CrownTech™ - Technical Bulletin No. 9

Chemical Resistance Guideline and Chart

CONTENT

INTRODUCTION

This Chemical Resistance Guide is intended to serve as a guideline only, since actual in-service conditions usually vary from the laboratory conditions where the test data was developed. The variations are due to differing conditions, therefore, Crown Polymers cannot assume liability for use or guarantee performance. Resistance to chemicals or concentrations appears on the Chemical Resistance Chart, which represents only a fraction of the known chemicals or combinations of chemicals.

Site conditions vary because of changes in concentration (water evaporation), chemical combinations, temperature, duration of exposure, contaminates, housekeeping and cleaning technique, etc., therefore, it is recommended that "actual testing" be performed with each of the specific reagents, as well as the specific method of cleaning. Prior to final selection of a chemical resistant system, it is

recommended by Crown Polymers that testing be performed under actual conditions, since the complexity of many end-use environmental circumstances and potential cross contaminates can influence actual performance.

When seeking assistance in the selection of the proper product(s) or system(s) from Crown Polymers, we may require samples of the actual reagents, environmental use and exposure conditions, cleaning, biocides or bio-stats, disinfectants, cleaning equipment, SDS, etc., as well as any other relevant information that might influence the performance of the chemical resistant system, including:

1. Commercial names of the reagents
2. Concentration of each reagent
3. In use ambient temperature and substrate surface temperature
4. Temperature of reagent as it contacts the surface
5. Combination of chemicals that will react with each other on the surface. Frequency of spills and elapsed time between spillage until clean up and neutralization occur

Note: Crown Polymers reserves the right to refuse to test chemicals it deems harmful.

UNDERSTANDING CHEMICAL RESISTANCE

Generally, chemical resistance is considered a functional concern, rather than an aesthetic concern. The ASTM tests and Crown Polymers' in-house proprietary tests are designed to evaluate the functional effect of exposure, which do not include an aesthetic evaluation of resistance to staining or discoloration.

PIGMENTED AND UNPIGMENTED PRODUCTS

Unpigmented resins and hardeners generally have superior chemical resistance to pigmented systems, since pigments normally have less chemical resistance than the neat (unpigmented and unfilled) liquids. When considering a pigment system to enhance chemical resistance of the selected system, Crown Polymers usually recommends that the system is top-coated with one or more chemical resistant clear coatings.

TEMPERATURE

Chemical resistant testing, unless otherwise indicated, is performed under Laboratory conditions at 75°F+/- 2°F (24°C+/- 1°C). Temperature has a significant effect on chemical reactivity and the aggressiveness of the chemical. Changes in temperature, evaporation rate and humidity can affect the performance of a chemical resistant system. As a rule of thumb, chemical reactivity doubles or halves with a temperature increase or decrease of 18°F (10°C), which is known as the Arrhenius Curve.

Typically, there is a correlation between the temperature of a chemical reagent and its reactivity. The higher the temperature, the greater the chemical reactivity and the more aggressive the chemical. Correspondingly, most chemical resistant coating and flooring surfaces will begin

to soften as the temperature is increased and they will lose their chemical resistances, as well as a significant reduction in their mechanical and physical properties.

LONG TERM PERFORMANCE

Crown Polymers' chemical resistant products and systems are formulated to protect substrates from a variety of specific corrosive reagents and environmental combinations. The long-term performance is based on chemical-resistance of the product(s) and reactivity of the reagent(s).

MAINTENANCE

Frequency of housekeeping-maintenance may vary depending on chemical, concentration, combination, etc. Good housekeeping is always
required, including the removal of deleterious chemicals, which normally requires neutralization. Caution should be exercised not to allow the system to be exposed to chemical attack for excessive durations or combinations of chemicals or physical abuse that exceeds the ratings contained in the Crown Polymers' Chemical Resistance Guideline and Chemical Resistance Chart.

Failure to maintain proper housekeeping can result in chemical changes in the reagent; acid concentrations will increase when the water carrier or other diluents evaporate. Generally, the higher the acidic concentration the more aggressive the acid, thus proper housekeeping is required to remove the potentially problematic chemical.

DISCOLORATION

Discoloration, such as dye, blemish, loss of gloss, spotting, staining, tarnishing, etc. may occur. Discoloration and its variation may not affect functional performance. However, it may affect appearance. Use of unpigmented products/systems may minimize discoloration. Use of certain colored pigment products or systems may mask discolorations.

CLEANING, SANITIZING & DISINFECTING PROCEDURES

Cleaning and sanitizing techniques, solutions, disinfecting compounds and other chemicals used, such as biocides, can affect the color, gloss, texture and performance of a chemical resistant product. As a precautionary step, Crown Polymers recommends that the end-user test their cleaning, disinfecting, etc. Compounds on a sample or small finished area to determine if they will affect the performance

or appearance of chemical resistant product/system. This test should be performed utilizing the intended cleaning technique and equipment prior to cleaning the entire surface area. As an example, some
cleaning agents intended for use on adjacent surfaces, such as stainless steel, might be harmful to organic surfaces. Care must be taken to avoid contact.

The mechanical cleaning equipment and techniques need to be evaluated for compatibility with the chemical resistant product/system prior to use and must be used in accordance with the end user's written instructions.

If no deleterious effects are observed during the test, the procedure can be continued. If the cleaning and disinfecting compounds or cleaning techniques damage the product/system, modification of the cleaning materials and/or techniques will be required. Contact Crown Polymers technical service representative for additional information.

Steam Cleaning: In most cases, steam cleaning at 212°F (100°C) may be used, provided that the wand and hoses are insulated and the direct contact temperature does not exceed 180°F (82°C) for a prolonged period of time, keeping the wand and the hoses moving in constant motion across the surface during the course of cleaning.

Cleaning Equipment: Floor scrubbers and buffing equipment with non- destructive and non-abrasive brushes and pads may be used to remove accumulation of dirt on the chemical resistant system. Micro-scratching from cleaning equipment and techniques may reduce gloss. Check with the Manufacturer for a sealer or polish recommendation to restore the lost luster.

SLOPE TO DRAINS and TRENCHES

Sloping to properly functioning drains or trenches is critical and must be maintained at all times. Puddling or standing chemicals should be avoided to elude premature degradation of the system.

PERFORMANCE REVIEW

Methodical and judicious review of the entire area will detect potential integrity loss from unusual spillage or abusive damage, which could result in serious problems if not detected in their incipit stage.

If repairs are required, the end-user shall notify the installing Contractor and Crown Polymers immediately to prevent further damage to the product/system and/or the substrate. Regardless of the origin of the problem, remedial repairs should be executed without delay by the contractor. The installing contractor must be given free and unencumbered access to the area in need of repair.

CHANGE IN USE

Change in the usage, chemical exposure or method of maintenance might have a negative effect. Crown Polymers and the installation Contractor should be advised and asked to assess the ability of the product/system to resist the new exposure conditions.

TESTING

Additional testing may be required; consult with Crown Polymers prior to specification, installation or exposure. Staining and Chemical Resistance Testing required.

Consult Crown Polymers prior to specification, installation or exposure. Test for use by the Specifier or end-user requires uncured (liquid and powder) or cured samples for testing at their facility or designated laboratory to determine chemical resistance, stain resistance, etc. of specific chemicals. Contact Crown Polymers and make arrangements for “specific test specimen”.

Normally, only the polymer product is tested rather than the system it is used in. This is done because many products are used in several systems, which would make the chart longer and more complicated than necessary.

NOTIFICATION

Immediately upon notice (within five working (5) days) of a defective product/system or workmanship or end user abuse, the owner or their representative shall notify Crown Polymers about the problem in writing, before it expands and becomes more costly to repair.

Crown Polymers
Chemical Resistance Charts

CHEMICAL REAGENTS	CrownCrete U (Without Top Coats)	320 320 Wall	8320 8320 Wall	7350 7350 Wall	7500	8110 & 8111	8112	8175 & 8340
Acetic Acid - 10%	3	3	2	2	2	2	3	2
Acetic Acid - 10-50%	3	3	2	2	2	2	3	2
Acetic Acid 70%	3	N	3	3	3	3	3	3
Acetic Glacial	N	N	N	N	N	N	N	N
Acetone - 100%	3	N	3	3	3	3	3	3
Adipic Acid - 25%	2	2	2	2	2	2	2	2
Alum (Saturated Solution)	2	3	2	2	2	2	2	2
Ammonium Hydroxide <10%	2	2	2	2	2	2	2	2
Ammonium Hydroxide - 20%	2	3	2	2	2	2	2	2
Ammonium Hydroxide - 38%	2	3	2	2	2	2	2	2
Antifreeze (Propylene glycol)	2	3	2	2	2	2	2	2
Aqua Regia	3	N	2	2	2	2	3	2
Beer	2	N	2	2	2	2	3	2
Benzyl Alcohol	3	3	2	2	2	2	3	2
Bleach - 5%	2	3	2	2	2	2	3	2
Boric Acid (Saturated)	2	N	2	2	2	2	3	2
Brake Fluid	2	N	2	2	2	2	3	2
Brine	2	2	2	2	2	2	2	2
Castor Oil	2	2	3	3	3	3	2	3
Catsup	2	3	2	2	2	2	2	2
Chlorine Water - Saturated	3	N	2	2	2	3	3	3
Chromic Acid - 10%	3	3	3	3	3	2	3	2
Chromic Acid 25%-35%	3	N	3	3	3	3	3	3
Corn Oil	2	3	2	2	2	3	3	3
Cottage Cheese	2	2	2	2	2	2	2	2
Cottonseed Oil	2	2	2	2	2	2	2	2
Crude Oil	2	3	2	2	2	2	2	2
Dibutyl Phthalate	3	3	2	2	2	3	2	3
Dichloro Acetic Acid - 20%	3	N	2	2	2	3	3	3
Diesel Fuel	3	N	3	3	3	3	3	3
Diethylene Glycol	3	N	3	3	3	3	3	3

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Ethoxylated Nonyl Phenol	3	2	2	2	2	2	3	2
Ethylene Glycol	2	2	2	2	2	2	3	2
Fatty Acids	2	3	2	2	2	2	2	2
Fluorine <50%	3	N	3	3	3	3	3	3
Formaldehyde <3%	2	3	2	2	2	2	2	2
Formaldehyde	3	3	2	2	2	2	3	2
Formic Acid 10%	3	N	3	3	3	3	3	3
Gasoline	2	3	3	3	3	2	3	2
Aviation	2	3	2	2	2	2	3	2
Diesel	2	3	2	2	2	2	3	2
Jet Fuel	2	3	2	2	2	2	3	2
Premium Unleaded	2	3	2	2	2	2	3	2
Unleaded	2	3	2	2	2	2	3	2
Glycerin	2	2	2	2	2	2	2	2
Grape Juice	2	N	2	2	2	2	3	2
Green Liquor (Paper Industry)	3	3	3	3	3	2	2	2
Heptane	2	2	2	2	2	2	2	2
Heptanoic Acid	3	N	3	3	3	3	3	3
Hexane	2	2	2	2	2	2	2	2
Hydrobromic Acid - 20%	3	N	2	2	2	2	3	2
Hydrobromic Acid - 48%	3	N	2	2	2	2	3	2
Hydrochloric Acid - 10%	3	3	3	3	3	2	3	2
Hydrochloric Acid - 20%	3	3	3	3	3	2	3	2
Hydrochloric Acid - 37%	3	N	3	3	3	2	3	2
Hydrofluoric Acid - 1-10% *	3	N	2	2	2	2	3	2
Hydrofluoric Acid - 20% *	3	N	2	2	2	3	3	3
Hydrofluoric Acid - 21-48%	3	N	2	2	2	3	N	3
Hydrogen Peroxide 10%	2	3	2	2	2	2	2	2
Hydrogen Peroxide - 30%	3	N	2	2	2	3	3	3
Hypo (Photographic Solution)	3	3	3	3	3	2	2	2
Hydroquinone	2	3	2	2	2	2	2	2
Hypochlorous Acid 10%	3	N	3	3	3	3	3	3
Iodine Tincture	3	N	3	3	3	3	3	3
Isopropyl Alcohol	3	3	2	2	2	2	3	2
Jet Fuel JP-4	2	3	3	3	3	2	3	2

Crown Polymers
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Kerosene	2	3	2	2	2	2	3	2
Ketchup	2	3	2	2	2	3	3	3
Lactic Acid <10%	2	3	2	2	2	2	2	2
Lactic Acid 50%	2	N	2	2	2	2	2	2
Lard	2	N	2	2	2	3	2	3
Linseed Oil	2	3	3	3	3	2	2	2
Mercury	2	N	2	2	2	2	2	2
Methanol - 100%	3	3	2	2	2	3	3	3
Methyl Acetate	3	N	2	2	2	3	3	3
Methyl Alcohol	3	N	3	3	3	3	3	3
Methyl Amine 40%	3	N	3	3	3	3	3	3
Methyl amyl Alcohol	N	N	2	2	2	3	3	3
Methylene Chloride	3	N	3	3	3	3	N	3
Methyl-Ethyl Ketone	3	3	2	2	2	2	3	2
Methyl Isobutyl Ketone	3	3	2	2	2	2	3	2
Milk - Fresh and Sour	2	3	2	2	2	2	2	2
Mineral Oil	2	3	2	2	2	2	2	2
Mineral Spirits	2	3	3	3	3	2	3	2
Molasses	2	N	3	3	3	2	3	2
Muriatic Acid	3	3	3	3	3	2	2	2
Mustard	2	3	2	2	2	2	2	2
Naphtha - Aliphatic	3	3	2	2	2	3	3	3
Naphtha - Aromatic (Coal Tar)	3	3	2	2	2	3	3	3
Nitric Acid - 5%	2	3	2	2	2	2	2	2
Nitric Acid - 10%	3	3	2	2	2	3	3	3
Nitric Acid - 25%	3	N	2	2	2	3	3	3
Nitric Acid - 40%	3	N	2	2	2	3	3	3
Nitric Acid - 60%	3	N	2	2	2	2	3	2
Nitric Acid - 73%	N	N	N	N	N	N	N	N
Nitric Acid - 89%	N	N	N	N	N	N	N	N
Oils	2	3	N	N	N	2	2	2
Sour Crude Petroleum	2	3	N	N	N	2	2	2
Animal	2	3	2	2	2	2	2	2
Mineral	2	N	2	2	2	2	2	2
Vegetable	2	N	2	2	2	2	2	2

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Perchloroethylene	3	N	3	3	3	3	3	3
Phenol - 5%	3	3	2	2	2	3	3	3
Phenol - 85%	3	N	3	3	3	3	3	3
Phosphoric Acid 10%	2	3	2	2	2	2	2	2
Phosphoric Acid - 20%	2	3	2	2	2	2	3	2
Phosphoric Acid - 50%	2	3	2	2	2	2	3	2
Phosphoric Acid - 85%	3	N	2	2	2	3	3	3
Pine Oil	2	3	2	2	2	2	2	2
Potassium Bicarbonate 10%	2	3	2	2	2	2	2	2
Potassium Carbonate - 25%	2	3	2	2	2	2	2	2
Potassium Chlorate 50%	3	N	3	3	3	3	3	3
Potassium Hydroxide - 10%	2	3	2	2	2	2	2	2
Potassium Hydroxide 25%	2	3	2	2	2	2	2	2
Potassium Hydroxide - 50%	2	N	3	3	3	2	3	2
Propanediol	2	3	2	2	2	2	2	2
Propylene Glycol	3	2	2	2	2	2	3	2
Pyridine	3	N	2	2	2	3	3	3
Salt Brine	2	2	2	2	2	2	3	2
Silicone	2	3	2	2	2	2	2	2
Skydrol	3	N	2	2	2	3	3	3
Sodium Chloride >10%	2	3	2	2	2	2	2	2
Sodium Cyanide - 15%	2	2	2	2	2	2	2	2
Sodium Hydrosulfide - 45%	3	N	2	2	2	3	2	3
Sodium Hydroxide - 10%	2	3	2	2	2	2	2	2
Sodium Hydroxide - 50%	2	3	2	2	2	2	2	2
Sodium Hypochlorite - 3%	3	N	2	2	2	2	3	2
Sodium Hypochlorite - 17%	3	N	2	2	2	2	3	2
Sodium Lauryl Sulfate - 20%	3	3	2	2	2	2	3	2
Sodium Peroxide - Peroxide Bleach	3	3	2	2	2	2	3	2
Sodium Hydroxide Aqueous <73%	2	3	2	2	2	2	2	2
Soybean Oil	2	N	2	2	2	2	3	2
Sulfite Liquor (Paper Industry)	3	N	2	2	2	2	3	2

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Sulfuric Acid - 10%	2	3	2	2	2	2	3	2
Sulfuric Acid - 25%	2	3	2	2	2	3	3	3
Sulfuric Acid - 50%	3	3	2	2	2	3	3	3
Sulfuric Acid - 70%	3	N	2	2	2	3	3	3
Sulfuric Acid - 90-98%	N	N	2	2	2	N	N	N
Tall Oil	2	3	3	3	3	2	3	2
Toluene	3	N	3	3	3	3	3	3
Turpentine	3	N	3	3	3	3	3	3
Urea 50%	2	3	2	2	2	2	2	2
Urea Solutions	2	3	2	2	2	2	2	2
Vinegar	3	3	2	2	2	2	2	2
Water, Distilled & Demineralized	2	2	2	2	2	2	2	2
Water, Deionized	2	2	3	3	3	3	2	3
Whiskey	2	3	2	2	2	2	2	2
White Liquor (Paper Industry)	3	N	3	3	3	2	2	2
Wine	2	3	2	2	2	2	3	2
Xylene	3	N	3	3	3	3	3	3
Xylol	3	N	3	3	3	3	3	3
Zinc Chloride 70%	3	N	3	3	3	3	3	3
Key								
1 = No Damage								
2 = Splash and Spill with Constant Clean Up								
3 = Splash and Spill with Immediate Clean Up								
N = Not Recommended								