

HOWARD COLLEGE SCHOOL OF CHEMICAL ENGINEERING Pollution Research Group

Health and Safety Manual

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Purpose

- 1. As required by law, Act85 of 1993(Occupational Health &Safety Act) provides for the health and safety of persons at work in connection with the use of plant or machinery, the protection of persons other than the persons at work against hazards to health and safety arising out of or connection with the activities of persons at work.
- 2. In the interest of health and safety, this manual shall provide information and instruction at work for all employees at the workplace.
- 3. Health and Safety Objectives:
 - a. As a minimum, adhere to all requirements of the Occupational Health and Safety Act no.85 of 1993.
 - b. Increase awareness of its staff to provisions and requirements of the Occupational Health and Safety Act.
 - c. Develop and maintain regular workplace inspections and reporting procedures.
 - d. Assess and control health and safety risks as they are identified.
 - e. Encourage the staff to take an active role in the development of safe working practices.
 - f. Implement appropriate drills for the evacuation of the workplace in the event of a dangerous situation.
 - g. Continue the consultative process between staff and management.
 - h. Train health and safety representatives in the implementation of the Health and Safety Act.
 - i. Keep the lab technicians and researchers informed of hazardous situations which may be associated with their work.
 - j. Provide adequate occupational health and first aid services to staff.
 - k. Develop and promote health and safety attitudes with the PRG laboratory.

Scope

This manual explains health and safety risks pertaining to the work environment. Refer to the table of contents for a complete list.

Responsibility

It is not possible to give a detailed list of actions for management and staff to achieve an environment where accidents and hazards are minimized. All staff must escalate any health and Safety issues for management as required.

However, the following guidelines are provided for various levels of responsibility:

1. Chief Executive Officer (Prof C.A Buckley)

The CEO has overall responsibility for health and safety and delegate specific health and safety responsibilities to Executive Management, Human Resource management, Managers and supervisors, health and safety representatives, and will hold these delegated officers to account through:

- a. Requesting annual and ad-hoc reports
- b. Raising concerns relating to health and safety at executive meetings
- c. Promote health and safety throughout the company

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- d. To ensure currency of the health and safety policies and procedures
- e. Ensures compliance with the Health and Safety Act no. 85 of 1993 and all legislation.

2. Managers and Supervisors

Managers and Supervisors are accountable for workplace health and safety and the welfare of their staff while on duty. As a guide to accident prevention and hazard identification, assessment and control they shall:

- a. Liaise and consult with the Occupational Health and safety committees and the Health and Safety Representatives.
- b. Consult with their staff on health and safety matters as required by the Occupational Health & Safety Act n. 85 of 1993.
- c. Establish safety goals and objectives for their area of responsibility.
- d. Investigate accidents, injuries and incidents affecting occupational health and safety with in their work area of responsibility and take all the necessary steps to remedy adverse situations without delay.
- e. Conduct workplace inspections, audits and risk assessments appropriate to their area of responsibility.
- f. Motivate their staff to adopt good health and safety practices.
- g. Make all staff aware of specific policies, manuals, procedures and guidelines where activities involve biological safety.
- h. Provide the necessary risk controls and maintenance procedures to ensure a safe and healthy workplace.
- i. Prepare and submit periodic reports on health and safety as required.
- j. Provide and maintain a training program for staff appropriate to their work/responsibilities, and keep records of all health and safety training provided to their staff.
- k. Ensure that protective equipment and clothing is provided and used.
- I. Ensure that all new staff are given appropriate induction in occupational health and safety.
- m. Make representation to ensure adequate budgetary induction in occupational health and safety needs within their area of responsibility.
- n. Meet all legal requirements with regards to occupational health and safety.
- 3. Staff

All the staff whilst at work are required to make every effort t ensure the health and safety of themselves and their co -workers, and that their acts or omissions do not affect the health and safety of other PRG staff. Staff should have an intimate understanding of their own workplace and therefore in a position to identify, report and minimize risks.

They shall at all times, be prepared to communicate with their Health and Safety Representative as the first point of contact in the PRG laboratory and office environment.

As a guide to accident prevention and hazard identification, assessment and control the staff should:

- a. Report all injuries on duty to their HODs and the Health and Safety Representative before the end of the working day..
- b. Complete the relevant documentation and seek medical assistance if required.

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- c. Assist with accident investigations.
- d. Report all identified health and safety hazards to their H&S representative.
- e. Follow all instructions such as safe work policies, procedures and practices and comply with information provided by material safety data sheets (MSDS).
- f. Seek information from the Health and Safety Department when in doubt about any aspect of task safety.
- g. Take care to protect the health and safety of oneself and their colleagues whilst at work.
- h. Make use of safety equipment and protective clothing provided or as directed.
- i. Evacuate buildings during emergencies under the direction of the Senior Lab Technician, Health and Safety personnel and Fire personnel.
- 4. Health and Safety Representatives:
- a. Shall at the time of appointment be clearly informed with regards to their responsibilities with particular reference to:
 - Health and safety committee membership
 - Incident Investigation
 - Dissemination of minutes to staff
 - Monthly inspections(as per approved checklist)
- b. Shall forward the inspection report checklist to the Occupational health and Maintenance department after completion should there be aspects that might require intervention from the Maintenance department.
- c. Shall keep copies of records/inspection checklist within the department.
- d. Shall attend the general Health and Safety committee meetings in Chemical Engineering School.
- e. Health and Safety reps are elected for a 2-year period.
- 5. Safety Committee members
- a. Shall schedule a safety meeting approximately every 1-3 months or ensue that safety issues are discussed during general staff meetings.
- b. Shall ensure that the minutes from the safety meetings are distributed to all staff.

Procedure

Refer to the manual's table of contents for reference to the individual procedure instructions.

References

1. Act 85 of 1993 – Occupational health and Safety Act.

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Occupational Health Department

Purpose

The Occupational Health Department at PRG is run by a qualified Occupational Health and Safety Doctor Rakesh Goordeen and Sister Jane Taylor who is available to staff when work-related incidents require medical attention COID (Compensation for Injury on Duty) work. All follow up incidents will be documented and managed by the Safety Manager-Mr. Thulani Mdadane, <u>Mdadane@ukzn.ac.za</u>)

Scope

This procedure explains the functionality of the Occupational Health Department at the Pollution Research Group.

Responsibility

All staff must be aware of the functions performed by the department.

The Occupational Health department is responsible for ensuring that all activities documented are performed.

Procedure

The department is only to be used for occupational Health injuries and the administration of vaccines.

The department operates during normal working hours (08h00 to 16h00).

For work related incidents at PRG-Howard College that require medical attention, staff are referred to Entabeni Hospital. The KZN Occupational Health Department will handle all other administrative work. All Occupational injuries and exposures must be reported to the OH Department (Sister Jane Taylor-0312603385).

Requirements of occupational health and safety department

- a. An analysis of incidents/accident according to the department.
- b. An analysis of incidents/accidents according to the type of incident.
- c. An estimate of the approximate cost of the incidents/accidents.
- d. An annual summary reflecting the number of incidents/accidents along with the total costs for the year.

Discussion at Health and Safety meetings

The above statistics will be tabled for discussion at the Health and Safety Committee meetings.

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Health and Safety Representative-PRG Laboratory

APPOINTMENT OF HEALTH AND SAFETY REPRESENTATIVE IN TERMS OF SECTION 19 OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, NUMBER 85 OF 1993, AS AMMENDED

Name of Company: PRG Laboratories

In terms of the above mentioned act:

I/WE	(for employ	er) appoint
you	as a Safety,	Health and
Environment (SHE) representative for the period	То	in the
following area		

Your responsibilities are as follows:

FUNCTIONS OF THE HEALTH AND SAFETY REPRESENTATIVE AS PER SECTION 18 OF THE OHS ACT 85 OF 1993

- 1. Review the effectiveness of Health and Safety measures.
- 2. Identify and report potential hazards and major incidents in the workplace.
- 3. Assist the employer in establishing the cause of incidents at the workplace
- 4. Investigate employees complaints regarding Health and Safety
- 5. Inspect the workplace at agreed levels
- 6. Participate with and accompany inspectors/auditors
- 7. Attend Health and Safety committee meetings

Signature	Signature
(HOD)	(Witness)
Designation	Designation
Date	Date

ACCEPTANCE:

I.....accept this appointment. I am familiar with my duties in terms of the Act, Regulations. I am familiar with my duties in terms of this appointment and the associated duties and responsibilities of this appointment. I was elected/nominated in Terms of Section 17 of the Occupational Health and Safety Act.

Signed	Date
<u>0</u>	2 4 10

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PRG Laboratory: Health and Safety Training

- 1. Complete this form in order to establish training needs and/or completion of training sessions attended.
- 2. Ensure all staff are trained on the procedures tabulated.

Trainee	Trainer	Fire	Hand	Eye	H&S	First	Evacuation	H&S	Training	Trainee	Comments
Name	Name	equip	washing	wash	manual	Aid	drills	rep	date	signature	
		training	procedure	facilities		box		name			
		_									
	1	1	1					1			1

General Health and Safety Inspection Form

Date of Inspection		
Lab location		
Inspected by	Merlien Reddy-Lab Technician, PRG	Signature

Doguiromont		F	Respon	ise	Astions and nates
	Requirement	Yes	No	N/A	Actions and notes
Α.	General policy and administration				
1.	Responsible person for health and safety of lab.	x			
2.	Responsible for workplace H&S and welfare of staff while on duty.		x		
3.	Where is the occupational health department?				
4.	Who is your occupational H&S nurse/doctor?		x		
5.	Laboratory rules of practice displayed or available and a record of personnel having read them?	Yes	No	N/A	
6.	Signs: hand-wash basin only, exit, emergency contact persons/numbers, PPE, safety shower/eyewash displayed.	Yes	Not all	N/A	
7.	Risk assessments available that have been reviewed within 12 months, with a completed sign-sheet. These should cover all hazardous activities (incl. chemical, biological hazards)?	Yes	No	N/A	
8.	Induction and training records for staff and students?	Yes	No	N/A	
9.	Training and supervision assessed and provided to match an individual's level of skills and experience?	Yes	No	N/A	
10.	Records of previous inspections with actions completed?	Yes	No	N/A	

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Boquiroment			Respor	ise	
	Requirement	Yes	No	N/A	Actions and notes
11.	Records of all installations,	Yes	No	N/A	
	servicing/calibrations of equipment			,	
В. С	General workplace safety				
12.	Building in good condition:				
	a. Walls, roof, painting, floor, doorways.	Yes	No	N/A	
	b. Ventilation: are there windows, air- conditioning unit, fume-hood.	Yes	No	N/A	
	c. Electricity: wiring, electrical plugs marked, overloading	Yes	No	N/A	
	d. Lighting: adequate light source available, emergency lighting	Yes	No	N/A	
	e. Toilets with hand wash basin	Yes	No	N/A	
13.	Emergency equipment unobstructed and in good condition:				
	f. Eyewash station/bottles (clean/flushed/in- date?), showers (clean/flushed), with signage?	Yes	No	N/A	
	g. Fire extinguishers (also serviced within last 12 months), with signage?	Yes	No	N/A	
	h. First Aid kit, with signage?	Yes	No	N/A	
	i. Chemical Spill kit, with signage?	Yes	No	N/A	
5.	Alarm activation points, smoke detectors (also alarm point signage)?	Yes	No	N/A	
14.	Housekeeping:				
	a. Excess combustible materials removed?	Yes	No	N/A	
	 Benches/shelves/surfaces: clean, tidy, organised, good condition? 	Yes	No	N/A	
	c. Floors: clean, tidy, good condition.	Yes	No	N/A	

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Deminerat		1	Respor	ise	
	Requirement	Yes	No	N/A	Actions and notes
d	. Traffic routes and exits unobstructed?	Yes	No	N/A	
e	. Stored materials: stable - no fall/spill hazards?	Yes	No	N/A	
f.	Stored materials: shelves/cupboards?	Yes	No	N/A	
h	. Fridge for samples and reagents	Yes	No	N/A	
15. E	quipment:				
а	All heating equipment is in working order and not left unattended while in use?	Yes	No	N/A	
b	 Pressure vessels are labelled with safe working pressure. 	Yes	No	N/A	
С	Centrifuges are clean inside and have working interlocking lids?	Yes	No	N/A	
d	 System in place to control apparatus or experiments running out of hours? 	Yes	No	N/A	
e	 Procedure in place for decontamination of equipment prior to testing, maintenance, repair, recycling or disposal? 	Yes	No	N/A	
16. \	Waste Disposal:				
	a. Liquid				
	b. Solid		NO		
	c. Hazardous				
	d. Sharps/broken glass				
	e. General				
17. H a w	land washing sink with soap and paper towels vailable near laboratory exit? Signage-hand vashing only.	Yes	No	N/A	

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Boguiroment		Respor	ise	A sticks and notes
Requirement	Yes	No	N/A	Actions and notes
18. Outdoor clothing and non-essential per- items removed and stored away from the laboratory area?	sonal ne _{Yes}	No	N/A	
19. <u>Evidence</u> of eating, drinking, or food sto laboratory	orage in Yes	No	N/A	
20. Hazardous and non-hazardous wastes segregated, stored and labelled appropriand removed (no build-up); procedures place for decontamination?	riately in ^{Yes}	No	N/A	
21. Personal Protective Equipment provisio use:	n and			
a. Laboratory coat stored at hazard are entrance/exit?	ea Yes	No	N/A	
b. Laboratory coats used and laundere frequently?	ed Yes	No	N/A	
 c. Gloves in use are of appropriate ma and resistance (by risk assessment) person and type of work? 	iterial for Yes	No	N/A	
 d. e. Specialist gloves (cold or heat resist readily available and good condition 	ant) Yes	No	N/A	
f. Respiratory protection provided (by assessment) and face fit testing reco	vrisk orded?	No	N/A	
g. Suitable eye protection available an where required to control risk?	id worn Yes	No	N/A	
 h. Non-disposable PPE has been inspendent before use; maintenance and testin been recorded? 	cted g has Yes	No	N/A	
22. Risk assessments cover handling, use, st and disposal of chemicals that are task r	torage related. Yes	No	N/A	

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Lighting, Electrical switches and air conditioners

Purpose

Lighting and electrical switches will comply with the minimum standards of the Environmental Regulations and Workplace made in terms of the Occupational Health and Safety Act no.85 of 1993,

Scope

This procedure explains what actions to take with lights not working and labeling of switches and isolators. Maintenance of air conditioners is also explained.

Responsibility

All staff must report problems to their Health and Safety Representative.

Procedure

Reporting of lights out

A formal monthly light inspection (see QC file) is undertaken by the Health and Safety Representative in each area and their findings are noted in the relevant section of their checklist.

Inspection Standards

- a) Missing or broken light fittings and switches must be reported and replaced as soon as possible.
- b) Contact CMS & FACILITIES MANAGEMENT.
- c) Contact Details: <u>cmsfm@ukzn.ac.za</u> or 031 260 4000
- d) Dirty windows need to be reported and arrangements should be made for cleaning.
- e) Do not stack items in front of the windows to obstruct natural lightning.
- f) Artificial light should not cause a glare.
- g) Dirty light and light fittings should be cleaned regularly.

Labelling of switches and isolators

Label all multi plugs, switches on trunking and switches on DB board for easy isolation in case of fire or electrical shorting.

Air conditioners

Air conditioners in the MP_AES room should be serviced regularly and copies of records kept on the LAN.

Central units should be serviced by CMS. Ronnie on 031 260 3343.

References

Environmental Regulations and workplace made in terms of the Occupational Health and Safety Act no. 85 of 1993.

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Fire- General and Emergency Procedures

Purpose

Fire safety refers to actions taken to prevent or reduce the possibility of a fire that may result in injury, death and damage to a building structure. Fire safety measure include the features built into the facility during construction or structures implemented (i.e. fire protection programs) on which all must be trained. Correctly sited equipment and adequate staff training is very important.

Scope

This procedure explains:

- Contracts with service providers
- Fire extinguisher usage and maintenance instructions(safety department)
- Training
- Floor plans and emergency exits
- Fire Drills, Fire alarm systems
- Procedure in the event of a fire

Emergency Exit Procedure

Assembly Point: Chemical Engineering Car Park

- Evacuate the building by the nearest emergency exit when FIRE ALARM sounds
- DO NOT USE ELEVATORS!
- Switch off all the equipment
- Close water / gas lines
- Close acid bottles
- WALK briskly, remain CALM and QUIET
- Proceed to the assembly area
- Remain at the assembly area until released by a person of authority

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Fire Evacuation Record

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Load Shedding – Emergency Procedures

In case of an ACCESS CONTROL FAILURE or a POWER FAILURE open the EMERGENCY EXIT DOORS in the following ways:

- 1. Push the release bar on the door- push the bar down and out,
- 2. Press the electronic emergency exit button(in the green box) next to the door
- 3. Call Richard Blindell on 0827209087 or Dudley Naidoo on 0614460415
- 4. Email Richard Blindell(Blindell@ukzn.ac.za) or Aaron Dlamini(Dlaminia3@ukzn.ac.za)
- 5. Call the following speed dial numbers a) *85549 or b) *85550

Stuck in the lift during Loadshedding-power failure

- 1. Press the emergency button on the panel in the lift(top left button)
- 2. Call the emergency number displayed in the lift(OTIS 0800112339)
- 3. Call RMS on 031 260 3777.



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Injury at the Workplace

Purpose

All injuries on duty must be reported to Sister Jane Taylor on 031 260 3285.

Scope

This procedure explains what to do during injures sustained at the workplace and the documentation to complete.

Procedure

Notification of injury

- HOD- Prof CA Buckley
- Clinic nurse- Sister Jane Taylor
- The Occupational Health Department-Dr Cheevers

Documents to complete

The following must be completed and submitted to the Occupational Health Department:

- Employer's report of an accident
- Incident report
- Copy of ID

Make copies of all submitted reports and save.

In case of hospitalization/surgery/absence from work, notify the Occupational Health Department of the date you return to work.

Reference

Forms to complete

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Minimum contents of a First-Aid Box

Purpose

First aid is the provision of initial care for an illness or injury. It is usually performed by non-expert persons or a trained first aider before medical treatment can be accessed.

Scope

The procedure explains:

- Minimal requirements for a first aid box.
- Legal requirements
- Maintenance of the first aid box

Procedure

Refer to Regulation ? of the general Health and Safety Regulation.

ltem 1	Wound cleaner / antiseptic (100ml)				
ltem 2	Swabs for cleaning wounds				
ltem 3	Cotton wool for padding (100g)				
ltem 4	Sterile gauze (minimum quantity 10)				
ltem 5	1 pair of forceps (for splinters)				
ltem 6	1 pair of scissors (minimum size 100mm)				
ltem 7	1 set of safety pins				
ltem 8	4 triangular bandages				
ltem 9	4 roller bandages (75mm x 5m)				
ltem 10	4 roller bandages (100mm x 5m)				
ltem 11	1 roll of elastic adhesive (25mm x 3m)				
ltem 12	1 Non-allergenic adhesive strip (25mm x 3m)				
ltem 13	1 Packet of adhesive dressing strips (minimum				
ltem 14	4 First aid dressing (75mm x 100mm)				
ltem 15	4 First aid dressings (150mm x 200mm)				
ltem 16	2 Straight splints				
Item 17	2 Pairs large and 2 pairs medium disposable latex				
ltem 18	2 CPR mouth pieces or similar devices				

Maintenance

The first aid box must be checked on a weekly basis. Replenish stock in the kit as required.

Reference

Minimum contents of a first aid kit

First aid usage log

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First Aid Usage Log

TIME(24:00)	Name	Age	Complaint/injury	Treatment	Treated by

				lations with t	
N	IPLOYER'S REPORT OF AN ACCIDENT MPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT, 1993 IOD 6(A) (b) – ADDRUID 13	CI	(For offici aim No.: ovincial Office	ial use only)	
ist	ructions:				
ion	npiete the form in block letters and mark appropriate areas (X)	Da	ate		
he	CLARATION BY EMPLOYER OR AUTHORISED PERSON reby declare that the particulars, shown in items 1 to 62 of this report, of an alleged injury on o ef true and accurate.	duty, are to	o the best of my	v knowledge and	
Sigr	ned on this day of year year	re			
M	PLOYER				
1.	Registered name with the Compensation Commissioner				
2.	Registered number of this business with the Compensation Commissioner				
3.	Contact person				
4.	Street address	Postal o	ode		
6.	Postal address	Tel. no.	()		
9.1	Fax no. ()				
9.2	E-mail address			********	
11.	Nature of business, trade or industry				
EMI	PLOYEE (CERTIFIED COPY OF IDENTITY DOCUMENT TO BE ATTACHED)				
12.	Is the injured person a working director working member of a CC owner of p	artner in t	he business?	Not applicable	
13.	Surname 14. First names				
15.	ID no	Sex	Male	Female	
18.	Marital state Married Single 19. Citizen of				
20.	Personnel no				
22.	Street address	Postal co	ode		
24.	Postal address	Postal co	ode		
26.	Tel. No. ()				
27.	Period in your employ (years/months)	nt (days)	0-13 days	14 & more	
ACO	CIDENT		h		
29.	Date of accident	Time			
31.	Place of accident	District			
32.2	2 Province				
	Date employee reported accident/	Time			
33.					
33. 35.	What task was the employee performing at the time of the accident?				
33. 35. 36.	What task was the employee performing at the time of the accident?				
33. 35. 36. 37.	What task was the employee performing at the time of the accident?		YES	NO	
33. 35. 36. 37. 38.	What task was the employee performing at the time of the accident?	verse side	YES	NO 3 and use same	
33. 35. 36. 37. 38.	What task was the employee performing at the time of the accident?	verse side	YES of Part A Page	NO 3 and use same	
33. 35. 36. 37. 38.	What task was the employee performing at the time of the accident?	verse side	YES of Part A Page	NO 3 and use same	
 33. 35. 36. 37. 38. 39. 	What task was the employee performing at the time of the accident?	verse side g to the accir	of Part A Page	NO 3 and use same NO	
 33. 35. 36. 37. 38. 39. 40. 	What task was the employee performing at the time of the accident?	verse side g to the accie	YES of Part A Page Sent). YES	NO 3 and use same NO	
 33. 35. 36. 37. 38. 39. 40. 	What task was the employee performing at the time of the accident?	verse side g to the accie	of Part A Page	NO 3 and use same NO NO	
 33. 35. 36. 37. 38. 39. 40. 41 	What task was the employee performing at the time of the accident?	g to the accid	of Part A Page tent). YES	NO 3 and use same NO NO NO	

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Incident/Injury Report

OCCUPATIONAL HEALTH AND SAFETY ACT, 1993

(ACT NO 85 OF 1993)

REGULATION 9 OF THE GENERAL ADMINISTRATIVE REGULATIONS

RECORDING AND INVESTIGATION OF INCIDENTS

Annexure 1

A. RECORDING OF INCIDENT

1. Name of Employer University of	1. Name of Employer University of KwaZulu Natal						
Incident / Accident/ Occupational Disease Investigation Report							
Polovant soctions must be							
Relevant sections must be	e completed in full by Salety						
Howard / Edgewood / Med schoo	l / Westville / Pietermaritzb	urg/ Africa Centre (circle					
ampus)							
OB/IR number	Staff / Student /Contractor/	visitor					
Incident Type							
¤ Incident-no Injury ¤ Minor inju	ry- no treatment 🛛 🛛 🛪 First Ai	d 🛛 🛛 🛪 Referral Health Care 🖄 Lost Time					
× Critical Injury × Occupational D	visease 🛛 Work Related 🖄	Sport Related X Other MVA / assault					
2. Name of Affected Person	Male / Female	Age					
Last Name	First name						
Employee Group: 🛛 Academic 🛛 🖄	Support × Full time	¤ Half Day a Contract post					
x Staff x Student x Contractor x Other(details)							
3. Identity Number		Work Phone					
Staff / student number		Home /cell					
4. Date of Incident	Job title	Department					
5. Time of Incident	Reported To:						
Supervisor name		Phone					
Safety Rep name	Phone						

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Brief description of the Injury, Damage or Loss, as well as how the Incident/Accident occurred (Include task performed by employee at the time of the Incident/Accident)												
Did incident occu	Did incident occur during work hours?YESNO											
Are you satisfied that the Incident/Accident took place in the manner alleged? NO YES								NO				
Name of any persons who witnessed the Incident/Accident												
6. Part of body		Head o	r ne	ck	Eye			-	Trunk		Finger	Hand
Affected		Arm			Foot				Leg		Internal	Multiple
7. Effect on person		Sprains or Co strains wc		Contus wound	Contusion/ wounds			Fractures		Burns	Amputation	
		Electric	: sho	ck	ck Asphyx		kiation		Unconsciousness		Poisonin g	Occ. Disease
8. Expected period of disablement		pected period 0-13 2-4 sablement days we s		1 eek	>4-16 « weeks		>16-52 weeks	:	>52 weeks or perm disablement		KILLED	Unknown period
INCIDENT CAUSE	ANA	LYSIS										
GE	NERA	L AGENT,	/S				OCCUPA	٩T	IONAL HEAL	TH/EN	/IRONMEN	TAL AGENT/S
Struck By	Fall	Ha		На	Indling	Tı	ransport		Chemical	Fume s	Fire	Gas
Struck against	Falli	ng objec	t	Ma	achine	Electricity			Dust	Noise	Vapour	Temperature
CLINIC REPORT (if see	n in the c	linic)								
Date Treated:												
Extent of injury:												
Patient referred	to:				Hos	spi	tal		Psycho	Ow	n Doctor	Other
Treatment Giver	n:						I			1		
Disabling injury?											Yes	No
Treated by Dr.							Clinic Sta	aff	f Member:	1		1
Comments by Professional Nurse:												

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Signature of Professional Nurse:		Date:
9. Description of Occupational Disease		
10. Machine/process involved/type of work performe	ed/exposure**	
11. Was the incident reported to the Compensation C	Commissioner ar	nd Provincial Director?
12. Was the incident reported to the police?*	Yes No	
13. SAPS office and reference		
*to be completed in case of a fatal incident. ** in case of a hazardous chemical substance, indicat	e substance exp	oosed to
B. INVESTIGATION OF THE ABOVE INCIDENT BY A PE	RSON DESIGNA	TED THERETO
1. Name of investigator		
2. Date of investigation		
3. Designation of Investigator		
4. Short description of incident		
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5. Suspected cause of incident	
6. Recommended steps to prevent a recu	rrence
Signature of Investigator	Date
C. ACTION TAKEN BY EMPLOYER TO PREV	VENT THE RECURRENCE OF A SIMILAR
Signature of employer	Date
D. REMARKS BY HEALTH AND SAFETY CO	OMMITTEE
Remarks	
Signature of Chairperson of Health a	nd Safety Committee Date
To be sent to the Safety Manager Ma	aglen Govender ext 2817 or Julius Frolich ext 4628/5724
To be kept for a period of 3 years	
This is a legal document, required by	the Department of Labour
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Hazardous Biological Agents

Definition of Biological Agents

Hazardous biological agents are microorganisms, which may cause infection or is a hazard to human health.

They are divided into 4 groups:

- Group 1 HBA are HBA's that are unlikely to cause human disease
- Group 2 HBA are HBA's that may cause human disease and be a hazard to exposed persons, which is unlikely to spread to the community and for which effective treatment is available e.g. hepatitis B virus
- Group 3 HBA are HBA's that may cause severe human disease, which presents a serious hazard to the exposed persons and which may present a serious risk of spreading to the community, but for which effective treatment is available
- Group 4 HBA are HBA's that causes severe human disease and is a serious hazard to the exposed persons and which may present a high risk of spreading to the community, but for which no treatment is available e.g. Ebola virus.

Sources of Infection

- Blood and other body fluids e.g. saliva
- Human waste such as faeces, urine and vomit
- Respiratory discharges such as coughs and sneezes
- Skin- direct contact

Duties of Employers

- It is the responsibility of the employer to ensure that the organization has the necessary management framework system to ensure compliance with the health and safety legislation including the regulations for hazardous biological agents.
 - Training on both practical and theoretical knowledge is required-
 - The content and scope of these regulations
 - The potential risks to health caused by the exposure
 - The measures to be taken by the employer to protect an employee against any risk of being exposed
 - The importance of good housekeeping at the workplace and personal hygiene requirements
 - The precautions to be taken to protect the staff- use of personal protective equipment and respiratory protective equipment
 - The necessity of medical surveillance
 - The safe working procedure regarding the use, handling, storage, labelling and disposal of HBA at the workplace
 - The procedures to be followed in the event of exposure, spillage, leakage or injury and decontaminating of infected areas

Duties of Employees

Page 25 of 66 Original Document PRG laboratory Any person who is or might be exposed to HBA, shall obey any lawful instruction given by the employer regarding,

- The prevention of an uncontrolled release of a HBA
- The adherence to instructions regarding environmental and health practices, personal hygiene and good housekeeping
- The wearing of personal protective equipment and clothing
- The wearing of personal samplers to measure personal exposure to airborne HBA
- The disposal of materials containing HBA and the disinfection of any contaminated site
- The reporting during normal working hours for medical examinations
- Information and training

Any person shall report to the employer, any possible accidental exposure to a HBA at the workplace and the employer shall ensure that such incident is investigated and record.

Risk Assessment

A risk assessment is a means of determining the risk associated with work with a particular hazard in the workplace.

- Hazard Identification
- Deciding who is at risk from the hazard and how harm could arise
- Assessing how likely harm will arise and whether existing precautions are adequate
- Record the findings, control measures to reduce risk of exposure
- Reviewing and revising the assessment as necessary mainly if the nature of the work changes. Also to ensure that the controls are working and still appropriate.

Transmission

To be infected, the microorganism has to get from the source into the host by some means. Infection at work can occur via:

- Touching mouth, nose or eyes with contaminated hands
- Breathing in infectious aerosols from the air
- Splashes of blood or other body fluids into the eye and other mucous membranes
- Broken skin if it comes in direct contact with the microorganism
- A skin penetrating injury.

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Laboratory Safety-General Rules & Management of Biological hazards

Purpose

Hazards are present in laboratories, which vary and may include poisons, infectious agents, flammables and explosives, radioactive materials, moving machinery or extreme temperatures.

Safety precautions are important in laboratories where dangerous conditions exist. Rules exist to minimize the individual's risk; safety equipment is available and used to protect the individuals from injury.

Scope

This procedure explains the safety rules to be followed in the PRG laboratory where hazards are present.

Responsibility

All staff and students entering and working in the laboratory.

Procedure

General

- Safe methods for handling and managing infectious agents in the laboratory must be instituted to reduce exposure of laboratory employees.
- Restrict access to the laboratory.
- Hygiene practices must be adhered to i.e. hand washing, no food/drink in the laboratory, no mouth pipetting, clean work surfaces, protective equipment to prevent direct exposure.

Gloves

- Latex or nitrile gloves must be worn by all staff/researchers handling fecal samples and who are exposed to hazardous material in the performance of their duties (workshop staff, contractors, IT staff).
- Staff must take appropriate precautions in the handling of all hazardous material.

Allergy to Latex gloves

- Allergy latex must be demonstrated and documented by the Occupational health department.
- Latex-free gloves will only be issued to individuals after an examination by the school nurse.

Universal rules

• Staff must remove gloves and wash hands when finished working with fecal samples as well as before leaving the laboratory.

Shoes

• Wear closed- nonporous, nonslip shoes in the laboratory.

Laboratory Coats

• Laboratory coats must not be taken home for washing. Place in the designated collection area for washing.

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- Each staff member and researcher should have two coats to allow one to be washed.
- The laundering is outsourced.
- Remove laboratory coats before leaving the laboratory and should not be worn in the office/tearoom.
- Fully button up laboratory coats.

Use of Cell phones in the Laboratory

- No cell phones are allowed on top or underneath workbenches for charging purposes.
- No cell phones while working in the laboratory.
- No cell phones while wearing gloves.

Eyewash facilities

- According to the Material Safety Data Sheets (MSDS) of chemicals used in the biochemistry laboratory, flush eyes with water for 10-15 minutes if eyes get splashed with chemicals or samples.
- The nearest eyewash facility or sink should be should be used.
- Safety glasses are part of the compulsory PPE therefore should be worn at all times.

Respiratory Protection

- Laminar flow cabinets and fume cupboards with HEPA filters should be used when handling infectious samples.
- Fume cupboards with carbon filters should be used for handling chemicals that emit hazardous vapors.
- The fume cupboards and other extraction points must be maintained and checked by an approved supplier (Vivid air) twice a year.
- Service reports must be filed.
- Dust masks (PPF2) and half mask respirators must be worn when working with fecal samples.

Smoking

• Smoking is prohibited in the biochemistry laboratory.

Eating and storage of food

• Eating, drinking or storage of food in the laboratory or in the laboratory cold-room/freezer is prohibited.

Cleaning of hands

Handing of fecal samples and spills

- Wear appropriate personal protective equipment.
- Examples: impermeable gloves (non-soak through gloves), safety glasses and a lab coat.
- Clean all spill contact areas with anti-bacterial soap or appropriate detergent.
- Disinfect thoroughly with a fresh dilute bleach solution. (1:10 with water).
- Soak up liquids with absorbent pads or paper towels.

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• Place all spill clean-up in autoclave bags and autoclave before discarding.

What should we do if we are exposed to INFECTIOUS WASTE

- Did infectious agents come in contact with any broken skin?
- Were the mucous membranes involved (mouth, nose, eyes)?
- Wash with anti-bacterial soap.
- If eyes were involved, flush with water for 15 minutes.
- Report to the clinic.

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Good Laboratory Practice

Pollution Research Group – Laboratory Rules

- 1. No eating, drinking, or smoking is permitted in laboratory.
- 2. Always wear lab coats, gloves, safety shoes and goggles.
- 3. Laboratory coats must be fully buttoned up at all times.
- 4. Coats are not taken home for washing and not worn outside of the laboratory.
- 5. Cell phones are not to be used whilst working in the laboratory.
- 6. No friends allowed in lab. (Need to be vaccinated).
- 7. Pipetting by mouth is strictly forbidden.
- 8. Always swab work areas with 70% alcohol before and after working.
- 9. Clear bench tops of all glassware and samples before leaving the laboratory.
- 10. All glassware used must be washed, with all labels removed.
- 11. Hands must be washed using antibacterial soap before leaving the laboratory.
- 12. Keep work areas neat and tidy.
- 13. General bins with the black bags are for non-hazardous waste.
- 14. Bins with autoclave bags are for hazardous waste.
- 15. All broken glassware goes into the allocated bin.
- 16. All chemical and biological spills must be cleaned up immediately.
- 17. Label all hazardous chemical waste bottles with the following: Name of Substance/Chemical, Contents, The Date, Name.
- 18. Place all hazardous waste bottles in the bunded area.
- 19. Discard all biological waste (feces, sludge, wastewater) down the sluice.
- 20. Standard Operating Procedures must be followed for each activity carried out.
- 21. Hazard Identification Risk Assessments must be drawn up for each activity carried out in the laboratory.

I understand all of the above and agree to abide by these basic rules for my own safety. I acknowledge that by not following basic safety procedures, I may be putting myself and /or colleagues at risk.

Researcher Name and Signature

Date_

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Vaccination Programme

Name	Twinrix	Booster	Booster	Tetanus	Typhoid	

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Vaccination Program Consent Form

This form must be filled out and handed over to the PRG technician during Laboratory Induction

First Name	Middle Name	Surname				
Student/Staff Number:	Date of Birth (dd/mm/yyyy):	Gender:				
Department	Identity / Passport No:	Contact numbers				
Faculty		Campus				
Undergraduate Qualification:	Institute:	Country:				
Previous inoculations: Yes/No	if Yes, list vaccines (attach copy	or vaccine record)				
Current Qualification						
Current position						
Research Group:						
Research Topic:						
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Original Document PRG laboratory Period of Study/Work:

Supervisor Details

Email:

contact No:

Signature

List All Exposures according to categories

Potential Hazardous Exposure: See **Categories of Potential hazards below
Chemicals
Physical
Biological
Ergonomic
Psychological

Sample Source (Region/ area)

What is the Sample?

Who collects the samples?

Page 33 of 66 Original Document PRG laboratory How are the samples collected? (Spades, honey sucker, pumps)

From where (VIP, UD, Sewer etc)

Do you have PPE? If so what?

Analyses:

What chemical analysis are to be carried out?

What chemicals will be used during your analysis?

Do you have the Material Safety Data Sheets (MSDS) available and printed for all chemicals in use?

(pse attach all MSDS)

Do you have Standard Operating Procedure (SOP) for all tests/ analyses/activities?

Do you have Hazard Identification Risk Assessment (HIRA) for all tests/analyses /activities?

(pse attach all HIRA reports)

Do you have a SWP / SOP for waste management? (pse attach)

**Categories of Potential Hazards *Please identify your hazards accordingly.*

Category	Definition	Examples
Chemicals	Chemicals that are toxic or irritating to	Toxic dust, fibers, fumes, vapors, mists,
	the body	poisons, asphyxiate, irritating, explosive and
	(HCS legislation)	flammable gases and chemicals

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Physical	Physical agents that can cause tissue trauma or other damage	Noise, ionizing and Non-ionizing radiation (e.g. sunburn), chafing, cutting, bruising etc.
Biological	Infectious biological agents such as bacteria, viruses, fungal infections or parasites	Tuberculosis, Athlete's foot, cholera, HIV, Hepatitis B virus, Hepatitis A, Hepatitis C, Rotavirus, TB, Diphtheria, Cholera, Typhoid, etc.
	(HBA legislation)	
Ergonomic	The study of human characteristic, behavioral and biological, for the appropriate design of the working environment	Skeletal and muscular stress, fatigue and stressors, load handling, visual rules of line of sight, posture, man / machine interfaces, tactile feedback, climate etc.
Psychological	Factors or situations encountered in the workplace that create stress, emotional strain or interpersonal problems	The effects of boredom, shift-work, stressful environments, etc.

This type of risk assessment often requires specialist skills as complexities of the problem may be beyond the scope of the practitioner employed at the place of work.

Occupational Health Sister Jane Knight Taylor Tel 031 260 3285 Email:Taylorjk@ukzn.ac.za

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Vaccination Checklist

Hepatitis A

What is the Hepatitis A?

Hepatitis is a disease that causes an inflammation or swelling of the liver. Hepatitis A is one of the viruses that cause this condition.

What are the symptoms?

Symptoms appear within 28 days of exposure and can include a flu-like illness, aches and pains, abdominal pain, dark urine, loss of appetite and yellowing of the skin and eyes (jaundice). Some people do not have symptoms but can still infect others. Symptoms usually go within 4 weeks. While hepatitis A can make infected people very sick for a number of weeks, it will not result in long-term liver damage. Deaths caused by hepatitis A are very rare.

How is it spread?

People with hepatitis A can pass on the virus from 2 weeks before the symptoms appear, and up to one week after they develop jaundice (yellowing of the eyes and skin).

Hepatitis A is transmitted from person to person when infected faeces (poo/shit) comes into contact with another person's mouth. This usually happens when eating or drinking contaminated food or water, by sharing a cigarette or smoking equipment, or during sex.

Who is at risk?

All unvaccinated people are at risk of contracting hepatitis A. People at most risk are:

- travellers to developing countries child care workers
- children who attend day care
- people living with poor hygiene and sanitation

People who have had hepatitis A in the past are immune and cannot get hepatitis A again.

How is it prevented?

You can reduce the risk of spreading hepatitis A by maintaining good personal hygiene, especially by washing hands carefully after going to the toilet, before eating, drinking or smoking.

Hepatitis A is preventable. The following groups of people should be vaccinated:

anyone who works with sewerage

How is it diagnosed?

A blood test can show if you have the virus or if you are immune to it.

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How is it treated?

There is no cure for hepatitis A which is why vaccination is very important. A person infected with hepatitis A needs to rest, avoid alcohol and drink plenty of fluids. Symptoms usually last between one to three weeks.

If you have recently been in close contact with someone who has hepatitis A, an injection called immunoglobulin can be given to reduce the chance of you becoming infected. Immunoglobulin should be given within 14 days of exposure and be followed by vaccination soon after. People who have had hepatitis A develop immunity to the virus and can't be infected again.

Hepatitis B

Hepatitis B is a serious infection that is spread through blood or bodily fluids. Immunisation is recommended for all children, and for adults at risk of disease. Safe sex and use of sterile instruments and equipment are important in prevention.

What is Hepatitis B?

- Hepatitis B is an infection of the liver caused by a virus called hepatitis B. 'Hepatitis' means 'inflammation or swelling of the liver'.
- Once infected, people will either clear the infection and have no further problems; or
- Become chronically infected. People with chronic infection are sometimes known as 'carriers'.
- Some people with chronic infection can have health problems related to the infection, while others will not. Whether a person clears the infection or becomes chronically infected depends mainly on their age: 90% of newborn babies, 20-50% of children aged 1-5 years, and 1-10% of older children and adults, become chronically infected. People with chronic infection are usually infectious for life, and may develop ongoing hepatitis. After many years this can result in complications such as cirrhosis or liver cancer.

What are the symptoms?

- Many people will have no symptoms when they are newly infected.
- When symptoms are present they usually include jaundice (yellowing of the skin and eyes), dark urine, pale stools, fatigue, abdominal pain, loss of appetite, nausea, vomiting and joint pain.

How is it spread?

Hepatitis B is passed on to others when blood or bodily fluids (for example, saliva, semen and vaginal secretions) that contain the hepatitis B virus enter a person's body through:

- Broken skin
- Mucous membranes

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The bloodstream by sharing contaminated injecting equipment, or using needles after an infected person, needlestick injury, or contaminated instruments.

Who is at risk?

People at risk of infection include:

- Sex partners of infected people
- Injecting drug users
- Babies born to infected women
- Health care workers
- Children of people born in countries with high rates of hepatitis B infection
- Household contact with people infected with hepatitis B

How is it prevented?

Immunisation

Hepatitis B vaccine is very effective in preventing infection. It is recommended for:

- Vaccines are given in the birth hospital and by your local doctor or clinic as part of the routine childhood vaccinations.
- All 12 year old children who were not immunised as babies. Vaccines are offered at high at school.
- Those who have household or sexual contact with chronically infected people
- People who receive blood products for clotting disorders
- People with chronic liver disease or hepatitis C infection
- Residents and staff of facilities for persons with intellectual disabilities
- Embalmers
- Emergency workers.

How is it diagnosed?

A blood test can show if a person has been infected with hepatitis B in the past, and whether a person is chronically infected. Other tests, such as liver function test, can show if any damage has been done to the liver.

How is it treated?

Page 38 of 66 Original Document PRG laboratory Some people may benefit from special anti-viral treatment. Talk to your doctor about possible treatments. People with chronic hepatitis B infection should take care of their livers and have hepatitis A vaccination if not already immune. Drinking alcohol can make you liver disease worse.

Tetanus

Tetanus is a severe disease that can result in serious illness and death. Tetanus vaccination protects against the disease.

What is tetanus?

Tetanus (sometimes called lock-jaw) is a disease caused by the bacteria *Clostridium tetani*. Toxin made by the bacteria attacks a person's nervous system. Although the disease is fairly uncommon now, it can be fatal.

What are the symptoms?

Early symptoms of tetanus include:

- Painful muscle spasms that begin in the jaw (lock jaw)
- Stiff neck, shoulder and back muscles
- Difficulty swallowing
- Violent generalized muscle spasms
- Convulsions
- Breathing difficulties

A person may have a fever and sometimes develop abnormal heart rhythms. Complications include pneumonia, broken bones (from the muscle spasms), respiratory failure and cardiac arrest.

How is it spread?

- The disease usually occurs after an incubation period of 3 to 21 days (range one day to several months).
- *Clostridium tetani* bacteria are found in dust and animal faeces. Infection may occur after minor injury (sometimes unnoticed punctures to the skin that are contaminated with soil, dust or manure) or after major injuries such as open fractures, dirty or deep penetrating wounds, and burns. Tetanus is not passed on from one person to another.

Who is at risk?

- In poor countries, with lower immunisation rates, newborn children, and young adults are also at risk.
- Injecting drug users may have a greater risk of being infected with the bacteria from contaminated injection sites.

Page 39 of 66 Original Document PRG laboratory How is it prevented?

- Immunisation protects against tetanus. Tetanus vaccine is given at 2, 4 and 6 months of age, with boosting doses at 4 years, between 15 to 17 years, and at 50 years of age.
- Individuals who received a primary course of 3 doses as adults, should receive booster doses 10 and 20 years after the primary course.
- Adults who have sustained tetanus prone wounds (e.g. open fractures, deep penetrating wounds, contaminated wounds or burns) should disinfect the wound and seek medical attention and receive a boosting dose of tetanus vaccine if more than 5 years have elapsed since their last dose. If there is doubt about prior vaccination history, tetanus toxoid should be given.

How is it diagnosed?

A doctor can diagnose tetanus from the symptoms, and an examination.

How is it treated?

Treatment may include antitoxin, antibiotics, surgical treatment of the infected area and prolonged treatment in the intensive care unit of a hospital.

Typhoid

Typhoid fever is caused by an infection with bacteria called *Salmonella* Typhi. Most typhoid infections are acquired overseas by individuals eating contaminated food or water while visiting friends and relatives in developing countries. Typhoid vaccination is strongly recommended for travellers to developing countries.

What is typhoid and paratyphoid fever?

Typhoid fever is a disease caused by the bacteria *Salmonella* Typhi. Paratyphoid fever is a disease caused by the bacteria Salmonella Paratyphi. These diseases cause a similar illness. Paratyphoid infections tend to be less severe and less common than typhoid.

Most typhoid and paratyphoid infections are acquired overseas by individuals eating contaminated food or water in developing countries while visiting friends and relatives or travelling. These infections are different to infection with *Salmonella* which usually causes gastroenteritis.

What are the symptoms?

People with typhoid or paratyphoid fever may experience mild or severe symptoms. The symptoms may include fever, headache, general discomfort and a lack of appetite. Some people have rose spots on the trunk of the body. Constipation or diarrhoea may occur. For typhoid fever, symptoms generally start 8 to 14 days following infection but possibly as early as 3 days or as late as over 60

Page 40 of 66 Original Document PRG laboratory days after infection. For paratyphoid fever, gastroenteritis may start 1 to 10 days following infection. Some people do not have any symptoms.

How is it spread?

The bacteria that cause typhoid and paratyphoid fever are found in the faeces of infected individuals. Some people (known as carriers) continue to carry the bacteria even after symptoms have resolved. Transmission usually occurs when faecally-contaminated food and water are ingested. Therefore, typhoid fever is more common in less developed countries with poor sanitation, poor hand hygiene and food handling standards, and untreated drinking water. Raw fruits and vegetables and shellfish are the types of foods most often associated with illness. Flies may transfer the bacteria to food.

Who is at risk?

Typhoid fever is widespread in most parts of the world except for the developed regions. Immigrants who return to developing countries (in particular India, Pakistan and Bangladesh) to visit friends and relatives are at greatest risk of acquiring the disease.

People who have travelled or live with an infected person will be screened for typhoid fever by their local public health unit.

Household contacts, or people who have travelled with a person infected with typhoid, will be screened for typhoid by their local public health unit. Contacts should be aware of the symptoms of typhoid and should see their general practitioner if they develop symptoms.

How is it prevented?

People travelling to countries where typhoid and paratyphoid fever are common should:

- receive the typhoid vaccine two weeks prior to travel (for those ≥ 2 years). Typhoid vaccination is required every three years to protect from infection.
- wash hands thoroughly with soap and water after going to the toilet and before eating
- avoid uncooked foods, including fruit and vegetables unless you are able to be peal them yourself
- drink bottled or boiled water
- not drink untreated water, including ice and drinks mixed with water
- avoid eating from street stalls
- ensure hot food is thoroughly cooked and eaten whilst hot.

People infected with typhoid or paratyphoid fever, or who share a house with someone infected with typhoid, MUST NOT work if their work involves food handling or caring for children, patients or the elderly, and should not prepare food for others until stool samples have shown that they are not infectious. A number of stool tests will be required to assess when you are no longer infected. Your local public health unit will advise you when are able to return to work.

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How is it diagnosed?

To diagnose typhoid and paratyphoid fever, your general practitioner or local hospital will send a blood or stool sample to a laboratory for testing.

How is it treated?

Typhoid or paratyphoid fever is treated with antibiotics. Some people may never have symptoms but may be carriers of typhoid or paratyphoid. Antibiotic treatment is required to treat carriers also.

Waste Disposal

Purpose

The generation of waste when working with chemicals is normal. It is extremely important for everyone to minimize the amount of waste produced as lower waste production leads to a lower environmental impact. A few ways of achieving this is to:

- take care that you correctly make up reagents the first time.
- carry out your experiment correctly the first time so that the volume is reduced
- substitute toxic chemicals with less toxic chemicals

Scope

This procedure explains how to handle the disposal of biohazard waste

The way in which the waste is disposed of utmost importance. Depending on the composition of the waste, it needs to be professionally incinerated or placed in a designated landfill. Chemicals are not to be disposed of via the sewer or general solid waste system.

Remember that what you wash away in the sink today, can land in your drinking and irrigation water tomorrow. Waste must therefore be collected and stored in a closed lid glass bottle. The following steps must be taken when collecting and storing chemical waste prior to disposal:

• Make very sure that the bottle to be used has been thoroughly washed and dried. The bottle must be clean!

• When adding waste into a bottle that already contains waste, ensure that both waste are compatible. The mixing of incompatible chemicals is extremely dangerous!

- Waste bottles must be properly separated out to avoid unwanted reactions in the event spills.
- The bottle must be properly labeled with t the following information regarding the waste:

a) the type of waste (composition of components must be stipulated in the case of multiple chemicals being present),

b) name of person generating the waste

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c) date on which collection into the container started

d) hazards of the chemical

In an attempt to save costs, empty reagent bottles (2.5L Winchester bottles), 25L aluminium and plastic drums are used for collection and storage of waste products. While this is appreciated, following points need to be noted:

• Do not place acids or alkaline material in a metal container. Metal and glass containers should be used mainly for organic waste.

• Any container to be utilised for chemical waste storage must be thoroughly cleaned and must be free of any reagents. The solvent rinse from the container is classed as waste.

- The original label must be removed before pasting the new label on.
- The container must be kept on a spill tray in a well ventilated room.

Damaged glass is not to be thrown into the general rubbish bin. Chemical residue must first be removed and the glass disposed of into the special "broken glassware" container. When this container has reached it capacity it will be sealed and disposed of in the fitting manner.

Used "sharps" (blades, scalpels, needles, etc.) must be put into a special rigid-walled container marked for these items. When these containers are three quarter full, they will be sealed and sent for incineration by the appropriate authority. Please consult the Laboratory Technician when your waste bottle is full. He will inform you of the waste collection points in the School. Under no circumstances may sharps be thrown into the general waste bins.

Gloves contaminated with hazardous chemical substances must be placed into a separate container and marked as such. This too is not to be disposed of into the general purpose waste.

- Hazardous chemicals should be disposed of appropriately.
- The following chemicals are routinely used in the Biochemistry laboratory. You should be aware of the procedures and any precautions, particularly with regard to your health. Safety measures stated should be strictly adhered to.
- All risk and safety criterion were obtained from the Sigma-Aldrich catalogue 2002-2003.

• Inorganic compounds (liquids and solids)

- Many dry solid inorganic compounds are innocuous and can be placed in a garbage can in a suitably labeled container. Since it is impractical for each student to prepare a separate waste container, we provide labeled jars for unwanted compounds. Innocuous solids include: sodium bicarbonate, calcium chloride, sodium chloride, potassium chloride, sodium sulfate, and magnesium sulfate.
- Aqueous solutions of the inorganic compounds listed above are innocuous and may be sent into a sink. Aqueous solutions of sodium hydroxide, potassium hydroxide, hydrochloric acid,

Page 43 of 66 Original Document PRG laboratory nitric acid, and sulfuric acid may also be sent into a sink, provided that you *test the solution* with pH paper first and establish that the solution's pH is between 5-11. If the solution's pH falls outside this range, you must partially neutralize the solution before disposal (do not simply dilute the solution with water unless a completely trivial amount of solution is involved).

- Inorganic compounds that have adsorbed organics should not be sent down the sink and should not be placed in the garbage can. In many cases, they can be left in a fume hood until the organics have evaporated (undesirable, but evaporation in the fume hood is better than evaporation in the lab or garbage) and then placed in the garbage.
- Neutralization
- If liquids meet all standards for the sanitary sewer except for pH, campus employees may neutralize the solution before pouring down the drain. Use proper equipment. Goggles, gloves, apron, and hood are required. Add neutralizing agent slowly, stirring constantly. If you are not familiar with neutralization techniques, do not attempt to neutralize solutions. Call the Hazardous Waste Manager for assistance. Report neutralization activities to the University Safety Manager for regulatory reporting.
- Acidic solutions (pH <5)

Adjust the pH to 5-9 using a dilute solution (e.g. KOH, NaOH, NaHCO3). Use a pH meter, indicator solution, or pH paper to determine the pH.

Flush down the drain of a chemical sink with 20 volumes of cool water.

Basic solutions (pH > 9)

Adjust pH to 5-9 using a dilute solution (e.g. HCl, H2SO4, HNO3). Use a pH meter, indicator solution, or pH paper to determine pH.

Flush down the drain of a chemical sink with 20 volumes of cool water.

- Note: For highly concentrated acids, neutralization with a relatively dilute basic solution will take a very large volume of base and a long time. In this case, consider neutralization using a concentrated basic solution with plenty of ice for an ice bath, performed slowly, and carefully and with constant stirring. Monitor the temperature of the solution with a suitable thermometer to ensure that the solution doesn't get too hot. The same is true for neutralizing some concentrated bases.
- Acids
- If you wish to dilute an acid with water before neutralizing it with a base (e.g., sodium hydroxide, potassium hydroxide or sodium bicarbonate), always add acid to water; *never* add water to acid.

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- Perform all neutralizations within a fume hood while wearing nitrile rubber gloves, a lab coat, and eye protection.
- Hydrochloric Acid
- 1. Slowly add hydrochloric acid to a container of cold water to form a 1:10 dilution of acid to water.
- 2. Slowly add a 1M potassium hydroxide, sodium hydroxide, or sodium carbonate solution until the pH is in the range of 6.0 to 8.0.
- 3. Flush down the drain with an excess of cold water.
- Sulfuric Acid
- 1. Slowly add sulfuric acid to a container of ice-cold water to form a 1:10 dilution of acid to water.
- 2. Slowly add sodium carbonate until the pH is in the range of 6.0 to 8.0.
- 3. Flush down the drain with an excess of cold water.
- Acetic Acid
- 1. Slowly add acetic acid to a container of cold water to form a 1:10 dilution of acid to water.
- 2. Slowly add a 1M solution of sodium hydroxide or sodium carbonate until the pH is in the range of 6.0 to 8.0.
- 3. Flush down the drain with an excess of cold water.
- Phosphoric Acid
- 1. Slowly add phosphoric acid to a container of cold water to form a 1:10 dilution of acid to water.
- 2. While stirring, slowly add sodium carbonate until the pH is in the range of 6.0 to 8.0.
- 3. Flush down the drain with an excess of cold water.
- Bases
- Potassium Hydroxide
- 1. While stirring, slowly add potassium hydroxide into a container of ice water to form a 1:10 dilution of base to water.
- 2. Slowly add 1M hydrochloric acid about 1 ml at a time until the pH is between 6.0 and 8.0.
- 3. Flush down the drain with an excess of cold water.
- Sodium Hydroxide

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- 1. While stirring, slowly add sodium hydroxide into a container of ice water to form a 1:10 dilution of base to water.
- 2. Slowly add 1M hydrochloric acid about 1 ml at a time until the pH is between 6.0 and 8.0.
- 3. Flush down the drain with an excess of cold water.
- Calcium Hydroxide
- 1. While stirring, slowly add calcium hydroxide into a container of ice water to form a 1:10 dilution of base to water.
- 2. Slowly add 1M hydrochloric acid about 1 ml at a time until the pH is between 6.0 and 8.0.
- 3. Flush down the drain with an excess of cold water.

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Waste Disposal Register

Date	Chemical Test	Vol/Mass	Type of	Project	Name of PRG Tech
			Container		

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Gas purchase/empty register

Date	Gas installation	Afrox/Air	Gas cylinder	Afrox/Air	Name of PRG Tech
		Flex	removal	Flex	

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Chemicals

Purpose

Technicians and researchers handling chemicals need to take extreme care. It is very important to have a good understanding of the chemicals you work with and the hazards associated with the chemicals (harmful effects, toxicity and explosive natures). Chemicals must always be handled with caution following all the safety handling rules.

Scope

This procedure explains the usage of:

- Material Safety Data Sheet(MSDS)
- The chemical register
- Storage chemicals for acids, bases and toxins.

Responsibility

All technicians and researches working in the laboratory and handling chemicals are responsible for proper handling f chemicals

Procedure

The laboratory should have a current file of MSDS for chemicals used in the laboratory and they must be easily accessible.

Storage of chemicals

The safe storage of chemicals is essential in order to,

- Provide effective management of chemicals,
- Lessen the risk of fire,
- Prevent accidental mixing in emergencies and
- To minimize exposure to corrosive and toxic chemicals.

The first principle of safe storage-Separate and isolate the most serious hazards. Segregate and store chemicals according to their compatibility and hazard category.

The second principle of safe storage- Store minimum quantities. The less you have – the smaller your risk.

Important Notes on Storage

- All chemicals should be hazard assessed, dated and labeled accordingly before storage.
- Chemicals that have more than one hazard should be should segregated by its primary hazard.
- Chemical compatibility must take preference when storing chemicals.
- Always keep copies of Material Safety data Sheets for each chemical in each store.

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- All chemicals should be regularly inspected for any signs of deterioration in the quality their labels and their containers.
- Ventilation is needed for chemicals and containers that may release dangerous or damaging quantities of vapours or gasses that are flammable, corrosive, irritating or toxic.
- Do not store chemicals in direct sunlight and near heat sources as ovens, autoclaves and hot pipes.
- Ensure chemical containers are closed at all times and intact, if not replace.
- Do not store any chemicals in glass containers on the floor.
- Do not place cabinets that are used for chemical storage near an exit or an escape route.
- Do not store chemicals above eye level. If storage container were to break, its contents may spill into face and upper body.
- Do not store liquids and solids together as contamination may occur in case of spillages.
- Store chemicals in their original containers.
- Chemicals stored at the bench tops should be used frequently and kept to a minimum amount.
- Do not store chemicals in the fumehood- poor lab practice.

Table incompatibility matri	x					
	Simplified diagram of the incompatibilities				es	
	between hazardous chemicals.					
Chemicals to be stored		\triangle		\land	\mathbf{A}	
flammables	+	-	-	o	+	
corrosives	-	ο	-	o	o	
toxins	-	-	+	+	o	
noxious	0	-	+	+	+	
irritants	+	ο	ο	+	+	
+ Compatible products						
O Do not store, handle or w	ther excep	ner except if particular conditic				
 - Non compatible products	<u> </u>	· ·				
non compatible products.						

Procedure for small chemical spills

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- Contain spill as best as possible using absorbent paper. If liquid has spilled from a container, return the container to the upright position to prevent further spread of the liquid.
- Notify all staff in the laboratory of the chemical spill.
- Close all drains to prevent the spill from reaching the environment.
- Switch off all electrical equipment near the spill.
- Cordon off the area and control access of unnecessary students.
- Assist any person that has been exposed to chemical contamination.
- First aid kit and spill kit available from Lab tech.
- Trained first aid workers are available in the department.
- The Safety Officer Dudley will report spill to EnviroServe if the spill is too big to handle ourselves.
- Clean up spill as follows:
- Put on all protective clothing, goggles and acid resistant gloves.
- Cover all wet spills with Spillow packs or paper towels
- Clean up all dry spill using the scoop.
- Try not to mix chemicals when scooping up. See list of incompatible chemicals on lab wall
- Place all dry chemicals in a sturdy plastic bag, tie with vinyl bag ties,
- and label if contents are known and place in bunded area for collection by Enviro Serve
- Pick up all broken glass using tongs and put it into the broken glass bin.
- Take note of all information on the labels from broken containers, both safety information and toxicity.
- After the Spillow packs have absorbed 10-20x their own weight, they are saturated and need to be replaced by another Spillow pack.
- Put saturated Spillow packs into plastic bags I bunded area for disposal by Enviroserve. Disposal of hazardous material are controlled by Rekha Maharaj ext 1056

Treatment of contaminated staff

In the case of serious injuries

- The treatment of serious injuries takes precedence over any other consideration.
- Call 10177 and request medical assistance.
- Advise the called assistance of the nature of the hazard, the amount of material, the chemical form of the material and any other pertinent information such as location.

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- Direct someone to meet the emergency medical personnel.
- Ensure that the victim is comfortable and cannot be further contaminated by other chemicals.

In case of minor wounds not requiring hospitalization

- Get Trained First Aid worker to treat the affected person immediately.
- Wash the contaminated wound with copious amounts of warm water.
- Clean the affected area with swabs.
- Encourage minor bleeding.
- In the case of contaminated facial wounds, ensure that contamination does not spread to the mouth, ears, eyes or nasal passages.
- After decontamination, apply first aid dressing.

If the skin is intact

- It is very important that skin contamination be removed immediately.
- Early, effective removal of the contamination can help to reduce chemical exposure.
- During skin decontamination, it is important to proceed from mild treatments to harsher ones only if necessary. Abrasion or any other breaks of the skin must be avoided, as these will allow rapid penetration of the chemicals.
- Therefore, hard scrubbing is discouraged.
- Flush contaminated area with copious amounts of water.
- Exercise caution so as to not spread contamination to other areas of the body.
- Rinse thoroughly.
- Repeat wash/rinse procedure several times using a soft brush, if necessary.

Eyes, Ears, Nose, and Mouth

- Use eyewash station or shower to flush eyes, ears, and nose.
- Rinse mouth with water, but do not to swallow the water.
- Hair
- Tilt head back so water doesn't run across face.
- Be sure to close eyes and mouth during decontamination.
- Wash gently with soap and warm water for 2-3 minutes in sink and rinse well.

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Treatment of Clothing Contamination

- In the event that personal clothing or lab coat becomes contaminated it is
- important that it be removed quickly to reduce the person's exposure to the chemicals.
- All contaminated clothing must be sealed in plastic bags to be removed by EnviroServe
- A full emergency shower can be used for major chemical spills.

Chemical Spill Kit

- 1. Drum with lid and side lever locking ring.
- 2. Spillow phenolic foam absorbent pack or loose PP absorbent. Can be used for all spills except nitric acid (HNO3).
- 3. Pair of neoprene/latex gloves.
- 4. Chemical resistant goggles.
- 5. Two thick plastic bags (100 micron thick from WasteTech).
- 6. Two self locking vinyl bag ties.
- 7. Scoop to pick up Spillow or loose PP absorbent.
- 8. Acid resistant lab coat/plastic apron.
- 9. Latex shoe covers.
- 10. Face shield with ratchet headgear.
- 11. Tongs.
- 12. Powdered zinc/iodine/sulphur for absorbing mercury spills.
- 13. Activated carbon/vermiculite for blanketing effect on both toxic and flammable spills-suppresses vapours and reduces risk of combustion and explosion.
- 14. Clean beach sand for acid spills.

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Chemical Register

CHEMICALS	FORMULA	Quantity	MASS	
2-Mercaptoethanesulfonic	C2H5O3S7Na	1	10g	
acid				
4-Aminobenzoic acid	NH2.C6H4-COOH	1	250g	
4-Aminoantipyrine				
Ammonium bicarbonate	CH2O3.H3N	4	500g/250/250/200	
Ammonium chloride	NH4Cl	3	500g/500/500	
Ammonium acetate	CH3COONH4	3	500/500/500	
Ammonium ferrous sulphate	(NH4)2Fe(SO4)2.6H2O	10	500g	
hexahydrate				
Ammonium hydrogen	NH4HPO4	1	250g	
phosphate				
di-Ammonium Hydrogen	(NH4)2HPO4	1	250	
orthophosphate				
Ammonium molybdate	(NH4)6MO7.4H2O	1	500g	
Ammonium nitrate	NH4NO3	1	500g	
Ammonium sulphate	(NH4)2SO4	3	500g	
Ammonium(metal) vandate	H4NO3V	1	50g	
Antimony Potassium(+)	[COOK.CHOH.CHOH.100()]2	1	500g	
Tartrate				
Ascorbic acid	С6Н8О6	3	500g/500/25	
Ammonium oxalate	(COONH4)2H2O	1	500	
Amberlite XAD7HP		2		
Aluminium Sulphate	Al2(SO4)3.18H2O	500		

FLAMMABLES	Quantit	Н	F	R	Hazard Classification
	у				
Acetone	2.5L	2	3	0	Flammable/Warning
Acetic acid	2.5L	3	2	0	
Amyl alcohol	2x	2	3	0	Flammable/irritant
	500ml				
Ethyl acetate	2x1.5L	2	3	0	Flammable
Ethyl alcohol/Ethanol 99%	10L	2	3	0	
Formaldehyde	2.5L	3	2	0	
Hexane 95%	1L	2	3	0	Flammable/warning/Environmental
					Hazard
Isobutyric acid	2x	3	2	0	Flammable/Harmful
	500ml				
Methanol	1.5L	2	3	0	Flammable/Toxic
Propionic acid	1L	3	2	0	

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Toluene	2.5L	2	3	0	Flammable/Harmful(R1120)
Ethanol 99.9%	500mL				Flammable

Procedure for Use and Disposal of Hazardous Chemicals

- Hazardous chemicals should be disposed of appropriately.
- The following chemicals are routinely used in the Biochemistry laboratory. You should be aware of the procedures and any precautions, particularly with regard to your health. Safety measures stated should be strictly adhered to.
- Inorganic compounds (liquids and solids)
- Many dry solid inorganic compounds are harmless and can be placed in the general bin in a suitably labelled container. Innocuous solids include: sodium bicarbonate, calcium chloride, sodium chloride, potassium chloride, sodium sulfate, and magnesium sulfate.
- Aqueous solutions of the inorganic compounds listed above are innocuous and may be flushed down the sluice. Aqueous solutions of sodium hydroxide, potassium hydroxide, hydrochloric acid, nitric acid, and sulfuric acid may also be sent into a sink, provided that you *test the solution with pH paper first* and establish that the solution's pH is between 5-11. If the solution's pH falls outside this range, you must partially neutralize the solution before disposal (do not simply dilute the solution with water unless a completely trivial amount of solution is involved).
- Inorganic compounds that have adsorbed organics should not be sent down the sluice and should not be placed in the bin. In many cases, they can be left in a fume hood until the organics have evaporated (undesirable, but evaporation in the fume hood is better than evaporation in the lab or bin) and then placed in the bin.
- Neutralization
- If liquids meet all standards for the sanitary sewer except for pH, then neutralize the solution before pouring down the drain. Use proper equipment. Goggles, gloves, apron, and hood are required. Add neutralizing agent slowly, stirring constantly. If you are not familiar with neutralization techniques, do not attempt to neutralize solutions. Call the Hazardous Waste Manager for assistance. Report neutralization activities to the Lab Technician for regulatory reporting.
- Acidic solutions (pH <5)
 <p>Adjust the pH to 5-9 using a dilute solution (e.g. KOH, NaOH, NaHCO3). Use a pH meter, indicator solution, or pH paper to determine the pH.

 Flush down the sluice with 20 volumes of cool water.

Basic solutions (pH > 9)

Adjust pH to 5-9 using a dilute solution (e.g. HCl, H2SO4, HNO3). Use a pH meter, indicator

Page 55 of 66 Original Document PRG laboratory solution, or pH paper to determine pH. Flush down the sluice with 20 volumes of cool water.

- Note: For highly concentrated acids, neutralization with a relatively dilute basic solution will take a very large volume of base and a long time. In this case, consider neutralization using a concentrated basic solution with plenty of ice for an ice bath, performed slowly, and carefully and with constant stirring. Monitor the temperature of the solution with a suitable thermometer to ensure that the solution doesn't get too hot. The same is true for neutralizing some concentrated bases.
- 2. Acid and Base Neutralization

2.1 Acids

If you wish to dilute an acid with water before neutralizing it with a base (e.g., sodium hydroxide, potassium hydroxide or sodium bicarbonate), always

ADD ACID TO WATER; NEVER ADD WATER TO ACID.

Perform all neutralizations within a fume hood while wearing nitrile rubber gloves, a lab coat, and eye protection.

2.1.1 Hydrochloric Acid

1. Slowly add hydrochloric acid to a container of cold water to form a 1:10 dilution of acid to water.

2. Slowly add a 1M potassium hydroxide, sodium hydroxide, or sodium carbonate solution until the pH is in the range of 6.0 to 8.0.

3. Flush down the drain with an excess of cold water.

2.1.2 Sulfuric Acid

1. Slowly add sulfuric acid to a container of ice-cold water to form a 1:10 dilution of acid to water.

2. Slowly add sodium carbonate until the pH is in the range of 6.0 to 8.0.

3. Flush down the drain with an excess of cold water.

2.1.3 Acetic Acid

1. Slowly add acetic acid to a container of cold water to form a 1:10 dilution of acid to water.

2. Slowly add a 1M solution of sodium hydroxide or sodium carbonate until the pH is in the range of 6.0 to 8.0.

3. Flush down the drain with an excess of cold water.

2.1.4 Phosphoric Acid

1. Slowly add phosphoric acid to a container of cold water to form a 1:10 dilution of acid to water.

2. While stirring, slowly add sodium carbonate until the pH is in the range of 6.0 to 8.0.

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3. Flush down the drain with an excess of cold water.

2.2 Bases

2.2.1 Potassium Hydroxide

1. While stirring, slowly add potassium hydroxide into a container of ice water to form a 1:10 dilution of base to water.

2. Slowly add 1M hydrochloric acid about 1 ml at a time until the pH is between 6.0 and 8.0.

3. Flush down the drain with an excess of cold water.

2.2.2 Sodium Hydroxide

1. While stirring, slowly add sodium hydroxide into a container of ice water to form a 1:10 dilution of base to water.

2. Slowly add 1M hydrochloric acid about 1 ml at a time until the pH is between 6.0 and 8.0.

3. Flush down the drain with an excess of cold water.

2.2.3 Calcium Hydroxide

1. While stirring, slowly add calcium hydroxide into a container of ice water to form a 1:10 dilution of base to water.

2. Slowly add 1M hydrochloric acid about 1 ml at a time until the pH is between 6.0 and 8.0.

3. Flush down the drain with an excess of cold water. .

Chemical Profile

Absolute Ethanol

Risk Profile R11

• Highly flammable

Safety Profile S7-16

- Keep container tightly closed
- Keep away from sources of ignition- No smoking

Isopropanol

Risk Profile R11-41-67

- Highly flammable
- Risk of serious damage to eyes
- Vapors may cause drowsiness and dizziness

Safety Profile S7-16-24-25/26

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- Keep container tightly closed
- Keep away from sources of ignition- No smoking
- Avoid contact with skin
- Avoid contact with eyes
- In case of contact with eyes, rinse immediately with plenty of cold water and seek medical advice

Precautions that you must take while working with Isopropanol

- Wear goggles when aliquoting on the bench top
- Ensure you use in a well ventilated area
- Large quantities should not be disposed of down the sink. Transfer used solvent to empty Winchester bottles and mark clearly that it is isopropanol waste.

Concentrated hydrochloric acid (HCl)

Risk Profile R34-37

- Causes burns
- Irritating to the respiratory system

Safety Profile S53-26-45

- Avoid exposure obtain special instruction before use
- In case of contact with eyes, rinse immediately with plenty of cold water and seek medical advice
- Wear suitable gloves

Precautions that you must take while working with HCl

- Wear goggles at all times when using HCl
- Do not dispose of down the sink. Transfer to the waste acids container.

Acetone

Risk Profile R11-36-66-67

- Highly flammable
- Irritating to eyes
- Repeated exposure may cause skin dryness or cracking
- Vapours may cause drowsiness and dizziness

Safety Profile S9-16-26

• Keep container in a well ventilated place

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- Keep away from sources of ignition no smoking
- In case of contact with eyes, rinse immediately with plenty of cold water and seek medical advice

Precautions that you must take while working with acetone

- Wear gloves
- Do not dispose of large volumes down the sink transfer to the non-chlorinated solvents waste disposal container.

Potassium permanganate

Risk Profile - R-8-22-50/53

- Contact with combustible material may cause fire
- Harmful if swallowed
- Very toxic to aquatic organisms
- May cause long-term adverse effects in the aquatic environment

Safety Profile – S53-60-61

- Avoid exposure obtain special instruction before use
- This material and/or its container must be disposed of as hazardous waste
- Avoid release to the environment. Refer to special instructions/safety data sheet

Precautions that you must take while working with Potassium Permanganate

- Wear gloves
- Wear a mask when aliquoting the powder

Formaldehyde 37% solution

Risk Profile R34-40-43-23/24/25

- Causes burns
- Possible risk of irreversible effects
- May cause sensitization by skin contact
- Toxic by inhalation
- Toxic in contact with the skin
- Toxic if swallowed

Safety profile S53-26-39-45-51, 36/37

• Avoid exposure – obtain special instruction before use

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- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- Wear eye/face protection
- In case of accident or if you feel unwell, seek medical advice immediately (show label where possible)
- Use only in well ventilated areas
- Wear suitable protective clothing
- Wear suitable gloves

Chemical and Biological Waste Disposal

Procedure For Chemical Waste Disposal

The generation of waste when working with chemicals is normal. It is extremely important for everyone to minimize the amount of waste produced as lower waste production leads to a lower environmental impact. A few ways of achieving this is to:

- take care that you correctly make up reagents the first time.
- carry out your experiment correctly the first time so that the volume is reduced
- substitute toxic chemicals with less toxic chemicals
- The way in which the waste is disposed off is of utmost importance. Depending on the composition of the waste, it needs to be professionally incinerated or placed in a designated landfill. Chemicals are not to be disposed of via the sewer or general solid waste system.

The following steps must be taken when collecting and storing chemical waste prior to disposal:

- Make very sure that the bottle to be used has been thoroughly washed and dried. The bottle must be clean!
- When adding waste into a bottle that already contains waste, ensure that both wastes are compatible. The mixing of incompatible chemicals is extremely dangerous!
- Waste bottles must be properly separated out to avoid unwanted reactions in the event spills.
- The bottle must be properly labeled with t the following information regarding the waste:

a) The type of waste (composition of components must be stipulated in the case of multiple chemicals being present),

- b) Name of person generating the waste
- c) Date on which collection into the container started
- d) Hazards of the chemical

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- In an attempt to save costs, empty reagent bottles (2.5L Winchester bottles), 25L aluminium and plastic drums are used for collection and storage of waste products. While this is appreciated, following points need to be noted:
- Do not place acids or alkaline material in a metal container. Metal and glass containers should be used mainly for organic waste.
- Any container to be utilised for chemical waste storage must be thoroughly cleaned and must be free of any reagents. The solvent rinse from the container is classed as waste.
- The original label must be removed before pasting the new label on.
- The container must be kept outside in the bunded area.
- ALL CHEMICAL OXYGEN DEMAND(COD) WASTE MUST BE POURED INTO THE MARKED 250L CONTAINER IN THE BUNDED AREA.
- ALL NITRATE AND PHOSPHOROUS WASTE CHEMICALS MUST BE POURED INTO LABELED 2.5L GLASS BOTTLES STORED IN THE BUNDED AREA.
- Damaged glass is not to be thrown into the general rubbish bin. Chemical residue must first be removed and the glass disposed of into the special "broken glassware" bin. When this bin has reached it capacity it will be sealed and disposed of in the fitting manner.
- Used "sharps" (blades, scalpels, needles, etc.) must be put into a special rigid-walled container marked for these items. When these containers are three quarter full, they will be sealed and sent for incineration by the appropriate authority. Please consult the Laboratory Technician when your waste bottle is full. He will inform you of the waste collection points in the School. Under no circumstances may sharps be thrown into the general waste bins.
- Gloves contaminated with hazardous chemical substances must be placed into a separate container and marked as such. This too is not to be disposed of into the general purpose waste
- If you don't know the correct procedure or the answer to something then ask!
- Make sure that the laboratory is a safe place for everybody!

Procedure For Hazardous Biological Waste Disposal

• DICARD ALL BIOLOGICAL WASTE (FEACES, WASTEWATER, VIP SAMPLES, SLUDGE) INTO THE SLUICE.

Biological Spills in the biochemistry lab

What should we do in an event of Infectious Waste Spills?

- Wear appropriate personal protective equipment.
- Examples: impermeable gloves (non-soak through gloves), safety glasses and a lab coat.
- Clean all spill contact areas with anti-bacterial soap or appropriate detergent.
- Disinfect thoroughly with a fresh dilute bleach solution. (1:10 with water).

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- Soak up liquids with absorbent pads or paper towels.
- Place all spill clean-up in autoclave bags and autoclave before discarding.

What should we do if we are exposed to INFECTIOUS WASTE?

- Did infectious agents come in contact with any broken skin?
- Were the mucous membranes involved (mouth, nose, eyes)?
- Wash with anti-bacterial soap.
- If eyes were involved, flush with water for 15 minutes.
- Report to the clinic.

Disposal of Faeces Samples

Faeces can potentially host a significant number of pathogens, and as such is classified as a biologically hazardous material. Thus, faeces cannot be disposed of as normal waste. By improperly disposing faeces into normal waste bins, personnel can potentially contract disease from any pathogens present in the samples. A sluice linked to the eThekwini sewage network has been set up in the Pollution Research Group labs to allow the safe disposal of faeces and urine.

Safety Precautions

General

The following general safety precautions should be taken:

- Cover any small open wounds with waterproof dressings if large open wounds then do not carry out laboratory work.
- Always use gloves, laboratory coat and closed shoes while working in the laboratory.
- Wear a face-shield when disposing of samples down the sluice (risk of splashback).
- Dispose of samples as specified by the Faeces Sample Disposal SOP.
- Clean all soiled equipment thoroughly after use.
- Any equipment that will be taken out of the laboratory into a 'clean' environment should be handled only with clean gloves and disinfected using 70% ethanol spray after use.
- Dispose of the used gloves in the appropriate waste bin after sample handling and disposal and cleaning of equipment is complete.
- Clean hands using antiseptic soap.
- Disinfect hands after washing with soap.

Page 62 of 66 Original Document PRG laboratory Where mixed samples are being handled (i.e. those from field location sources such as community ablution blocks), additional care must be taken as sharps may be present in the faecal matter. Samples should not be handled directly with gloved hands, but rather with a spoon or spatula.

Maintain 'clean' and 'dirty' work areas

The basement laboratory where excreta samples are processed should be considered in its entirety a 'dirty' area, however within this 'clean zones' should be designated for any items that will later be taken out of the laboratory:

- Sample boxes and equipment used to handle samples should only be placed on wipe-clean surfaces plastic or metal top workbenches or trays.
- Any 'clean' items that will be taken out of the laboratory e.g. camera and paper forms used to record results should be kept on a clean tray or segregated clean area of the workbench.
- 'Clean' items should only be handled whilst wearing clean gloves.

Materials & Equipment Required

- Paper sheets for cleaning spilled faeces, equipment and general cleaning
- Metal/plastic spoons for scraping faeces into sluice
- 70% ethanol for disinfection of equipment, splashes and spills

Procedure

All faeces must be disposed of using the sluice. The procedure for the disposal follows:

- Pour unwanted faeces samples into the sluice, and scrape and excess sample from the sample container if necessary
- Flush the sluice once all sample has been disposed of into the sluice
- Clean the sluice of any unflushed faeces
- Clean all containers and equipment used with water and dishwashing detergent, and disinfect with 70% ethanol

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Gases and Liquids under Pressure

- Permanent gases, oxygen, nitrogen, air, argon, helium, hydrogen, methane, etc. are supplied in high pressure cylinders. Numerous other gases are supplied as liquids under pressure.
- These include, ammonia, butane, carbon dioxide, chlorine, hydrogen chloride, propane, and sulphur dioxide. The pressure is dependant on the characteristics of the substance. In addition, the gases can be toxic and flammable.
- Cylinders of flammable gases generally have valve outlets with left hand threads, while non-flammable gases have right-hand threaded outlets.

Storage of Gas Cylinders

- Due to the large amount of energy associated with compressed gases, gas cylinders can be very dangerous.
- All cylinders must be stored in a vertical position at all times, except for cylinders designed to be horizontal, e.g. ammonia or chlorine. This is to keep any liquid present out of the valve, and to protect the sides of the cylinder from shocks.
- Cylinders must also be chained at any given time. If a cylinder of compressed gas falls over and the fitting snaps off, that cylinder will propel like a rocket and can go through concrete walls. The cylinders must always be stored and used in a cool well-ventilated area away from all ignition sources. Valve caps should always be kept in place to protect the valve from damage and accidental opening.
- Cylinders containing noxious or toxic gases must be stored in a well ventilated area, and ALL cylinders must be returned as soon as they become empty. These cylinders should be kept aside from full cylinders, be clearly marked and their valves closed.

Transportation of Gas Cylinders

• Always read the label on a cylinder before transporting or connecting up a fresh cylinder. If the label is illegible or altogether missing, return to the supplier. It is unsafe to use a cylinder of unidentified contents.

• Cylinders must always be in an upright position and never on their side, except for cylinders designed to be horizontal, e.g. ammonia or chlorine. This is to keep any liquid present out of the valve, and to protect the sides of the cylinder from shocks.

• Ensure that cylinders are always chained to a stable object, whether in use, being stored or

transported. A damaged valve on a cylinder means that the contents will exit with great force.

• Cylinders are not to be rolled or "walked". Always use a proper trolley and ensure that the valve is protected with a valve cover during transportation. Do not transport a cylinder with the regulator still in place.

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Using Gas Cylinders

Firstly, secure the cylinder to a permanent fixture such as a laboratory bench or a wall with a cylinder support bracket. Then select a regulator that is recommended by the supplier as this is compatible with the gas content of the cylinder. At no time must you attempt to use a cylinder without a regulator in place. Always ensure that the valve socket is clean, dry and free of damage before fitting the regulator. If defects are detected, return the cylinder to the supplier. Any dust or liquid may be cleared out by use of a jet of compressed air.

Do not quickly open and shut the valve of a cylinder because if you cannot close it the loud noise produced can damage your hearing. In addition you may discharge a toxic or highly flammable gas. If a valve cannot be opened by hand, or the hand wheel supplied, the cylinder should be returned. Never hammer a cylinder valve.

To withdraw gas from a high pressure cylinder follow the procedure outlined below:

- Close off the regulator valve
- Open the cylinder valve until pressure is shown, then an extra quarter turn
- Adjust the regulator to the required pressure (or flow rate)

To shut-down the gas system:

- Turn off the gas cylinder valve
- Bleed the regulator and gas lines
- Turn off the regulator

Do not close off the regulator without shutting down the gas cylinder valve as this leaves the regulator under pressure.

If a cylinder of hazardous gas develops a leak, evacuate and seal off the area. Ensure all sources of ignition have been removed if the gas is flammable. Contact the fire department.

Beware of all the precautions when using liquefied gases or cryogenic liquids.

Gas Regulators

The primary function of a gas regulator is to reduce high pressure gas in a cylinder or process to a lower usable level as it passes from the cylinder to a piece of equipment. It is not a flow control device and is only used to control delivery pressure.

As there are various hazards associated with the use of gases, take proper precautions to assure safety in high pressure gas control. When unsure of an operation, seek the advice of an expert. Never use a regulator for a gas that it is not intended for. Only use the type of regulator appropriate for the gas in the cylinder, as interchanging these could lead to mixing reactive gases under pressure. Regulators should not be modified except by authorized personnel.

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Gasses Used In the Biochemistry Lab

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