



UCON Quenchant A and A-NN

Product Description

UCON™ Quenchant A and A-NN (non-nitrite) are nonflammable polymeric quenchants manufactured by The Dow Chemical Company. They are aqueous solutions of a liquid organic polymer and a corrosion inhibitor. The organic polymer is soluble in water and produces a homogenous solution. At temperatures above 74°C (165°F), however, the polymer separates from water as an insoluble phase.

UCON Quenchant A-NN if formulated with a proprietary non-nitrite corrosion inhibitor that is completely compatible with UCON Quenchant A without nitrosamine formation.

Analogous quenching performance is obtained with either UCON Quenchant A or A-NN.

When hot metal is quenched in a diluted solution of UCON Quenchant A or A-NN, a film of the liquid organic polymer is deposited on the surface of the hot metal. The rate at which the metal is cooled is governed, in part, by the thickness of the polymer-rich film. The thickness of this film is controlled by the concentration of UCON Quenchant A or A-NN in the quench bath.

The cooling rate is also controlled by adjusting the quench bath temperature and/or the rate of agitation. These parameters, along with product orientation, allow UCON Quenchant A and A-NN to function uniformly in the heat transfer range from water to medium-speed oils.

Applications

UCON Quenchant A and A-NN are suitable for:

- The heat treatment of carbon and alloy steels by flames, induction and submerged induction heating.
- In batch and continuous furnace operations employing gas-fired and carburizing-carbonitriding atmospheres.
- With wrought, case and forged aluminum alloys.

Advantages and Features

- FM Approvals has classified UCON Quenchant A and A-NN as “FM Approved” as tested against the latest testing criteria.
- UCON Quenchant A product meets AMS3025B specifications.
- The optimum operating conditions for a specific metal or part may be determined by control, bath temperature, and/or agitation.
- UCON Quenchant A and A-NN minimize replacement control because of its low deterioration and/or oxidation rate. The major make-up requirement is for water lost by evaporation.
- UCON Quenchant A and A-NN eliminate the smoke, soot and residues common to oil quenchant. Equipment maintenance and plant cleanliness are easier to achieve and maintain.
- UCON Quenchant A and A-NN are soluble in water and resistant to bacterial growth.
- UCON Quenchant A and A-NN will freeze below 0°C (32°F). They should be thawed to room temperature and mixed before use. The product will not be affected in any way.



Performance

UCON Quenchant A and A-NN are readily adapted to induction and flame hardening, both spray quench and immersion, for such items as gears, crankshafts, camshafts, and other pieces of intricate geometry and different metallurgy.

UCON Quenchant A and A-NN may follow either oxidizing or protective atmosphere furnaces of shake, pit, rotary or continuous design. They may be used for continuous case quenching and for general hardening of forged and cast steels, and cast irons.

UCON Quenchant A and A-NN are a proven quenching agent for wrought, cast, dip-brazed, and forged aluminum alloys. Compared to water-quenching, UCON Quenchant A and A-NN reduce residual stresses in aluminum alloys, resulting in extensive straightening, potential cost savings and improved uniformity of mechanical results.

Typical Physical Properties†

	UCON Quenchant A	UCON Quenchant A-NN
Weight per Gallon @ 20°C, lb	9.13	9.13
Specific Gravity at 20/20°C	1.092	1.095
Flash Point, Cleveland Open Cup, ASTM D 92	None	None
Pour Point, °C (°F)	-16 (3)	-19 (-1)
Rust Inhibition, ASTM D 665A	Pass	Pass
Viscosity at 100°F (37.8°C), SUS	2200 - 2800	2375-2900

†Typical physical properties, not to be construed as specifications

Cooling Curves

Figures 1 and 2 illustrate the rate of cooling achieved with UCON Quenchant A in laboratory tests using a 750 mm x 12.5 mm (dia.) Inconel probe fitted with a Type K thermocouple. Figure 1 illustrates the influence of variations in concentration at constant temperature and agitation. Figure 2 illustrates the change in cooling rate at elevated bath temperatures, again, with uniform agitation. Equivalent results will be obtained with UCON Quenchant A-NN.

Figure 1 ● Concentration Effect on Cooling and Cooling Rate for UCON™ Quenchant A
Agitation Rate = 15 L/min.

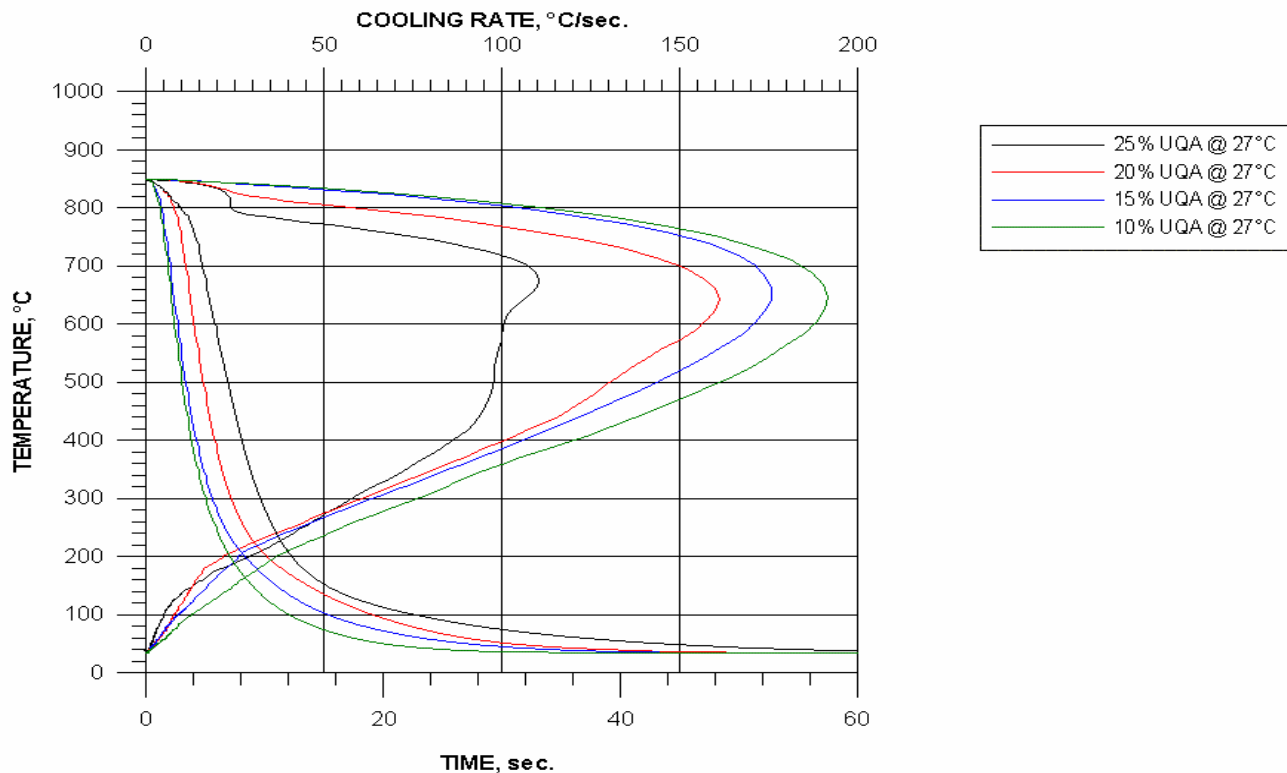
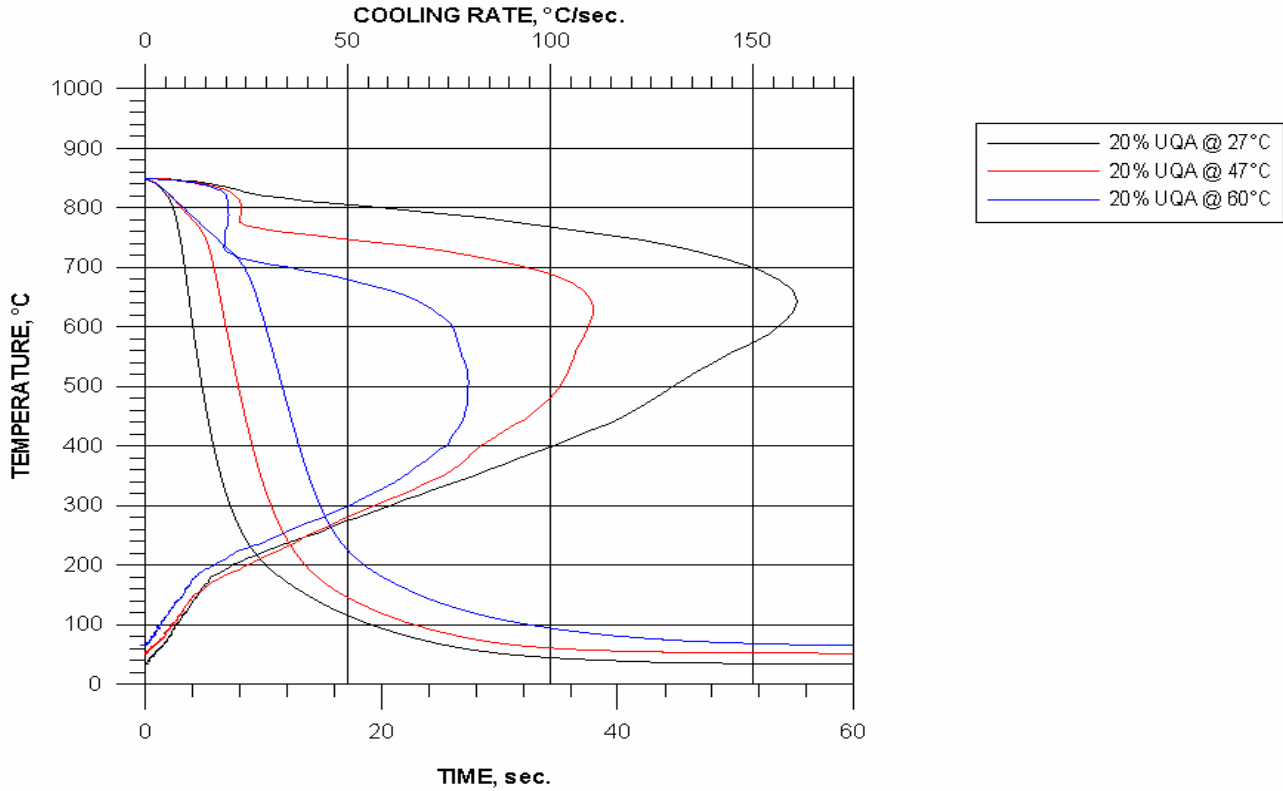


Figure 2 ● Temperature Effect on Cooling and Cooling Rate for UCON™ Quenchant A
 Agitation Rate = 15 L/min.



**Product Use
 Precautions**

Steam and small amounts of organic vapors can be evolved during quenching. The vapors could be irritating and toxic if allowed to accumulate. Adequate workplace ventilation should be provided to prevent irritation and accumulation of vapors; this may require use of a special, local ventilation system in the immediate area where vapors are released.

Where this product is burned under conditions of relatively complete combustion, the major products are carbon dioxide and water vapor. Where this material is subjected to overheating (thermal degradation) but does not burn, the degradation products can be such things as organic acids (formic, acetic acids), aldehydes, esters, ketones, etc. These vapors or fumes can be highly irritating to the eyes, nose, and throat. Special ventilation may be needed. In normal use, no respiratory protective equipment should be needed, but self-contained breathing apparatus should be available for use in emergencies. Small amounts of organic vapors can be formed by oxidation of quenchant. These vapors could be irritating or toxic if released in a poorly ventilated area. Good ventilation should be maintained in the area around quench tanks.

Product Stewardship

Dow encourages its customers and potential users to review their applications from the standpoint of human health and environmental aspects. To help ensure that Dow products are not used in ways for which they are not intended or tested, Dow personnel will assist customers in dealing with environmental and product safety considerations. Dow literature, including Material Safety Data Sheets, should be consulted prior to the use.

For More Information:

North America: toll-free 1-800-447-4369
fax 1-989-832-1465
Europe: toll-free +800 3 694 6367
call +32 3 450 2240
fax +32 3 450 2815
Pacific: call +852 2879 7260
fax +852 2827 5881
Other Areas: call 1-989-823-1560
fax 1-989-832-1465
<http://www.dow.com>

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