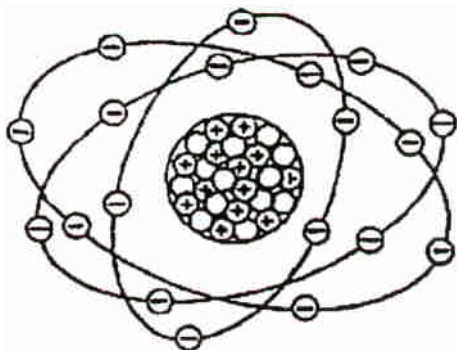


# IPNS Site-Specific Version of Radiation Worker I Training

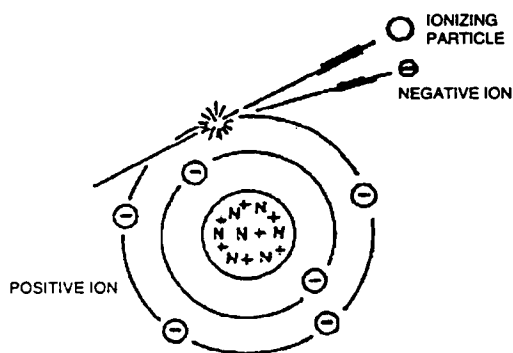
## WHAT IS RADIATION?

It is a form of energy released at the atomic level.



### Ionization

A process whereby electrons may be removed or added from a neutral atom or molecule.



Radiation  
(energy release)

Non-Ionizing  
(no electron removal)

Electromagnetic  
Microwaves  
Ultraviolet  
Infrared  
Radar  
TV  
Radio  
Electric Power

Ionizing  
(electron removal)

Electromagnetic	Particulate
Gamma	Alpha
X-ray	Beta
	Neutron

### Non-ionizing Radiation

Type of radiation that does not have enough energy to strip away electrons from the atom.

### Ionizing Radiation

Type of radiation capable of removing an orbital electron from an atom with which it interacts.

### Electromagnetic Radiation

Gamma rays  
X-rays

### Particulate Radiation

Alpha  
Beta  
Neutron

## PHOTON

Smallest quantity of electromagnetic radiation - just as an atom is the smallest quantity of an element.

Usually associated with X-rays and gamma rays.

## GAMMA RAYS X-RAYS

Photons  
No electrical charge  
Travel at the speed of light  
Very penetrating  
Lose energy through chance encounters

## ALPHA PARTICLE

Helium nucleus	4	
4 protons and neutrons		He
2 protons	2	

Massive particle  
Travels 0.05 x the speed of light.  
Range - 4 cm in air

## ALPHA PARTICLE - 2

Does not penetrate the outer layer of skin.  
 Energy lost by direct collision ionization.  
 Source - uranium, thorium, plutonium, polonium.  
 External hazard - minimal  
 Internal hazard - severe

## BETA PARTICLE

More penetrating than alpha.  
 Range in air - to 10 m.  
 Spectrum of energy.  
 Source - free electron emitted from the nucleus of an unstable atom.  
 Shielding hazard - X-rays.  
 May have negative or positive (positron) charge.

## NEUTRONS

Usually not naturally occurring.  
 No electrical charge.  
 Extensive tissue damage.  
 Encountered with reactors accelerators, and nuclear weapons.

## ROENTGEN (R)

Unit of radiation exposure in air.  
 Measures ionizations produced.  
 Expressed as ionizations per kilogram of air.  
 Applies to photons only.  
 Historical term.

## RAD

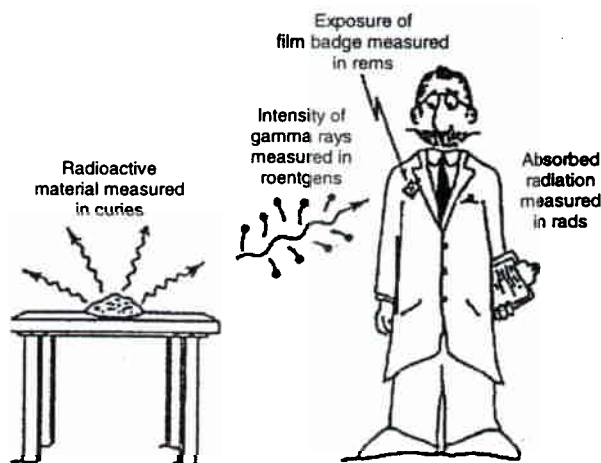
Radiation absorbed dose (in any medium).  
 Applies to all types of radiation.  
 Measures energy imparted not ionizations produced.

## REM

Unit of dose equivalent  
 The product of:  
 Absorbed dose (RADS) X  
 A quality factor.  
 External dosimetry - reported dose unit

## CONTAMINATION

Radioactive material where it is not wanted!



## BACKGROUND RADIATION

Cosmic rays  
 Internal radioactivity  
 Natural radioactivity

Radiation has always been a part of the natural environment - and a large part of the radiation dose we receive naturally is unavoidable.

### Cosmic Rays

Origin - space.

Altitude effect -

Higher altitude = higher dose

Van Allen Belt -

Band of charged particles trapped in, earth's magnetic field.

Internal Radioactivity

40

K (potassium)

14

C (carbon)

Natural radioactivity manifested in:

Soil

Rock (granite)

Bricks

Natural gas

Asphalt/concrete

Air

Water

Natural Radioactivity

Uranium

Thorium

Radium

Radon

The average annual dose to the general population from naturally occurring background radiation is approximately 360 mrem per year.

**INTERNAL RADIATION HAZARDS**

4 possible ways radioactive material can enter the body:

1. by inhalation
2. by ingestion
3. skin absorption
4. skin breaks

Internal Exposure

Fate of isotope depends on its chemical properties

Organ absorption:

Iodine - thyroid

Radium - bone

Sodium - dispersed etc.

What cells are sensitive to ionizing radiation?

Very sensitive

Actively dividing

Immature cells (skin, intestinal lining, hair follicles, blood, cancer)

Not sensitive

Not dividing

Mature (nerve, brain)

Law of Bergonie & Tribondeau

---

**CLASSIFYING BIOLOGICAL EFFECTS**

By the generation affected

Somatic effects

appear in the exposed people

Genetic effects

appear in their descendants

By the time of appearance

Acute effects

appear shortly after exposure

Sub acute effects

appear within the first year

Late effects

appear after the first year

By the probability of occurrence

Stochastic effects

occur by chance at all dose levels

Non stochastic effects

always occur above a threshold dose but never occur below it

Stochastic Effects

Probability of the effect occurs with increasing dose.

No Threshold.

Any dose, however low, has the probability of causing the effect.

May result from injury to a single cell, or number of cells, i.e., cancer, leukemia, genetic.

Non stochastic Effects

Severity of effect varies with dose.

Threshold may exist.

No effect observed if below threshold.

Result from collective injury of a substantial number of cells in the tissue.

Acute dose is defined as a high dose received over a short period of time. Chronic dose is defined as a low-level, prolonged, repeated exposure.

An example of chronic radiation dose is the very low-level dose that IPNS personnel, who work around the beam lines, receive throughout the

year. The word chronic, as used here, does not necessarily imply meaningful medically hazardous dose, only dose received in an ongoing basis.

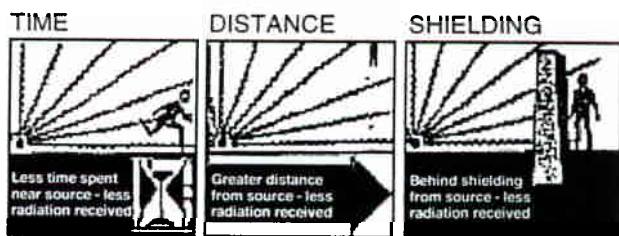
The biological risks from low level chronic radiation doses are usually lower than the health risks workers are subjected to from standard industrial hazards and normal daily life. For example, one chest x-ray results in a 10 mrem dose and an airplane flight from New York to California exposes passengers to 3 mrem.

### RADIATION SAFETY PRACTICES FOR THE PREGNANT WOMAN

Woman must declare herself pregnant and notify supervisor in writing.  
 Inform Health Physics.  
 Limit radiation work.  
 Practice ALARA.

### METHODS OF RADIATION PROTECTION

#### TIME DISTANCE SHIELDING



#### Shielding

Alpha - paper, 2" of air, outer layer of skin  
 Beta - plastic  
 X-ray - Pb, dense material  
 Gamma - Pb, dense material

### ALARA

As Low As Reasonably Achievable

#### Practice of ALARA Worker Responsibilities

Work according to procedures.  
 Watch your own exposure levels.  
 Interact with the Health Physics Department.  
 When working in radiation area.  
 When working with radioactive materials.  
 When shipping/disposing of radioactive materials.

### DOSE LEVELS AND LIMITS

#### DOE Exposure Limits for Students, Minors & General Public

Requirement of age 18  
 Limiting value of 100 mrem/y

#### DOE Exposure Limits for Occupational Workers

Whole body - 5 rem/y  
 Extremity - 50 rem/y  
 Pregnant worker - 500 mrem/term  
 ANL limit - 1 rem/y

The purpose of the ANL-E - IPNS radiation dose administrative control level is to have a level that is reasonable for the facility and that is well below the DOE limit. The administrative control level is tracked so that any potential over exposure is identified before it approaches the DOE limit.

The employee is responsible for knowing the DOE radiation dose limit of 5 rem per year and the ANL-E and IPNS administrative control level of 1 rem per year.

If you suspect that you are approaching or exceeding the administrative control level, contact IPNS management immediately. The dose that IPNS personnel receive should never approach the ANL-E and IPNS administrative control level of (1 rem/year). Users, as a rule,

always receive much less dose than IPNS personnel.

IPNS personnel typically receive dose in the range of 0 to 400 mrem/year. IPNS users typically receive dose in the range of 0 to 35 mrem/year.

To obtain your IPNS radiation dose records, see the IPNS ESWQA Coordinator, who is also the IPNS ALARA Coordinator.

#### ANL Radiation Protection Procedures

ESH & Health Physics  
Radiation signs & tags  
ANL sources of radiation  
Dosimetry  
Responsibilities  
Contamination prevention  
Protective clothing

#### ESH Sections

Industrial Hygiene  
Safety & Fire Protection  
Health Physics  
Radiological monitoring  
External dosimetry  
Internal dosimetry

#### ESH Sections - 2

Technical support  
Environmental protection  
Analytical support  
Emergency management  
Training & QA  
Environmental projects

---

### **EMPLOYEE INTERACTIONS WITH HEALTH PHYSICS**

Orientations  
Dosimetry assignment  
Radiological monitoring  
Consultations & questions  
Intermediary to other groups  
Hand & foot counter usage  
Shipment of equipment

#### Sources of Ionizing Radiation at Argonne

Accelerators  
Analytic X-ray machines  
Electron microscopes  
Glove box operations  
Hot cell facilities  
Experiment labs

#### ANL Radiation Protection Responsibilities

Provide:

A safe working environment  
Radiation protection  
(HP, monitoring, dosimetry, ALARA)  
Procedures & training  
Enforce the DOE regulations  
ALARA & 1 rem/y limit  
Health & safety manual

#### Employee Radiation Protection Responsibilities

Wear dosimetry or protective clothing as necessary.  
Comply with policy & regulations.  
Obtain Health Physics monitoring.  
Survey themselves on H & F.

#### Employee Responsibilities

Ensure appropriate paperwork done.  
Report safety problems/violations to ESH.  
Get required training.  
Buddy system - as appropriate  
Work safely

#### Radiation Area Identification

Signs  
Barriers  
Tags  
Warning Lights  
Audible Warning

Users must not disregard or alter radiological postings, signs or labels. To do so may cause loss of beam time or restriction of access to the experimental area.

The possible consequence for disregarding a radiological alarm is that there may be an actual radiation incident to which personnel may be exposed. Users must not disregard radiological

alarms. To do so may cause loss of beam time or restriction of access to the experimental area.

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## POSTING FOR EXTERNAL RADIATION

### Controlled Area

Access is controlled to protect persons  
from exposure to radiation and  
radioactive materials

---

## RADIATION AREA

Area (within a controlled area) where  
an individual can receive a dose equivalent--  
5 mrem/h - 100 mrem/h  
at 30 cm from the source

### High Radiation Area

Area (within a controlled area) where  
an individual can receive a dose equivalent--  
100 mrem/h - 5 rem/h  
at 30 cm from the source

### Very High Radiation Area

Area (within a controlled area) where  
an individual can receive a dose equivalent--  
5 rem/h or greater  
at 30 cm from the source

---

## FIXED LOOSE INDUCED

### Conservation Theorem

No matter what changes a system of some kind undergoes, a certain quantity keeps the same value it had originally.

Examples: angular momentum, charge, energy, linear momentum, mass, mass-energy, filth

### Conservation of Filth

In order that something may be cleaned, something else must get dirty.

Airborne contamination is loose radioactive particulates that are dispersed in air. Significant airborne contamination levels are very uncommon at IPNS, but could exist if radioactive powder samples are handled improperly.

The sources of loose radioactive contamination at IPNS include the oxidation and loose debris from beam line components and radioactive powder samples. The sources of fixed radiation contamination at IPNS include activated beam line components and shielding, and some experimental samples.

The concern about loose radioactive contamination is in the potential spread of it to uncontrolled areas and possibly even to off-site. Though it is usually very low-level, the spread of the contamination is an indication of poor radioactive material handling practices.

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## CONTAMINATION

### Radioactive Material in Places Where it is not Wanted

#### Decontamination:

Process of removing that material (usually very gently with mild soap & water)

Hand & shoe monitors detect contamination.

#### Contamination Prevention

Health Physics monitoring.

Hand & foot counters.

Suspect equipment control.

ANL 8 - HP monitoring

Proper procedures (hoods, bagging out)

Protective clothing

Remember everything you touch, everywhere you walk could be contaminated by your actions.

Actions in the Event of a Contamination Incident

Recognizing a contamination incident.  
 Notify Health Physics or Dial 911.  
 Remain in place vs. exiting area.  
 Containment methods.  
 HP monitoring (area, persons, nose blows).  
 Decontamination (types & processes).  
 Investigation & follow-up.

If you get a "HOT" indication on a hand & Emergency

Do one of the following:

- Step off & try again
- Have someone contact HP (do not walk to the HP office)
- Call HP from nearby phone.
- If an incident - evacuate
- Dial911

Assist HP in locating source.

---

**WASTE**

Simply stated - if you wouldn't normally eat it or drink it, contact WMO for disposal information.

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**EMERGENCY PREPAREDNESS**

ANL has prepared for a wide range emergency conditions through:

- Pre-planning
- Training
- Practice in emergency response

Emergency Management Organization

Functions

- Crisis management
- Impact assessment
- Public information
- Communications

Technical assessments  
 Administrative support  
 Documentation

Emergency Management Levels of Authority

Emergency Management Officer  
 Crisis Manager  
 Incident Commander  
 Area Emergency Supervisor  
 Building Monitors

The primary means of notification of the emergency response organization is by means of the 911 telephone system.

911 and the group alerting system

911	Corn Center Fire Health Physics PFS Security Guard Post Industrial Hygiene Medical Department Emergency Management Officer
-----	--

Alarm Systems

2-3342 for recording of signals  
 Criticality  
 Fire  
 Site-wide tone & public address system  
 Outdoor Siren (air raid siren eliminated)  
 Radiation alarms (RAM, CAM, stack monitor)

ANL buildings with a criticality warning system:

- 212
- 306
- 315
- 350

A Crisis:

Can be an operational emergency when a degree or risk exists.

Interrupts normal Operations.  
 Requires immediate response.



Can strike at any time (tornado, fire, etc.).  
Requires upper level decision making.  
May require offsite assistance (Mutual Aid).

#### Event Classification Levels (same as Nuclear Industry)

(N/A - i.e., false alarm)

Unusual event

Alert

Site Area Emergency

(N/A - general emergency)

#### Emergency Operations Center (EOC)

Coordinated command center for emergency response organization.

Communication links to other facilities & offsite agencies.

Center for briefing of emergency staff & for providing information to Public Affairs Office.

#### Crisis Manager

Oversees emergency response.

Laboratory management level decision maker for major incidents.

EOC Manager.

ANL representative to DOE.

#### Incident Command System

Senior Fire Dept. Officer is the Incident Commander.

Directs on-scene response.

Performs initial assessments.

Supports the Crisis Manager.

Command may later be transferred to Security.

#### Area Emergency Supervisor (AFS)

Local Emergency Supervisor.

Develops and maintains facility emergency plans.

Provides training and exercises for facility staff.

Is knowledgeable about facility hazards.

Advises Incident Commander.

#### Mabas 10

Mutual aid box alarm 10.

System to link IL Fire Depts.

Share resources.

Train together.

Respond as a team.

ANL - active participant.

The ANL Office of Public Affairs provides information to the media and to the public regarding emergencies.

#### RAT Team

Radiological Assistance Team - for DOE.

Vehicle with emergency response capabilities.

Comprised of ESH personnel.

## **HAZARD COMMUNICATION AND GENERAL SAFETY**

Employees have a need and right to know the hazards and identities of chemicals they are exposed to when working.

Employees need to know what protective measures are available.

Addresses the issue of evaluating and communicating hazards to workers.

#### Hazcom Standard

Effective 1986.

Some states had right-to-know standards as precursor (IL).

Affects all workers in all workplaces.

#### Parts of the Hazcom Standard

Hazardous chemical inventory.

Written hazard communication program.

Labels and other forms of warning.

Material Safety Data Sheet.

Employee information and training.

#### Hazardous Chemicals Inventory

Accuracy of initial inventory.

Maintenance of inventory.

MSDS

New chemical - New MSDS.

Reevaluation of hazards.

Hazcom standard on-going and pro-active.

Workers need & right to know.

Written Hazard Communication Program

Formalized, written and site-specific  
ANL list - long, not static and on database.

Labels and Other Forms of Warning

Hazcom does not specify type and format of labeling.

Requires labeling - but not type.

## Identity

On label

In MSDS

On hazcom list

Be able to link these

Labels - list hazards (flammable)

Be able to read

Understand (flammable)

NFPA 704 a Card System

National Fire Protection Association

Developed - hazard identification.

Numbers 0-4 (4 severe)

Blue - health

Red - flammability

Yellow - reactivity

White - special markings

W with slash - no water

Material Safety and Data Sheets (MSDS)

Chemical manufacturers - develop MSDS.

Distributors - ensure given to customer.

Employers - provide to employees upon request

- 1 working day (OSHA).

Industrial Hygiene - ANL source.

Employee Information and Training

For every employee who may be "exposed" to hazmat in workplace.

Initial training.

Systematic review.

Changes - new training.

Summary of Hazcom

Employers have the obligation to provide information to their employees about the hazards in the workplace.

Employees have the right and need to know about the hazards in their workplace.

General Safety

Recognize the hazard

Eliminate the hazard

Control the Hazard

Protect yourself (PPE)

**Safety is up to you!**Confined Spaces

Defined as:

Limited access and egress

Poor or non-existent ventilation

Not designed for human occupancy

Medical Considerations

Notify health Division of important medical conditions.

Do not work alone - especially with certain medical conditions.

Do not work with radioactive materials with an open wound.

Nuclear medicine tests will affect radiation detection instrumentation.

Employee Safety Practices

Learn job-specific procedures

Don't take chances.

If you question the safety of an operation, report it.

Buddy system.

Do not hesitate to ask for guidance (ESH, AES, or Safety Committee).

Safety Summary

ANL has a professional staff (ESH) to provide you with safety advise and guidance

Important!

ESH does not have the sole responsibility for your safety - **IT'S UP TO YOU.**

If you have a visitor or vendor on site-you are responsible for his safety.

# Mallinckrodt Material Safety Data

Emergency Phone Number: 314-982-5000

Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

Mallinckrodt makes no representations, or warranties, either express or implied, of merchantability, fitness for a particular purpose with respect to the information set forth herein or to the product to which the information refers. Accordingly, Mallinckrodt will not be responsible for damages resulting from use of or reliance upon this information.

Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361.

## ASPIRIN

### PRODUCT IDENTIFICATION:

Synonyms: 2-(acetyloxy)benzoic acid; salicylic acid acetate

Formula CAS No.: 50-78-2

Molecular Weight: 180.15

Chemical Formula:  $C_9H_8(O_2C)O$

Hazardous Ingredients: Not applicable.

### PRECAUTIONARY MEASURES

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

### EMERGENCY/FIRST AID

SEE SECTION 5.

DOT Hazard Class: Not Regulated

### SECTION 1 Physical Data

Appearance: Transparent, colorless crystals.

Odor: Odorless.

Solubility: 1g/100g water @ 37°C.

Boiling Point: Not applicable.

Melting Point: 135°C.

Density: 1.40

Vapor Density (Air=1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

### SECTION 2 Fire and Explosion Information

Fire:

As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

Use protective clothing and breathing equipment appropriate for the surrounding fire.

### SECTION 3 Reactivity Data

Stability:

Stable in dry air.

Hazardous Decomposition Products:

Decomposes to acetic acid and salicylic acids in the presence of moist air.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizers, alkali hydroxides, boiling water, and antipyrine, aminopyrine, methamine, phenol, phenyl salicylate, and sodium bicarbonate.

### SECTION 4 Leak/Spill/Disposal Information

Ventilate area of leak or spill. Clean-up personnel may require respiratory protection from dust.

Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

Disposal: Whatever cannot be saved for reclamation may be delivered to an approved waste disposal facility.

Ensure compliance with local, state and federal regulations.

Effective Date: 10-09-85

ASPIRIN

Effective Date: 10-09-85

ASPIRIN

SECTION 5 Health Hazard Information

A. EXPOSURE/HAZARD EFFECTS

**Inhalation:**  
May cause mild irritation to the mucous membrane.

**Ingestion:**  
Extremely large oral doses may cause mild burning pain in the mouth and stomach, anorexia, nausea, vomiting, intense thirst, diarrhea, dizziness, irritability, confusion, coma, and death from respiratory failure. The mean lethal dose of aspirin by mouth probably lies between 20 and 30 grams in adults.

**Skin Contact:**  
May cause mild irritation.

**Eye Contact:**  
May cause mild irritation.

**Chronic Exposure:**  
Repeated ingestion may cause tinnitus, abnormal bleeding (gastric or renal), gastric ulcer, weight loss, mental deterioration, and skin eruptions. May cause liver damage in susceptible individuals.

**Aggravation of Pre-existing Conditions:**  
No information found.

B. FIRST AID

**Inhalation:**  
Remove to fresh air. Get medical attention for any breathing difficulty.

**Ingestion:**  
If swallowed in amounts exceeding 10 grams (adults) induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. Call physician immediately.

**Skin Exposure:**  
Wash exposed area with soap and water. Get medical advice if irritation develops.

**Eye Exposure:**  
Wash thoroughly with running water. Get medical advice if irritation develops.

C. TOXICITY DATA (RTECS, 1982)

Oral rat LD50: 1000 mg/kg. Mutation references cited. Reproductive effects cited.

SECTION 6 Occupational Control Measures

**Airborne Exposure Limits:**  
None established.

**Ventilation System:**

A local exhaust system which captures the contaminant at its source is recommended to prevent dispersion of the contaminant into the workroom air.

**Personal Respirators: (NIOSH Approved)**

For conditions of use where exposure to the dust is apparently a dust/mist respirator may be worn. For emergency, a self-contained breathing apparatus may be necessary.

**Skin Protection:**

Wear protective gloves and clean body-covering clothing.

**Eye Protection:**

Use chemical safety goggles. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Spillage Information

Keep in a tightly closed container. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Isolate from incompatible substances.

.....

ASPIR

**FISHER SCIENTIFIC CHEMICAL DIV -- ACETONE - ACETONE, REAGENT**

**MATERIAL SAFETY DATA SHEET**

FSC: 6810

NIIN: 014120075

Manufacturer's CAGE: 1B464

Part No. Indicator: B

Part Number/Trade Name: ACETONE

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**General Information**

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Item Name: ACETONE, REAGENT

Company's Name: FISHER SCIENTIFIC CO CHEMICAL DIV.

Company's Street: 1 REAGENT LANE

Company's City: FAIR LAWN

Company's State: NJ

Company's Country: US

Company's Zip Code: 07410

Company's Emerg Ph #: 201-796-7100 OR 201-796-7523

Company's Info Ph #: 201-796-7100

Safety Data Action Code: A

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 02DEC94

Safety Data Review Date: 26OCT95

Supply Item Manager: CX

MSDS Serial Number: BXWHG

Hazard Characteristic Code: F2

Unit Of Issue: BX

Unit Of Issue Container Qty: 4 LITER

Type Of Container: BOTTLE

Net Unit Weight: 6.4 LBS

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**Ingredients/Identity Information**

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Proprietary: NO

Ingredient: ACETONE (SARA III)

Ingredient Sequence Number: 01

Percent: 100

Ingredient Action Code: A

NIOSH (RTECS) Number: AL3150000

CAS Number: 67-64-1

OSHA PEL: 1000PPM

ACGIH TLV: 750PPM/1000STEL;9293

Other Recommended Limit: NONE RECOMMENDED

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**Physical/Chemical Characteristics**

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Appearance And Odor: CLEAR, COLORLESS, VOLATILE LIQUID WITH A CHARACTERISTIC SWEETISH ODOR

Boiling Point: 133F,56C

Melting Point: -139F,-95C

Vapor Pressure (MM Hg/70 F): 180

Vapor Density (Air=1): 2.0

Specific Gravity: 0.7899

Decomposition Temperature: UNKNOWN

Evaporation Rate And Ref: 6 (BUTYL ACETATE = 1)

Solubility In Water: VERY SOLUBLE

Percent Volatiles By Volume: 100 %

Viscosity: UNKNOWN

Corrosion Rate (IPY): UNKNOWN

Autoignition Temperature: 869F

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**Fire and Explosion Hazard Data**

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Flash Point: -4F,-20C

Flash Point Method: CC

Lower Explosive Limit: 2.5 %

Upper Explosive Limit: 13 %

Extinguishing Media: WATER SPRAY, DRY CHEMICAL, CARBON DIOXIDE, ALCOHOL-RESISTANT FOAM

Special Fire Fighting Proc: MOVE CONTAINER FROM FIRE AREA IF CAN DO SO.

APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES. STAY AWAY FROM ENDS OF TANKS.

Unusual Fire And Expl Hazrds: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

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**Reactivity Data**

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Stability: YES

Cond To Avoid (Stability): HEAT, OPEN FLAME

Materials To Avoid: STRONG OXIDIZING AGENTS, ACIDS, AMINES, BROMINE, NITRIC ACID

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**Health Hazard Data**

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**Precautions for Safe Handling and Use**

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**Control Measures**

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**Transportation Data**

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Transportation Action Code: A

Trans Data Review Date: 95299

DOT PSN Code: ABF

DOT Proper Shipping Name: ACETONE

DOT Class: 3

DOT ID Number: UN1090

DOT Pack Group: II

DOT Label: FLAMMABLE LIQUID

IMO PSN Code: ADF

IMO Proper Shipping Name: ACETONE

IMO Regulations Page Number: 3102

IMO UN Number: 1090

IMO UN Class: 3.1

IMO Subsidiary Risk Label: -

IATA PSN Code: ACM

IATA UN ID Number: 1090

IATA Proper Shipping Name: ACETONE

IATA UN Class: 3

IATA Label: FLAMMABLE LIQUID

AFI PSN Code: ACM

AFI Prop. Shipping Name: ACETONE

AFI Class: 3

AFI ID Number: UN1090

AFI Pack Group: II

AFI Label: FLAMMABLE LIQUID

AFI Basic Pac Ref: A7.3

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**Disposal Data**

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Label Data

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Label Required: YES \*

Label Status: G \*

Common Name: ACETONE \*

Label Name: FISHER SCIENTIFIC CO CHEMICAL DIV. \*

Label Street: 1 REAGENT LANE \*

Label City: FAIR LAWN \*

Label State: NJ \*

Label Zip Code: 07410 \*

Label Country: US \*

Label Emergency Number: 201-796-7100 OR 201-796-7523 \*

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