

Appendix G Chemical Compatibility

Overview of chemical compatibility

Chemical compatibility chart (list of *incompatible products*)



CHEMICAL COMPATIBILITY

Information provided by the ODOT Office of Employee Safety.

Purpose

Chemical materials should be stored so that incompatible materials do not come in contact with each other. This section contains general principles for ensuring incompatible materials are segregated, chemical definitions for determining compatibility, and a chart showing chemical incompatibilities for most common shop chemicals. For chemicals not on the list, contact the Office of Employee Safety for guidance.

Definitions

Acid: A corrosive chemical, solid or liquid, with a low pH (below 7.0). Examples: vinegar, muriatic acid, battery acid.

Base: A caustic chemical, usually liquid but can also be solid, with a high pH (above 7.0). Examples: Bleach, sodium hydroxide, ammonia.

Caustic: Destructive to skin, tissue, eyes, etc.; usually applies to alkaline liquids or solids with pH above 7.0 (basic). Examples: Sodium hydroxide.

Combustible: Solids and liquids that will burn but have flash points above 100° F and below 200° F, and require a source of ignition.

Corrosive: Destructive to skin, tissue, eyes, etc.; usually applies to acidic liquids with pH below 7.0 (acidic).

Flammable: Any solid, liquid, vapor or gas that will ignite easily and burn rapidly; flash point less than 100° F.

Inorganic: Compounds neither containing carbon nor of biological origin.

Organic: Compounds containing carbon and chiefly of biological origin. Example: Petroleum based liquids.

Oxidizer: A compound that supplies its own oxygen and heat in contact with incompatible chemicals and can accelerate burning. These can react violently and explode.

Toxic: A substance that can cause damage to living tissue, impairment of the central nervous system, and illness or death when ingested, inhaled, injected, or absorbed through skin.

General Storage Principles

- Minimize inventory: discard or properly dispose of old stock and excess material
- Separate solids from liquids; this solves many incompatibility issues
- Store liquids in trays or in cabinets
- Separate organic chemicals from inorganic chemicals

CHEMICAL COMPATIBILITY CHART

Group Name	Examples	Incompatible Materials	Examples	Reaction if Mixed
Acids	Battery acid, muriatic acid, some paint removers, rust preventors	Flammables/combustibles, alkalis, bases, caustics, oxidizers	Degreasers. Carbon removers, anti-fog compounds	Heat, violent reaction
Adhesives	Epoxies, isocyanates, spray foams	Acids, bases, caustics, oxidizers	Muriatic acid, sodium hydroxide,, bleach, water treatment chemicals	Heat, fire hazard
Alkalies/Bases/Caustics	Ammonia, sodium hydroxide, sodium hypochlorite (bleach)	Acids/oxidizers, flammables/combustibles	Battery acid, paint removers, anti-rust sprays, paints, solvents	Heat, violent reaction
Batteries	Lead-acid, dry-cell, alkaline, lithium	Solvents, heavy metals, oxidizers	Xylene, toluene, alcohol	Heat, violent reaction, toxic gas
Cleaning compounds	Degreasers, carbon removers, anti-fog compounds	Detergent/soaps, oxidizers	Calcium hypochlorite, sodium nitrite, hydrogen peroxide	Heat, fire hazard
Corrosion preventive compounds	Anti-corrosion sprays	Acids, bases, oxidizers, ignition sources		Fire hazard
Detergents/soaps	Trisodium phosphate (TSP), scouring powders, disinfectants	Acid-containing compounds	Battery acid, paint removers, anti-rust sprays	Violent reaction, heat
Fuels	Gasoline, diesel fuel, No. 2 diesel, fuel oil, propane	Corrosives, oxidizers	Battery acid, calcium hypochlorite, sodium nitrite, sodium hydroxide	Fire hazard, toxic gas generation
Greases	Lithium grease, silicone greases, molybdenum grease	Oxidizers, acids, bases, caustics	Muriatic acid, sodium hydroxide, bleach, water treatment chemicals	Fire hazard, heat, violent reaction
Heavy metals	Lead, mercury, beryllium	Corrosives, oxidizers, water treatment chemicals		Violent reaction, toxic & flammable gas
Hydraulic fluids	Petroleum-based hyd. Fluids, synthetic fire-resistant fluids	Corrosives, oxidizers	Battery acid, caustic soda, chlorine bleach, calcium hypochlorite, hydrogen peroxide, paint removers	Fire hazard, heat, violent reaction

CHEMICAL COMPATIBILITY CHART

Group Name	Examples	Incompatible Materials	Examples	Reaction if Mixed
Inspection penetrants	Petroleum based dyes	Corrosives, oxidizers	Battery acid, caustic soda, chlorine bleach, calcium hypochlorite, hydrogen peroxide, paint removers	Fire hazard, heat, violent reaction
Lubricants/Oils	Motor oils, gear oils, general purpose petroleum based lubricants (WD-40, Liquid Wrench, 3-in-1, assembly lubes)	Corrosives, oxidizers	Battery acid, caustic soda, chlorine bleach, calcium hypochlorite, hydrogen peroxide, paint removers	Fire hazard, heat, violent reaction
Oxidizers	Calcium hypochlorite, granulated laundry bleach, hydrogen peroxide	Petroleum based materials, fuels, solvents, corrosives, heat		Fire hazard, violent reaction, explosion hazard, toxic gas generation
Paints	Primers, enamels, urethanes, lacquers, varnishes, non-skid paints, thinners	Acids, oxidizers	Battery acid, paint removers, anti-rust sprays	Heat, fire hazard
Pesticides/Herbicides	Insecticides, herbicides, fungicides, fumigants	Corrosives, oxidizers	Battery acid, caustic soda, chlorine bleach, calcium hypochlorite, hydrogen peroxide, paint removers	Toxic gas generation
Polish/Wax compounds	Buffing compounds, metal polishes, general purpose waxes	Corrosives, oxidizers	Battery acid, caustic soda, chlorine bleach, calcium hypochlorite, hydrogen peroxide, paint removers	Heat, fire hazard, violent reaction
Solvents	Methyl ethyl ketone, (MEK), toluene, xylene, acetone	Corrosives, oxidizers, batteries	Battery acid, calcium hypochlorite, sodium nitrite, sodium hydroxide	Heat, fire hazard
Water treatment chemicals	Nitric acid, caustic sodas, mercuric nitrate	Corrosives, oxidizers, heavy metals		Heat, violent reaction

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