MATERIAL SAFETY DATA SHEET

SUPPLIER: PRODUITS CHIMIQUES ACP CHEMICALS INC

*** SECTION 1. CHEMICAL IDENTIFICATION ***

DATE DE LA FICHE: 2003-01-02
CHEMICAL NAME : Methyl ethyl ketone
SYNONYMS :
* MEK
* 2-Butanone
* Methylethylketone
* Ethyl methyl ketone
* Methyl acetone
* Ethyl methyl cetone
CAS REGISTRY NUMBER : 78-93-3
PIN - (UN/NA NUMBER(S)) : 1193
RTECS NUMBER(S) : EL6475000
CHEMICAL FAMILY : Aliphatic Ketone
MOLECULAR FORMULA : C4-H8-O
STRUCTURAL FORMULA : CH3-CO-CH2-CH3

TELEPHONE NO. IN CASE OF EMERGENCY:
CANUTEC: (613) 996-6666

*** SECTION 2. DESCRIPTION ***

APPEARANCE AND ODOUR :
Colourless liquid; sharp, fragrant, acetone-like odour.
ODOUR THRESHOLD :
2 ppm (detection); 5 ppm (recognition)
WARNING PROPERTIES :
Good -- recognizable at about 25 ppm; vapour has strong odour and irritating effects at about 300 ppm.
USES AND OCCURRENCES :
Solvent for adhesives, coatings, resins and inks; cleaning agent; component of paint removers; production of perfumes, flavours, catalysts and antioxidants; extraction of vegetable and petroleum oils.

*** SECTION 3. HAZARDS IDENTIFICATION ***

** POTENTIAL HEALTH EFFECTS **

EFFECTS OF SHORT-TERM (ACUTE) EXPOSURE :
INHALATION :
Irritation of nose and throat beginning at 100-200 ppm; headaches; numbness in fingers and arms; numbness and weakness in legs; nausea, vomiting, light-headedness, dizziness, incoordination and eventually unconsciousness.
SKIN CONTACT :
MEK is not irritating to skin. Liquid or concentrated vapour can cause drying of the skin. MEK can be absorbed through the skin, but it has low toxicity by this route.
EYE CONTACT :
Vapour can irritate the eyes; liquid can cause severe irritation and temporary clouding of the cornea, apparently without permanent damage.
INGESTION :

No reports: probably similar to inhalation
EFFECTS OF LONG-TERM (CHRONIC) EXPOSURE :
Long-term exposure to MEK does not appear to cause any problems beyond those seen with acute (short-term) exposure. SKIN: Repeated or prolonged exposure to liquid or concentrated vapour can cause dermatitis (dry, cracked, thickened, reddened skin). LIVER: Reversible liver damage is possible at high doses. NOTE: MEK can increase the toxicity of some chemicals in animal tests (eg. n-hexane or carbon tetrachloride) and may decrease the toxicity of others.
CARCINOGENICITY :
Limited available evidence does not indicate increased risk of cancer.
TERATOGENICITY AND EMBRYOTOXICITY :
Possible reproductive risks identified in one animal study; a second study was negative.
MUTAGENICITY :
No data
POTENTIAL FOR ACCUMULATION :
None known

*** SECTION 4. FIRST AID MEASURES ***

INHALATION :
Remove source of contamination or move victim to fresh air. If breathing has stopped, properly trained personnel should begin artificial respiration or cardiopulmonary resuscitation (CPR) immediately. Obtain medical attention immediately.
SKIN CONTACT :
As quickly as possible, flush contaminated area with lukewarm, gently running water for at least 20 minutes, by the clock. Under running water, remove contaminated clothing, shoes, and leather goods (e.g. watchbands, belts). Obtain medical attention immediately. Completely decontaminate clothing before re-use or discard.
EYE CONTACT :
Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, by the clock, holding the eyelid(s) open. Obtain medical attention immediately.
INGESTION :
Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 8 to 10 ozs. (240 to 300 ml) of water to dilute material in stomach. Obtain medical attention immediately.
FIRST AID COMMENTS :
Provide general supportive measures (comfort, warmth, rest). Consult a physician and/or the nearest Poison Control Centre for all exposures except minor instances of inhalation or skin contact.

*** SECTION 5. FIRE FIGHTING MEASURES ***

FLASH POINT :
-4 deg C (24 deg F) (closed cup); -6 deg C (open cup)
LOWER FLAMMABLE (EXPLOSIVE) LIMIT (LFL/LEL) :
2% (20,000 ppm)
UPPER FLAMMABLE (EXPLOSIVE) LIMIT (UFL/UEL) :
12% (120,000 ppm)
AUTOIGNITION (IGNITION) TEMPERATURE :
515 deg C (960 deg F)
COMBUSTION AND THERMAL DECOMPOSTITION PRODUCTS :
Carbon monoxide and carbon dioxide
EXTINGUISHING MEDIA :
Carbon dioxide, dry chemical or "alcohol" foam.

FIRE FIGHTING INSTRUCTIONS :
Water is not generally suitable for fighting fires involving this material. Water can cause the fire to spread. A water mist can be used to help keep containers cool. NOTE: Concentrated solutions in water may be flammable

** NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) HAZARD INDEX **

NFPA - HEALTH : 1 - Slightly hazardous to health.
NFPA - FLAMMABILITY : 3 - Can be ignited under almost all normal temperature conditions.
NFPA - REACTIVITY : 0 - Material is normally stable

*** SECTION 6. ACCIDENTAL RELEASE MEASURES ***

PRECAUTIONS :
Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Wear adequate personal protective equipment. Ventilate area. Extinguish or remove all ignition sources. Notify government occupational and environmental authorities.
CLEAN-UP :
Do not touch spilled material. Prevent material from entering sewers or confined spaces. Stop or reduce leak if safe to do so. Contain spill with earth, sand, or absorbent material which does not react with spilled material. Small spills: Soak up spill with absorbent material which does not react with spilled chemical. Put material in suitable, covered, labelled containers. Flush area with water. Contaminated absorbent material may pose the same hazards as the spilled product. Large spills: Contact fire and emergency services and supplier for advice.

*** SECTION 7. HANDLING AND STORAGE ***

HANDLING :
Use approved flammable liquid storage containers in the work area. Ground drums and bond transfer containers. (Grounding clips must contact bare metal.) Keep material away from sparks, flames and other ignition sources. Post "NO SMOKING" signs in area of use. Avoid generating mist. Use smallest possible amounts in designated areas with adequate ventilation. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Label containers. Keep containers closed when not in use. Empty containers may contain residues which are hazardous.
STORAGE :
Store in a cool, dry, well-ventilated area, out of direct sunlight. Store away from heat and ignition sources. Store away from incompatible materials such as oxidizing materials or strong acids. Use grounded, non-sparking ventilation systems and electrical equipment that does not provide a source of ignition. Store in suitable, labelled containers. Keep containers tightly closed when not in use and when empty. Protect from damage. If storing small quantities under refrigeration, use an approved, explosion-proof refrigerator. Limit quantity of material in storage. Restrict access to storage area. Post warning signs when appropriate. Keep storage area separate from populated work areas. Inspect periodically for deficiencies such as damage or leaks. Have appropriate fire extinguishers available in and near the storage area. Comply with all applicable regulations for the storage and handling of flammable materials.

*** SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION ***

NOTE : Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on

the extent of exposure. This general information can be used to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire, and other applicable regulations.

SAMPLING AND ANALYSIS :
Method No. S3 NIOSH Manual of Analytical Methods, Second edition, part ii, volume 2. Cincinnati OH: U.S. Dept of Health, Education and Welfare, National Institute for Occupational Safety and Health, DHEW (NIOSH) Publ No. 77-157-B.

ENGINEERING CONTROLS :
Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification (e.g., substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required. Use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside. Use local exhaust ventilation, and process enclosure if necessary, to control airborne mist and vapour. Supply sufficient replacement air to make up for air removed by exhaust systems.

PERSONAL PROTECTIVE EQUIPMENT :
If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer to the CSA Standard Z94.4-M1982, "Selection, Care, and Use of Respirators," available from the Canadian Standards Association, Rexdale, Ontario, M9W 1R3.

RESPIRATORY PROTECTION GUIDELINES :
NIOSH RECOMMENDATIONS FOR 2-BUTANONE CONCENTRATIONS IN AIR (11): UP TO 1000 ppm: Powered air-purifying respirator with organic vapour cartridge(s); or full-facepiece chemical cartridge respirator with organic vapour cartridge(s). UP TO 3000 ppm: Gas mask wth organic vapour canister; or SAR operated in a continuous flow mode; or full-facepiece SCBA; or full-facepiece SAR. EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA. ESCAPE: Gas mask with organic vapour canister; or escape-type SCBA. NOTE: The IDLH concentration for 2-butanone is 3000 ppm. NOTE: Substance causes eye irritation or damage; eye protection needed. ABBREVIATIONS: SAR = supplied-air respirator; SCBA = self-contained breathing apparatus. IDLH = Immediately Dangerous to Life or Health. NOTE: In these recommendations, the IDLH concentration is defined as the maximum concentration which would not cause any escape-impairing symptoms or irreversible health effects to a person exposed for 30 minutes if the respirator failed. Recommendations apply only to NIOSH and MSHA (Mine Safety and Health Administration) approved respirators. Air-purifying respirators do not protect against oxygen-deficient atmospheres.

EYE/FACE PROTECTION :
Chemical safety goggles. A face shield may also be necessary.

SKIN PROTECTION :
Impervious gloves, coveralls, boots, and/or other resistant protective clothing. Have a safety shower/eye-wash fountain readily available in the immediate work area.

RESISTANCE OF MATERIALS FOR PROTECTIVE CLOTHING :
GOOD - Rubber, neoprene, or polyethylene. FAIR/POOR - NBR Hycar and PVA

(polyvinyl alcohol). NOT RECOMMENDED - PVC (polyvinyl chloride), Nitrile rubber. NOTE: Resistance of specific materials can vary from product to product. Evaluate resistance under conditions of use and maintain clothing carefully.
EXPOSURE CONTROLS/PERSONAL PROTECTION COMMENTS :
Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before rewearing. Inform laundry personnel of contaminant's hazards. Do not smoke, eat or drink in work areas. Wash hands thoroughly after handling this material. Maintain good housekeeping.

** EXPOSURE GUIDELINES **

* THRESHOLD LIMIT VALUES (TLVs) / AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) / 1992-93 *

TIME-WEIGHTED AVERAGE (TLV-TWA) : 200 ppm (590 mg/m3)
SHORT-TERM EXPOSURE LIMIT (TLV-STEL) :
300 ppm (885 mg/m3)
TLV COMMENTS :
BIOLOGICAL EXPOSURE INDICES (BEIs): The ACGIH has adopted a BEI for this chemical. BEIs provide an indication of worker exposure by measuring the chemical or its breakdown products in the body or by measuring biochemical changes resulting from exposure to the chemical. Consult the BEI documentation for further information. NOTE: Since the manner in which exposure limits are established, interpreted and implemented can vary among the jurisdictions, detailed information should be sought from the appropriate government agency in each jurisdiction.

*** SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES ***

MOLECULAR WEIGHT : 72.10
CONVERSION FACTOR :
1 ppm = 2.94 mg/m3; 1 mg/m3 = 0.340 ppm at 25 deg C
MELTING POINT : -86.4 deg C
BOILING POINT : 79.6 deg C
RELATIVE DENSITY (SPECIFIC GRAVITY) :
0.805 (20 deg C/water=1)
SOLUBILITY IN WATER :
27%
SOLUBILITY IN OTHER LIQUIDS :
Soluble in alcohol, benzene, ether, oils
VAPOUR DENSITY : 2.41 (Air = 1)
VAPOUR PRESSURE : 77.5 mm Hg (20 deg C)
SATURATION VAPOUR CONCENTRATION : Approx. 347 g/m3 (20 deg C)
EVAPORATION RATE : 2.7 (ether = 1)
pH VALUE : Not applicable
CRITICAL TEMPERATURE : Not available
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT) :
Log P(oct) = 0.26-0.29

*** SECTION 10. STABILITY AND REACTIVITY ***

STABILITY :
Normally stable.
HAZARDOUS POLYMERIZATION :
Does not occur
INCOMPATIBILITY - MATERIALS TO AVOID :
OXIDIZING AGENTS (e.g. peroxides, nitrates, perchlorates) - Increased risk of fire and explosion. STRONG ACIDS (e.g. oleum) - Reaction can produce heat and pressure. MIXTURES CONTAINING CHLORINATED SOLVENTS (e.g. chloroform) AND

STRONG BASES (e.g. sodium hydroxide) - May react vigorously or explosively.
POTASSIUM t-BUTOXIDE - Mixture ignited.
CORROSIVITY TO METALS :
Not corrosive

*** SECTION 11. TOXICOLOGICAL INFORMATION ***

LD50 (rat, oral): 7 ml/kg(3)
LD50 (rat, oral): 3400 mg/kg(6); 2737 mg/kg(7)
LD50 (mouse, oral): 4050 mg/kg(7)
LD50 (rabbit, dermal): 8000 mg/kg; 13 g/kg(6)
Lethal concentration (rat, inhalation): 2000 ppm/4 hours(6)
Lethal concentration (rat, inhalation): 4000 ppm/2 hours; 4/6 animals died(2)
Lethal concentration (rat, inhalation): 8000 ppm/8 hours; 3/6 animals died(2)
LC50 (inhalation, mouse): 40 g/m3 (13600 ppm)/2-hour exposure(7)
EYE IRRITATION: Liquid can cause moderate to severe eye irritation(6,10).
SKIN IRRITATION: MEK was judged non-irritating by 12/16 laboratories in a large comparative study using 24-hour application times(10).
CHRONIC INHALATION: Rats inhaled up to 5000 ppm MEK, 6 hours/day, 5 days/week, for 90 days. Only slight toxic effects were seen: at 5000 ppm, growth was reduced and the liver was slightly enlarged(9).
TERATOGENICITY AND EMBRYOTOXICITY: Two studies give inconclusive results. In both studies pregnant rats inhaled up to 3000 ppm MEK, 7 hours/day on days 6-15 of gestation. In the first study MEK was embryotoxic, fetotoxic and potentially teratogenic; no maternal toxicity was seen(4). In the second study, 3000 ppm MEK caused slight maternal toxicity and some minor fetal abnormalities(5).
MUTAGENICITY: Negative results in short-term tests using two kinds of bacteria(8). MEK causes anenploidy (unequal cell division) in yeast (Saccharomyces)(7).

*** SECTION 12. ECOLOGICAL INFORMATION ***

NOTE : This section is under development.

*** SECTION 13. DISPOSAL CONSIDERATIONS ***

Dispose of in a designated landfill site or burn in an approved solvent burner. If small amounts of MEK are disposed of into a sink or sewer, rinse with ample water to prevent the accumulation of flammable vapours. Comply with federal, provincial and local government requirements.

*** SECTION 14. TRANSPORT INFORMATION ***

** TRANSPORTATION OF DANGEROUS GOODS (TDG) SHIPPING INFORMATION **

DESCRIPTION AND SHIPPING NAME: Ethyl methyl ketone or Methyl ethyl ketone
PRODUCT IDENTIFICATION NUMBER (PIN): 1193
CLASSIFICATION: 3.2 - Flammable liquid, flash point not less than -18 deg C but less than 23 deg C
SPECIAL PROVISIONS: ---
IMO CLASSIFICATION: 3.2
ICAO CLASSIFICATION: 3
PACKING GROUP: II

*** SECTION 15. REGULATORY INFORMATION ***

** WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) **

PROPOSED WHMIS CLASSIFICATION :
Flammable and combustible material - Flammable liquid
Poisonous and infectious material - Other effects - Toxic
WHMIS HEALTH EFFECTS :
Eye irritation - toxic - other
WHMIS INGREDIENT DISCLOSURE LIST :
Confirmed A; Meets criteria for disclosure at 1% or greater
DETAILED WHMIS CLASSIFICATION ACCORDING TO CRITERIA :
CLASS A - COMPRESSED GAS: Does not meet criteria
CLASS B - FLAMMABLE & COMBUSTIBLE MATERIAL: Classified as "Flammable Liquid"; flash point -6 deg C
CLASS C - OXIDIZING MATERIAL: Does not meet criteria
CLASS D - POISONOUS AND INFECTIOUS MATERIAL. DIVISION 1 - IMMEDIATE AND SERIOUS TOXIC EFFECTS: Does not meet criteria
Acute Lethality: Does not meet criteria
CLASS D - POISONOUS AND INFECTIOUS MATERIAL. DIVISION 2 - OTHER TOXIC EFFECTS: Meets criteria for "Toxic material". See detailed evaluation below.
CHRONIC HEALTH EFFECTS: Insufficient data
CARCINOGENICITY: Does not meet criteria; not in reference lists
TERATOGENICITY AND EMBRYOTOXICITY: Insufficient data; inconsistent results in two studies (4,5)
REPRODUCTIVE EFFECTS: Insufficient data
MUTAGENICITY: Insufficient information
RESPIRATORY SENSITIZATION: Does not meet criteria; not reported as human respiratory sensitizer
SKIN SENSITIZATION: Insufficient data
SKIN IRRITATION: Does not meet criteria
EYE IRRITATION: "Toxic"
CLASS E - CORROSIVE MATERIAL: Does not meet criteria
CLASS F - DANGEROUSLY REACTIVE MATERIAL: Does not meet criteria

*** SECTION 16. OTHER INFORMATION ***

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(3) Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th ed. Cincinnati: American Conference of Governmental Industrial Hygienists, 1986. p. 395
(4) Schwetz, B.A.; Leong, B.K.J.; Gehring, P.J. Embryotoxicity and fetotoxicity of inhaled carbon tetrachloride, 1,1-dichloroethane and methyl ethyl ketone in rats. Toxicology and Applied Pharmacology. Vol. 28, no. 3 (June 1974). p. 452-464
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(10) Weil, C.S., et al. Study of intra- and interlaboratory variability in the results of rabbit eye and skin irritation tests. Toxicology and

Applied Pharmacology. Vol. 19 (1971). p. 276-360
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