

Table 10
PARTIAL LIST OF REPRODUCTIVE TOXINS
(From: "Reproductive Hazards of the Workplace" by Linda M. Frazier, MD, MPH & Marvin L. Hage, MD)

CHEMICAL / ROUTE OF ENTRY	COMMENTS / POTENTIAL PROBLEMS
acrylamide [resp/skin]	animal-decrease copulatory behavior & fertility, possible fetotoxin
acrylates [resp/skin]	animal-possible fetotoxin, decrease in fetal size
aflatoxin B1 [oral/resp]	human-mutagen, decrease male fertility, animal-teratogen, fetotoxin, decrease sperm counts, increase sperm abnormalities
aldicarb [resp/skin/oral]	human-at near toxic levels may cause stillbirth
aluminum [resp]	animal-neurotoxin mid to late term
ammonia [resp]	human-spermicide
anesthetic gases (enflurane, halothane, nitrous oxide) [resp]	human-decrease in female fertility when exposed to nitrous oxide \geq 5 hours a week, mixed gases may increase chance of spontaneous abortion, decrease birth weight, animal-teratogen, embryotoxin, nitrous oxide-reduced sperm counts, mixed gases-possible reduced fertility,
aniline & derivatives [resp/skin]	human-possible menstrual & ovarian disorders, reduction of , maternal and fetal blood oxygen
antimony [resp]	animal-increase spontaneous abortion rate
antineoplastic agent [resp/oral/skin]	human-testicular & ovarian dysfunction, permanent sterility, increased rate of spontaneous abortion, ectopic pregnancy, decrease birth weight, animal-teratogen, embryo-lethal
arsine [resp]	animal-teratogen
arsenic [resp/skin/oral]	human-possible chromosomal and testicular toxin, increased rate of spontaneous abortion, teratogen, mutagen, fetotoxin
barium [resp/oral]	animal-soluble compound (carbonate, chloride) acute testicular toxicity
benomyl [resp/oral]	human-possible teratogen, animal-possible teratogen, testicular toxin, increase rate of post implantation mortality,
benzene [resp/skin]	animal-fetal death, delayed ossification
beryllium [resp]	possible human mutagen (sperm), fetal stunting, pre-implantation mortality
boric acid [skin/resp]	animal-high dose tests- borax is testicular toxin, female impaired fertility
1,3-butadiene [resp]	human-increased rate of abnormal sperm, animal-reduced fetal weight
cadmium [resp/oral]	human mutagen, decrease in motility counts, testicular necrosis, may prevent egg implantation, increase stillbirth rate, animal-teratogen, fetotoxic
captan [oral/resp]	human-mutagen, possible teratogen, animal-possible teratogen, testicular toxin, increase post implant mortality
carbaryl [oral/resp/skin]	human-weak mutagen, animal-increased rate of sperm abnormality, decreased sperm counts & function, teratogen only at toxic levels
carbon disulfide [resp/skin]	human-reduced male libido, alterations of menstrual cycle, increased rate of spontaneous abortion and neurobehavioral abnormalities after birth
carbon monoxide [resp]	human-fetal asphyxiation, increased rate of neurological abnormalities, malformations, animal-reduced fetal weight,
chlordecone [skin/resp/oral/ocular]	human-decreased motility, animal-reduced male fertility, reduced litter size, increase in mouse resorptions, subtle neurobehavioral changes
chlorine dioxide, chlorite, chlorate [resp/skin/oral]	animal-reduced weight between birth and weaning
chloroform [resp/skin]	animal-increased rate of fetal loss, reduced fertility
chloroprene [resp]	human-possible increase in spontaneous abortion rate , animal-reduced male fertility
chlorpyrifos [oral/skin]	animal-near lethal doses decrease sperm motility, possible neurotoxin
chromium [resp]	human genotoxin, decreased motility counts
cobalt [resp]	animal-seminiferous tubule degeneration
copper [resp]	human-direct contact is toxic to sperm, low motility counts

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cyfluthrin [oral/resp/skin]	animal-large exposures through pregnancy caused neurological dysfunction
cypermethrin [oral/resp]	animal-large exposures through pregnancy caused neurological dysfunction
2,4-D [skin]	human-(reversible) abnormal sperm, animal-possible teratogen at toxic levels
DDT [resp/ocular/skin/oral]	human-possible male infertility,
DEET (N,N-diethyl-m-toluamide) [skin/oral]	human-at (maternal) high dose exposures there is an increase in acute neurotoxic symptoms in children
diazinon [oral/skin]	animal-teratogen, reduced genital weight, decreased motility, increase in sperm mortality
dibromochloropropane [oral/skin/resp]	human-testicular damage, animal-mutagen, genotoxin
dicamba [skin/resp]	animal-(single study) induced unscheduled DNA synthesis
1,3-dichloropropene and 1,2-dichloropropene [resp/skin]	animal-mutagen, causes testicular degeneration, reduced sperm counts, abnormal sperm
dimethylformamide [resp/skin]	human-possible testicular cancer, inconsistent data indicates teratogen
epichlorhydrin [resp/skin]	animal-male reproductive toxin, sterility,
ethidium bromide [skin/resp]	animal-mutagen, embryotoxin
ethyl alcohol [resp/oral/skin]	human-high doses suggest an increased rate of miscarriages & stillbirths, fetal alcohol syndrome, occupational exposure problems rarely encountered
ethylene bisdithiocarbamate [resp]	animal-possible teratogen near lethal dose
ethylene oxide [resp]	human-teratogen, increased rate of spontaneous abortions, animal-teratogen, testicular toxin, increased rate of sterility, decreased fertility
formaldehyde [resp]	human-one study suggests a slight % increase in spontaneous abortion and subtle neurobehavioral abnormalities, animal-decreased sperm motility, reduced fetal & maternal weight
glutaraldehyde [resp/oral/skin]	animal-cytotoxin (bacteria)
glycidyl ethers [skin/resp]	animal-testicular atrophy
glyphosate [oral/skin]	animal-sperm count reduction at high concentrations
hair dyes [skin]	human-may cause neuroblastoma, animal-bacterial mutagen (coal tar)
hexachlorobenzene [oral/resp]	human-long half life, excessive exposures can result from breast milk, animal-menstrual irregularities, neonatal lethality at high doses
hexane (n-) [resp]	animal-testicular toxin, reduced fetal weight
hydrazine & derivatives [resp]	animal-abnormal sperm, reduced fetal weight, increased rate of resorptions,
hydrogen cyanide [resp/skin]	animal-impaired spermatogenesis & fertility, reduced brain function
hydrogen sulfide [resp]	human-fetal asphyxiation, increased rate of menstrual irregularities,
hydroquinone [resp/skin]	animal-reduced testicular weight, increased rate of resorptions, recent studies suggest that hydroquinone is not a reproductive toxin
indium [resp]	animal-teratogen, testicular and sperm abnormalities
iron [resp]	human-decline in semen parameters,
isocyanates [resp]	human-increased risk of spontaneous abortion and stillbirths, animal-male decrease in successful matings, female persistent diestrus, increased rate of resorptions,
lead [resp/oral/skin]	human-decrease in motility counts, increased rate of preterm deliveries, stillbirths, neurological abnormalities
lindane [resp/skin]	animal-testicular degeneration, altered fetal steroid metabolism
malathion [oral/skin]	human-(applicators) increase in chromosomal abnormalities, animal-testicular atrophy

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manganese [resp]	human-possible decline in sperm parameters (excessive exposure & manganese deficient), animal-adverse neurodevelopmental effects from breast milk, retarded offspring growth
mercury [resp/oral/skin]	human-mutagen, teratogen, neurotoxin, increased rate of spontaneous abortion, embryolethal, menstrual irregularities
methyl alcohol [resp/oral/skin]	animal-decrease testicle size, reduced sperm counts, high dose (inhale >5,000 ppm) teratogen,
methyl bromide [resp]	animal-(high dose studies near toxic levels) mutagen, genotoxin
methyl chloride [resp]	animal-reduced male fertility, testicular degeneration, heart valve defects
methyl ethyl ketone [resp]	animal-at high doses (3,000 ppm-7 hour days) minor birth defects
methylene chloride [resp/skin]	animal-fetotoxic, neurologic deficits because it is metabolized into CO
methylpyrrolidone (N)[resp/skin]	animal-fetotoxin
molybdenum [resp/oral]	human-mutagen, animal-embryolethal
nickel [resp/oral]	human-mutagen, decline in semen parameters, animal-embryolethal, increased rate of fetal growth retardation and skeletal anomalies
nitriles [resp/skin]	animal-teratogen, reduced sperm counts, increased rate of resorptions,
nitrates, nitrites & organic nitro compounds [resp/skin/oral]	human-reduced oxygen uptake causing oxygen debt, animal-testicular toxin, abortifacient
paraquat [resp/oral/skin]	animal-mutagen, embryotoxin
pentamidine [resp/skin/oral]	animal-increased rate of resorptions
perchloroethylene [resp]	human-possible increased rate of spontaneous abortion (only a few studies were completed)
permethrin [oral/resp]	animal-large exposures through pregnancy caused neurological dysfunction
phenol [skin/resp/oral]	animal-minimal embryotoxin
phenoxyacid herbicides [oral]	animal-fetotoxin at high doses
phthalates [oral/resp/skin]	animal-possible teratogen, testicular toxin, increased rate of resorptions & stillbirths
polybrominated biphenyls [oral/skin/resp]	animal-possible prolonged menstrual cycles, blocked implantation, increased rate of resorptions, increased fetal liver weight
polychlorinated biphenyls [skin/oral]	human-hyperpigmentation, possible reduction of birth weights do to shortened gestation, neurological delay, animal-testicular toxin, reduced female conception rates, fetotoxin at high dose, decrease birth weight,
polycyclic aromatic hydrocarbons [resp/oral]	animal-gonadotoxin, increased rate of stillbirths & resorptions,
providone-iodine [skin/oral]	human-possible fetal goiter due to elevated iodine levels
selenium [resp/oral]	animal-teratogen, embryolethal
sodium azide [oral/resp]	animal-embryotoxin, increased rate of resorptions
styrene [resp/skin]	human-associated with sperm abnormalities, menstrual disorders, animal-possible genotoxin
tellurium [resp]	human-does not cross the placenta, animal-mutagen
thallium [resp/oral/skin]	human-induces abortion, absorbed by testicles, animal-lethal mutagen, teratogen
tin [resp/skin]	animal-possible increase in subtle neurological & skeletal deformities
titanium dioxide [resp]	animal-embryolethal, reduction in litter sizes
toluene [resp/skin]	human-increased rate of spontaneous abortion at 50-150 ppm TWA, intentional inhalation-microcephali, growth retardation, learning delayed
1,1,1-trichloroethane [resp/skin]	human-acute exposure at high concentrations cause fetal death (drug abuse)
trichloroethylene [resp/skin]	human-decreased libido, increase in menstrual disorders at levels that effect CNS
tungsten [resp]	animal-possible embryolethal (single study)

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uranium [resp/oral]	animal-nephrotoxin, genotoxin (from radiation)
vanadium pentoxide [resp]	animal-mutagen (at high doses), decrease in fertility rates
vinyl chloride [resp]	human-increased rate of impotence, decreased libido, decreased testosterone, change in menstrual cycles, pregnancy complications
xylene [resp/skin]	animal-increased rate of abnormal sperm, may also be genotoxic and mutagenic (rats only)
zinc chloride & oxide [resp]	human- <u>deficiency</u> is teratogenic and can cause behavioral abnormalities, zinc salts are spermicidal