insertion of wires into the outlet without plug).

Pouring a flammable powder might create a cloud of dust which might catch fire in presence of an ignition source. When pouring flammable liquids such as petrol in another electrically conductive container, it is necessary to connect the containers to earth with a wire to prevent static electricity spark, which could inflame the chemical vapor.

3.4.1 Procedures & Documents

As mentioned above, the factory must keep documents such as chemical inventory, MSDS, labels. Based on the risk assessment, the factory can develop additional Standard Operating Procedures needed to ensure chemicals are used correctly (BLR 68 (10), 80 (1)).

To remind workers about the rules and procedures, it is good to post

- warning signs
- obligation signs (e.g. obligation to wear a protective mask)
- interdiction signs (e.g. no access; "no smoking" required by BLR 66)
- posters

3.4.2 Training

The Chemical officer must receive training on chemical management. There are various external providers of such trainings. In a large factory the training might be provided by the OSH/Fire officer, if s/he has the know-how.

Workers working with chemicals and their supervisors need to be trained about the hazards of the chemicals they are using, the safe working procedure, the use of the corresponding PPE and the appropriate reaction in case of emergency (e.g. chemical spill, exposure to chemicals). It is recommended that such trainings include practical demonstration on site (not only classroom training). BLA 78A (3); BLR 67, Schedue IV (5).

Other workers in the factory need to be trained at least on the chemical hazard pictograms, so that they know how to identify when a substance is hazardous (e.g. a flammable chemical). See annex 4 at the end of this brochure, BLA 78 (3), BLR schedule IV (5).

3.4.3 Monitoring

Various actions are recommended to monitor that the system of management of chemicals in the company is working effectively. Some are even required by the Act/the rules:

- **Daily-weekly checks**: members of the safety committee must control on a weekly basis the work of the chemical officer, e.g. that the chemical inventory is up to date, that the chemicals are properly labelled, that the chemicals are properly stored.
- **Workers health checks**: the employer must organize at his own costs pre-assignment and annual health checks by registered doctors for workers working with hazardous chemicals (BLR 68, schedule IV 1 2 IV).
- **Risk-assessment**: when conducting the regular comprehensive risk assessment of the company, the Safety committee members also assess exposure to chemicals and the functioning of corresponding controls (see Brochure on Risk Assessment; BLA 53, 78; BLR schedule IV 1 (b), 2 III).
- **Time of exposure monitoring**: it is recommended that workers record the number of hours they work with chemicals on a daily basis; the threshold value of exposure for a chemical is calculated on the basis of 8 hours of exposure per day. Recording duration of exposure is therefore needed to prevent overexposure. In case the worker is exposed more than 8 hours to the chemical due to overtime, the various controls taken might not be sufficient to ensure safety (See annex 5).
- **Chemical quantity measurement**: another possible action to monitor the exposure to chemicals is to conduct measurements of chemical particles or gas in the air.

৬) তদারকি (মনিটরিং)

নং	মনিটরিং-এর নাম	১ সপ্তাহ	২ সপ্তাহ	৩ সপ্তাহ	৪ সপ্তাহ	৫ সপ্তাহ	৬ সপ্তাহ
১	দৈনিক-সাপ্তাহিক পরীক্ষা						
২	শ্রমিকদের স্বাস্থ্য পরীক্ষা						
৩	ঝুঁকি নিরূপণ						
৪	প্রভাবাধীন সময়ের মনিটরিং						
৫	রাসায়নিক পদার্থের পরিমাণ পরিমাপ						

3.4.4 Emergency preparedness

In addition to the usual actions for emergency preparedness[1], some specific equipment is needed when certain types of chemicals are used: emergency shower, eye wash, spill cleansing material, type of fire extinguisher. The legislation and the specific MSDS give the details:

- **Emergency shower/eye wash:**

An eye wash station enables workers to rinse their eyes during 15-20 minutes in case of chemical splash or vapor in the eyes. At least one is required in the medical room (BLR 77(5)). The factory needs to check regularly that the eye wash station is not obstructed by material and that it is properly connected to clean

running water (enough pressure; clearly identified by a sign).

Eye wash bottles are an emergency solution to rinse immediately the eyes on the spot (for the first few minutes). They give immediate relief and enough time to the injured persons to go to the eye wash station. Eye wash bottles do not have sufficient capacity for the required 15-20 minutes of rinsing. They can be a replacement for a second eyewash station but not for the main eyewash station.

Washing facility: Workers must

be able to wash themselves with soap and water (tab and shower) in case of exposure (to combat chemical burns). The legislation requires

- at least 2 bathrooms with shower for the first 25 workers and one such bathroom for every subsequent 50 workers;

- one water tab for every 15 workers

(BLA 59, 91; BLR 86 , Schedule II.

- **Spill cleansing material:**

Legislation and many MSDS require the factory to have a bucket of sand or earth to be ready to respond in case of chemical spills (BLR 55c). This is needed in particular for flammable chemicals as wiping of the flammable liquid might cause a fire.

Additional equipment might be needed depending on the chemical used in the factory (see the MSDS).

Bangladesh building code requires an automatic fire alarm in areas where flammable material is stored (BNBC 5.9.2). It is a good practice to install a system of automatic fire extinguishers or of sprinklers to automatically bring the fire under control.

Additional emergency procedures and preventive & corrective actions are needed for factories manufacturing chemicals or using large amounts of hazardous chemicals (e.g. procedure in case of uncontrolled release of gas).

Further information:

- Bangladesh Labour Act 2006, Labour Rules 2015
- Brochure “Managing Health & Safety in the workplace”
- Brochure “Emergency preparedness”
- Brochure “Risk Assessment”
- Brochure “PPEs”

Disclaimer

This resource has been prepared to help the workplace parties understand some of their rights and obligations under the legislation. It is not intended to replace the regulation and only the text of the legislation is binding.

[1] See Brochure on Emergency preparedness

Annexes

1. Chemical Inventory
2. Sample of MSDS
3. Labels according to GHS
4. Hazard Pictograms
5. Log to record Chemical Exposure Time
6. Chemical Store Self-Assessment

All these files can be downloaded for free from the website of DIFE:
http://www.dife.gov.bd/

Annex 1: Chemical Inventory

The original file can be downloaded for free from the website of DIFE: http://www.dife.gov.bd/

Chemical Inventory (Main Storage)

Factory Name Factory X
Address Dakha
Maintainance of Inventory by Omar **Position** Chemical Officer

Entry Number	Product / Chemical Name	MSDS on file?	Manufacturer /Seller	Date received	Expiration Date	Capacity of the container	Storage Location	Quantity Dispatched	Sent to section	Date	Receiver Signature
1	Acetone	Yes	Central Chem	10.10.2010		5L	Main Chemical Storage; shelf number 2	1	Spot cleaning 1	11.10.2010	
								1	Spot cleaning 2	12.10.2010	
								1	Spot cleaning 3	15.10.2010	
								1	Spot cleaning 1	11.12.2010	
								1	Spot cleaning 3	15.11.2010	
2	Acetone	Yes	Central Chem	10.10.2010		5L	Main Chemical Storage; shelf number 2	1	Spot cleaning 2	03.12.2010	
								1	Spot cleaning 1	12.02.2011	

Annex 2: Sample of MSDS

Sample of MSDS (typical 16 sections of an MSDS).

Material Safety Data Sheet
Acetone MSDS

Section 1: Chemical Product and Company Identification

Product Name: Acetone

Catalog Codes: SLA3502, SLA1645, SLA3151, SLA3808

CAS#: 67-64-1

RTECS: AL3150000

TSCA: TSCA 8(b) inventory: Acetone

CI#: Not applicable.

Synonym: 2-propanone; Dimethyl Ketone; Dimethylformaldehyde; Pyroacetic Acid

Chemical Name: Acetone

Chemical Formula: C3-H6-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Acetone	67-64-1	100

Toxicological Data on Ingredients: Acetone: ORAL (LD50): Acute: 5800 mg/kg [Rat]. 3000 mg/kg [Mouse]. 5340 mg/kg [Rabbit]. VAPOR (LC50): Acute: 50100 mg/m 8 hours [Rat]. 44000 mg/m 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED].
The substance is toxic to central nervous system (CNS).
The substance may be toxic to kidneys, the reproductive system, liver, skin.
Repeated or prolonged exposure to the substance can produce target organs damage.

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Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 465°C (869°F)

Flash Points: CLOSED CUP: -20°C (-4°F). OPEN CUP: -9°C (15.8°F) (Cleveland).

Flammable Limits: LOWER: 2.6% UPPER: 12.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Slightly explosive in presence of open flames and sparks, of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Vapor may travel considerable distance to source of ignition and flash back.

Special Remarks on Explosion Hazards:
Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid + sulfuric acid, chromic anydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol + hydrogen peroxide, potassium ter-butoxide, sulfur dichloride, 1-methyl-1,3-butadiene, bromoform, carbon, air, chloroform, thitriazylperchlorate.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, acids, alkalis.

Storage:
Store in a segregated and approved area (flammables area) . Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Keep away from direct sunlight and heat and avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 500 STEL: 750 (ppm) from ACGIH (TLV) [United States]
TWA: 750 STEL: 1000 (ppm) from OSHA (PEL) [United States]
TWA: 500 STEL: 1000 [Austalia]
TWA: 1185 STEL: 2375 (mg/m3) [Australia]
TWA: 750 STEL: 1500 (ppm) [United Kingdom (UK)]
TWA: 1810 STEL: 3620 (mg/m3) [United Kingdom (UK)]
TWA: 1800 STEL: 2400 from OSHA (PEL) [United States]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Fruity. Mint-like. Fragrant. Ethereal

Taste: Pungent, Sweetish

Molecular Weight: 58.08 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 56.2°C (133.2°F)

Melting Point: -95.35 (-139.6°F)

Critical Temperature: 235°C (455°F)

Specific Gravity: 0.79 (Water = 1)

Vapor Pressure: 24 kPa (@ 20°C)

Vapor Density: 2 (Air = 1)

Volatility: Not available.

Odor Threshold: 62 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.2

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, exposure to moisture, air, or water, incompatible materials.

Incompatibility with various substances: Reactive with oxidizing agents, reducing agents, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 3000 mg/kg [Mouse].
Acute toxicity of the vapor (LC50): 44000 mg/m3 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED].
Causes damage to the following organs: central nervous system (CNS).
May cause damage to the following organs: kidneys, the reproductive system, liver, skin.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenicity) based on studies with yeast (S. cerevisiae), bacteria, and hamster fibroblast cells. May cause reproductive effects (fertility) based upon animal studies.
May contain trace amounts of benzene and formaldehyde which may cancer and birth defects. Human: passes the placental barrier.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation. May be harmful if absorbed through the skin.
Eyes: Causes eye irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury.
Inhalation: Inhalation at high concentrations affects the sense organs, brain and causes respiratory tract irritation. It also may affect the Central Nervous System (behavior) characterized by dizzness, drowsiness, confusion, headache, muscle weakeness, and possibly motor incoordination, speech abnormalities, narcotic effects and coma. Inhalation may also affect the gastrointestinal tract (nausea, vomiting).
Ingestion: May cause irritation of the digestive (gastrointestinal) tract (nausea, vomiting). It may also affect the Central Nevous System (behavior), characterized by depression, fatigue, excitement, stupor, coma, headache, altered sleep time, ataxia, tremors as well at the blood, liver, and urinary system (kidney, bladder, ureter) and endocrine system. May also have musculoskeletal effects.
Chronic Potential Health Effects:
Skin: May cause dermatitis.
Eyes: Eye irritation.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 5540 mg/l 96 hours [Trout]. 8300 mg/l 96 hours [Bluegill]. 7500 mg/l 96 hours [Fatthead Minnow]. 0.1 ppm any hours [Water flea].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Acetone UNNA: 1090 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Benzene
California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Benzene
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene, Formaldehyde
Connecticut hazardous material survey.: Acetone
Illinois toxic substances disclosure to employee act: Acetone
Illinois chemical safety act: Acetone
New York release reporting list: Acetone
Rhode Island RTK hazardous substances: Acetone
Pennsylvania RTK: Acetone
Florida: Acetone
Minnesota: Acetone
Massachusetts RTK: Acetone
Massachusetts spill list: Acetone
New Jersey: Acetone
New Jersey spill list: Acetone
Louisiana spill reporting: Acetone
California List of Hazardous Substances (8 CCR 339): Acetone
TSCA 8(b) inventory: Acetone
TSCA 4(a) final test rules: Acetone
TSCA 8(a) IUR: Acetone

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable.
R36- Irritating to eyes.
S9- Keep container in a well-ventilated place.
S16- Keep away from sources of ignition - No smoking.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References:
-Material safety data sheet issued by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Hawley, G.G., The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
LOLI, RTECS, HSDB databases.
Other MSDSs

Other Special Considerations: Not available.

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Annex 3: Labels according to GHS

Sample:

ToxiFlam (Contains: XYZ)

Danger!

Toxic If Swallowed, Flammable Liquid and Vapor

Do not eat, drink or use tobacco when using this product. Wash hands thoroughly after handling. Keep container tightly closed.
Keep away from heat/sparks/open flame. - No smoking. Wear protective gloves and eye/face protection. Ground container and receiving equipment. Use explosion-proof electrical equipment. Take precautionary measures against static discharge.
Use only non-sparking tools. Store in cool/well-ventilated place.

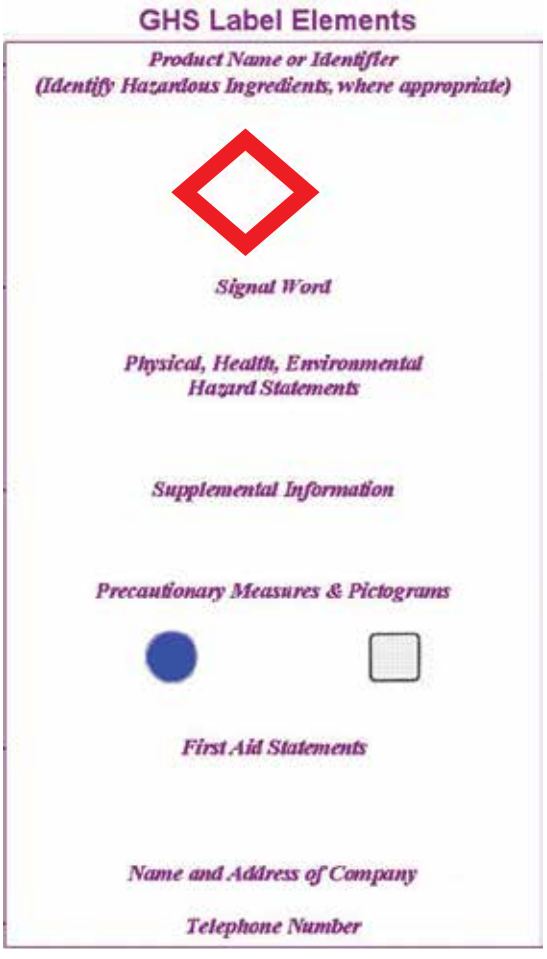
IF SWALLOWED: Immediately call a POISON CONTROL CENTER or doctor/physician. Rinse mouth.

In case of fire, use water fog, dry chemical, CO_2, or "alcohol" foam.

See Material Safety Data Sheet for further details regarding safe use of this product.

MyCompany, MyStreet, MyTown NJ 00000, Tel: 444 999 9999

Template:



For more information:

http://www.osha.gov/dsg/hazcom/ghs.html#4.3

Annex 4: Hazard Pictograms

GHS Pictograms and Hazard Classes		
		
Oxidizers (fuel the fire by contributing oxygen)	▪ Flammables ▪ Self Reactives ▪ Pyrophorics (spontaneously ignite in the air at temperature of 54C or below) ▪ Self-Heating ▪ Emits Flammable Gas ▪ Organic Peroxides	▪ Explosives ▪ Self Reactives ▪ Organic Peroxides
		
▪ Acute toxicity (severe) A simple skin contact, inhalation or ingestion can cause death	▪ Corrosives (irreversible damage to skin or eye) Strong acid & base	▪ Gases Under Pressure
		
▪ Carcinogen (induce cancer) ▪ Respiratory Sensitizer ▪ Reproductive Toxicity ▪ Target Organ Toxicity ▪ Mutagenicity (mutation of human cells) ▪ Aspiration Toxicity	▪ Environmental Toxicity	▪ Irritant ▪ Skin Sensitizer (allergic response; redness of skin however reversible damage) ▪ Acute toxicity (harmful) ▪ Narcotic Effects ▪ Respiratory Tract Irritation

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Annex 5: Log to record Chemical Exposure Time

The original file can be downloaded for free from the website of DIFE: http://www.dife.gov.bd/

Company Name
Company Address

MONITORING WORKER'S EXPOSURE TIME TO CHEMICALS

Month:

No	Fullname	Worker Code	Worker's signature	Daily monitor																														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Masum	XZ32		8	3	4	2	0	0	0	4	2	2	2	3	0	0	4	8	7	2	0	0	0	2	1	0	8	8	4	0	2	1	3

Supervisor's signature:

Compliance Officer signature:

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Annex 6: Chemical Store Self-Assessment

The original file can be downloaded for free from the website of DIFE: http://www.dife.gov.bd/

No	Question	Yes	No	Details / Action required
	Chemical store			
1	Is the chemical warehouse away from production area / not next to the canteen?			
2	Are large quantities of chemicals all stored in the chemical store?			
3	Do signs warn about the storage area? Is a no smoking sign posted?			
4	Is access restricted ? Is the chemical store locked?			
5	Is there adequate light?			
6	Is there adequate ventilation?			
	Arrangement of Chemicals			
7	Does each chemical have a definite storage place?			
8	Are chemicals not stored on the way?			
9	When needed, are shelves provided? Do they have adequate sturdiness?			
10	Is an inventory of chemicals provided?			
11	Are chemicals separated according to properties (e.g. acid & base)?			
12	Are corrosive chemicals stored on the lowest level of the shelf?			
13	Are retention container provided, with the adequate capacity?			
	Containers/Recipients			
14	Are chemicals properly labelled (name of substance, hazard pictogram, and in local language)?			
15	Are the containers in good condition (e.g. no leak)?			
16	No soft drink bottle / coffee mug is used as secondary container?			
17	Do recipients have a proper cap?			
	Instructions			
18	Are the MSDS available (in local language, with all necessary information)?			
	PPEs, Eye Wash			
19	Is the personal accessing the storage / pouring the chemicals wearing the required PPEs?			
20	If required by the MSDS, is an eye wash station available? Is it functioning? Is it not obstructed?			
21	Is earth or sand available in case of chemical spill? Is other material required by the MSDS available?			
	Flammable or Explosive Chemicals			
22	Are they stored away from possible sources of ignition (like electricity)? Also gas cylinders?			
23	Are they stored away from additional combustion material (like cardboard box)?			
24	Is there a sufficient number of fire extinguishers? Are they in good condition? not obstructed ?			
25	Is there a sufficient number of smoke detectors connected to an alarm?			
26	Are gas cylinder secured to prevent them from falling?			

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