

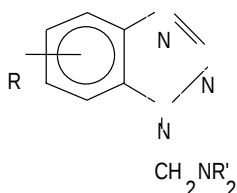
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IRGAMET® 42

Water soluble metal deactivator

Typical chemical and physical properties

IRGAMET 42 is a liquid, water / glycol soluble, tolutriazole derivative which acts as a metal deactivator



Appearance	Clear brown liquid
Viscosity at 40 °C	33 mm²/s
Melting point	< 5 °C
Density at 20 °C	1.16 g/cm³
Flash point	Not applicable
Solubility	
Water	Between 1% and 15% there is a solubility gap. At all other ratios fully miscible.
Mineral oil	< 0.01%
Nitrogen content	17.5%

Applications and typical treat levels recommended

All types of water based fluids, when used at 0.1 - 0.3% with pH > 7, such as :
 Antifreeze (engine coolants)
 High water based hydraulic fluids (HFA)
 Water glycol hydraulic fluids (HFC)
 Metal working fluids (emulsions and synthetics)

Benefits

Easy to handle liquid
 Suitable replacement for benzotriazole and tolutriazole
 Protects yellow metals and cobalt alloys from corrosion

Restrictions

Not recommended for use in combination with nitrites due to the possible formation of nitrosamines

May begin to crystallise if stored at temperatures below 5 °C
In water and in glycols there is a solubility gap. (Details are available on request).

Performance benefits : Metal surface protection

Multimetal protection

IRGAMET 42 is an effective metal deactivator for formulating HFC fluids meeting the multimetal protection requirements of the 7 th Luxembourg report

Test fluids

IRGAMET 42 Base fluid ⁽¹⁾	(%)	- neat	0.05 balance	0.1 balance	Specified limits
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CECA test
7 th Luxembourg report
method 5.9 ⁽²⁾
35 °C, 28 days

Test specimen weight loss	(mg)				
Steel	0.1	0.3	0.2	11 max	
Copper	22	1.6	1.4	11 max	
Zinc	+ 13.7	+ 0.7	0.1	22 max	
Aluminium	+ 0.8	0.1	0.1	5.5 max	
Cadmium	+ 13.6	+ 1.9	+ 1.3	22 max	
Brass	0	0.7	0.8	11 max	
Steel ⁽³⁾	0.4	0.5	0.4	(4)	
Cadmium	+ 25.2	+ 2.9	+ 3.0		
Copper ⁽³⁾	16.6	1.4	1.1	(4)	
Zinc	+ 22.6	+ 0.7	+ 2.1		
Aluminium ⁽³⁾	0	0.2	0.3	(4)	
Zinc	+ 16.8	0.5	+ 0.3		
Steel ⁽³⁾	0.6	0.4	0.2	(4)	
Aluminium	0.1	0	+ 0.2		

⁽¹⁾ Commercially available HFC fluid, not containing any metal deactivator

⁽²⁾ The 7 th Luxembourg Report, visual assessment is omitted

⁽³⁾ Pairs of metal were electrically coupled

⁽⁴⁾ Not specified

Multimetal protection

The combination of IRGAMET 42 and Irgacor L 190 neutralised with triethanolamine is very effective in providing multimetal protection in aqueous fluids e.g. HFC

Test fluids

IRGAMET 42	(%)	-	0.1	-	0.25
Irgacor L 190	(%)	-	0.95	-	1.4
Distilled water		neat	balance	-	-
HFC test fluid ⁽¹⁾		-	-	neat	balance
pH adjusted with triethanolamine		8.5	8.5	8.5	8.5

(IP 329 test)
50 °C, 330 hrs

Metal weight change	(mg)				
Copper		- 1.6	- 0.3	- 2.5	0
Cadmium		- 85	- 2.8	- 120	- 7.6
Brass		- 1.4	- 0.1	- 2.2	- 0.3
Cast iron		- 79	- 0.5	- 27	- 0.4
Steel		- 5.7	- 0.2	- 2.9	- 0.1
Aluminium		+ 11	- 0.8	- 0.2	0
Zinc		- 120	- 2.8	- 45	- 4.1

⁽¹⁾ HFC test fluid Ethylene glycol 40 % wt
 Polyethylene glycol 40 % wt
 Water 20 % wt

**Engine coolants
Multimetal protection**

The liquid IRGAMET 42 gives the same level of multimetal protection as the solid benzotriazole in engine coolants.

Engine coolant concentrate		
Borax	(%)	3.0
Phosphoric acid	(%)	1.1
Triethanolamine	(%)	2.9
Ethylene glycol		balance

Test fluids

IRGAMET 42	(%)	0.2	-
Benzotriazole	(%)	-	0.2
Engine coolant concentrate	(%)	33.0	33.0
Water according to ASTM D 1384		balance	balance

Ford glassware test
(ASTM D 1384)
14 days, 88 °C, air

Metal specimen wt. loss	(mg/cm ²)		
Copper		0.06	0.06
Solder		0.016	nil
Brass		0.2	0.2
Cast iron		nil	0.2
Steel		0.06	0.14
Al alloy		1.3	1.7

Engine coolants

Use of IRGAMET 42 and Irgacor L 190 enable the formulation of nitrate / nitrite free engine

Multimetal protection

coolants with good multimetal protection

Engine coolant concentrate		
IRGAMET 42	(%)	0.1
Borax	(%)	1.2
Caustic soda, NaOH (30%)	(%)	1.2
Irgacor L 190	(%)	1.0
Sodium silicate (40° Bé) ⁽¹⁾	(%)	0.05
Ethylene glycol		balance

Test fluids

Engine coolant concentrate ⁽²⁾	(%)	50	FORD
Water according to ASTM D 1384		balance	norm MB-BL1-1

Ford glassware test
(ASTM D 1384)
14 days, 88 °C, air

Metal specimen wt. loss	(mg/cm ²)		max.
Copper		0.16	0.3
Solder		0.28	0.6
Brass		0.16	0.3
Cast iron		0.03	0.3
Steel		0.08	0.3
Al alloy		0.33	1.1

⁽¹⁾ Density in degree Baumé

⁽²⁾ Note: 50 % dilution was used instead of 33 % as mentioned in ASTM D 1384

Engine coolants

The liquid IRGAMET 42 provides the same degree of copper protection, but better ferrous.

Copper protection

metal inhibition, than the solid tolutriazole in an engine coolant conforming to the French Standard NF R 15-601.

Test fluids

IRGAMET 42	(%)	-	0.2	NF R 15-601
Tolutriazole	(%)	0.2		
Engine coolant		balance	balance	Spec. limits

Corrosion test
(NF R 15-602-7)
100 °C, 6 l air/hr, 336 hrs

Copper ⁽¹⁾ weight change	(mg)			(mg)
after physical treatment ⁽²⁾		+ 0.1	0	-
after chemical treatment ⁽³⁾		- 1.4	- 1.5	- 5 < to < + 5
visual appearance ⁽⁴⁾		7	7	
Solder ⁽¹⁾ weight change	(mg)			
before treatment		- 1.1	- 0.8	-
after treatment		- 1.6	- 1.3	- 5 < to < + 5
visual appearance		8	6	
Brass ⁽¹⁾ weight change	(mg)			
before treatment		- 0.1	- 1.4	-
after treatment		- 0.2	- 2.3	- 5 < to < + 5
visual appearance		8	7	
Steel ⁽¹⁾ weight change	(mg)	- 8.9	- 0.4	- 2.5 < to < + 2.5
visual appearance		M6	8	
Cast Iron ⁽¹⁾ wt. change	(mg)	- 3.4	- 0.8	- 4 < to < + 4
visual appearance		7	7	
Cast aluminium ⁽¹⁾ wt. change	(mg)			
before treatment		+ 21.6	+ 21.3	-
after treatment		- 11.5	- 14.4	- 10 < to < + 20
visual appearance		M3	M3	

pH test
(NF T 78-103)

pH of fresh fluid	7.44	7.70	7.0 < 8.5
pH after test	7.33	7.56	

Reserve alkalinity test
(NF T 78-101)

Reserve alkalinity fresh(ml HCl 0.1N)	13.2	15.8	> 10
Reserve alkalinity after test	11.5	12.8	

- (1) Copper: UNS C 11000 or C 13000 (SAE J 463) Solder : Grade 30 A or 30 B (ASTM B 32) Brass : UNS C 26000 (SAE J 463) Steel : UNS G 10200 (SAE J 403) Cast iron: FGL 200 (INF A 32-101) Cast aluminium : A-S5 U3 Y30 (INF A 57-702) These are typical metals/alloys used in the construction of engines.
- (2) Wash and brush (brass brush) ferrous metals, use soft brush on other specimens, under distilled or deionised water. Dry with acetone and soft paper. Leave for 1 hr in a desiccator. Weigh. Assess visual appearance.

- (3) Not for ferrous metals.
Copper and brass: 15 secs in HCl 37% soln(1:1) water. Then soft brush under tap water.
Solder: 5 mins in boiling soln. of 1% glacial acetic acid. Then soft brush under tap water.
Cast Al: 5 mins in 2% soln H₃PO₄ (85%) at 80 °C.
- (4) Appearance:
1 = metal salts deposits on total surface
5 = pits or marbled on 25% of surface
10 = unchanged
P = pitting , M = marbled

Rinse under tap water. Soft brush under tap water and rinse again. Repeat until deposit film disappears. Take all metals, rinse with distilled or deionised water. Dry with acetone and soft paper. Leave for 1 hr in desiccator and weigh.

Corrosion inhibition

Mixtures of IRGAMET 42 and Irgacor L 190 are very effective in providing iron protection.

Test fluids

pH 8.5 adjusted with triethanolamine
water DIN 51 360 hard water

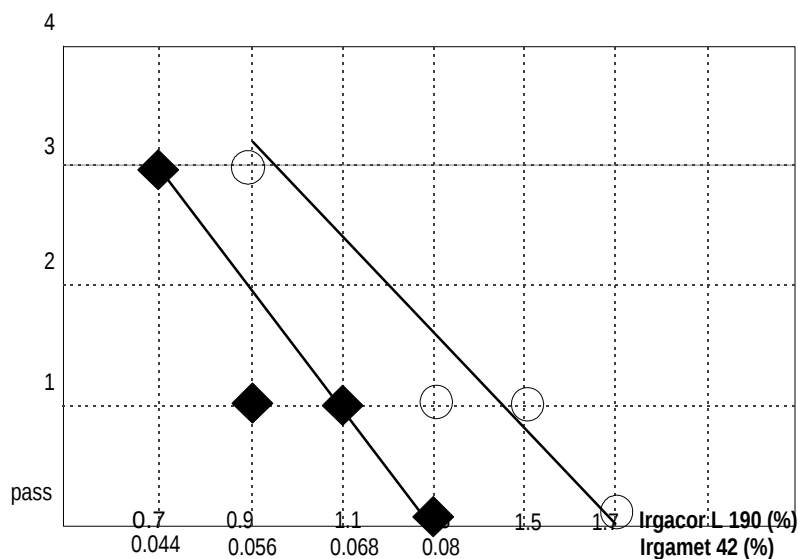
○ Irgacor L 190

◆ Irgacor L 190 / IRGAMET 42
(ratio of concentration Irgacor L 190 : IRGAMET 42 = 15 : 1)

(IP 287 test)

Cast iron chips on filter paper

Rating IP 287



Metal working fluids

Inhibition of cobalt leaching

IRGAMET 42 provides effective control of cobalt leaching to protect tools and MWF colouration (from cobalt containing steel chips / swarf)

Test fluids

IRGAMET 42	(%)	-	0.1
Base fluid ⁽¹⁾		neat	balance
pH adjusted with triethanolamine		8.8	8.8

Cobalt leaching test
50 ml test fluid together with 25 mg cobalt powder and 5 g glass beads (4 mm) are shaken intensively together for 5 days at ambient temperature. Then the solution is filtered off. Concentration of cobalt ions determined by atomic absorption.

Co concentration in test fluid (ppm)	530	0.4
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⁽¹⁾ Fully formulated metal working fluid diluted with DIN 51 360 hard water
pH = 8.8 (adjusted with triethanolamine)

Safety and Handling

Please read Material Safety Data Sheet (MSDS) before handling.

Product Specification

This information is available on request through our local representative.

Packaging

This information is available on request through our local representative.

Safety

When using this product, the information and advice given in our **Safety Data Sheet** should be observed. Due attention should also be given to the **precautions** necessary for handling chemicals.

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights, etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

BASF Corporation
100 Campus Drive
Florham Park, NJ 07932
www.basf.com/automotive-oil