

# QuadraPure™ Metal Scavengers

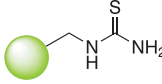
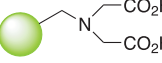
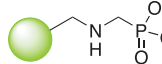
## Application Guide

Sigma-Aldrich is pleased to announce an agreement with Reaxa Ltd. to distribute QuadraPure™ metal scavengers worldwide.

The QuadraPure™ range of functionalized macroporous and microporous resins are intended to solve problems associated with metal contamination arising during pharmaceutical or fine chemical processing from R&D scale through to manufacture. The very low levels of extractable impurities make QuadraPure™ products particularly suitable for use in GMP-compliant applications.

QuadraPure™ Metal Scavengers are available in 5g, 25g, 100g units, and bulk.

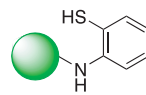
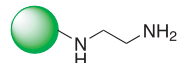
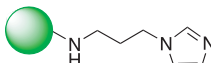
### Macroporous

Prod. No.	Name	Structure	Typical Experimental Capacity	Metals Removed	Effective in acid/base
65,542-2	QuadraPure™ TU		0.19 mmol/g (based on Pd(OAc) <sub>2</sub> in DCM)	Pd, Pt, Ru, Au, Ag, Cu(I), Hg, Pb, Cd, Ni	Y/Y
65,702-6	QuadraPure™ IDA		0.16 mmol/g (based on Cu(acac) <sub>2</sub> in DCM)	Fe(III), Al(III), Ga(III), In(III), Cu, Va, Pb, Ni, Zn, Cd, Fe(II), Be, Mn, Ca, Mg, Sr, Ba	Y <sup>a</sup> /Y
65,761-1	QuadraPure™ AMPA		0.17 mmol/g (based on Ni(acac) <sub>2</sub> in DCM)	Fe, Cu, Ni Multivalent metal ions, particularly transition metals	Y <sup>a</sup> /Y

<sup>a</sup>pH <2 gives poorer scavenging

### Microporous

The microporous resins demonstrate excellent scavenging properties, particularly for palladium, at different pH values, and in the presence of competing ligands and substrates. Metal loading capacity can be significantly higher for these microporous products.

Prod. No.	Name	Structure	Functional Group Loading	Metals Removed	Effective in acid/base
65,766-2	QuadraPure™ MPA		1.5 mmol/g	Pd, Ru, Rh, Hg, Au, Ag, Cu(I), Hg, Pb, Ir, Pt and Cd	Y/Y
65,764-6	QuadraPure™ AEA		1.3 mmol/g	Pd + many multivalent transition metals	N/Y
65,765-4	QuadraPure™ IMDAZ		1.5 mmol/g	Pd, Os, Co + many multivalent transition metals	N/Y



www.reaxa.com

QuadraPure is a trademark of Reaxa Ltd.

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To inquire about bulk quantities for any of the products listed above, please call 800-244-1173 (USA) or visit us at [www.safcglobal.com](http://www.safcglobal.com).

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# Scavenging Capabilities of QuadraPure™

## Macroporous and Microporous Resins

### Palladium Salt Removal Using QuadraPure™ Resins

QuadraPure™	Palladium Removal (%)				
	Pd(OAc) <sub>2</sub> in DCM	Pd <sub>2</sub> (dba) <sub>3</sub> in DCM	Pd(OAc) <sub>2</sub> in DMF	Pd(OAc) <sub>2</sub> in THF	Pd(OAc) <sub>2</sub> in DCM/Et <sub>3</sub> N
TU <sup>a</sup>	>99.9	>99.5	99.7	>99.9	95.3
AEA <sup>b</sup>	99.6	99.4	97.1	98.2	97.7
IMDAZ <sup>b</sup>	>99.9	>99.5	>99.9	99.9	95.2
MPA <sup>b</sup>	>99.8	>99.5	99.8	>99.9	95.9

QuadraPure™	Palladium Removal (%)				
	Pd(OAc) <sub>2</sub> in DCM/AcOH	Pd(OAc) <sub>2</sub> /PPh <sub>3</sub> in DCM	PdCl <sub>2</sub> in THF	PdCl <sub>2</sub> in Aq. HCl	Pd(OAc) <sub>2</sub> in Water
TU <sup>a</sup>	>99.7	34.8	99.2	>99.6	97.6
AEA <sup>b</sup>	0	77.7	96.2	-	-
IMDAZ <sup>b</sup>	53.7	68.1	89.3	-	-
MPA <sup>b</sup>	99.8	99.4	5.5	-	-

### Nickel Salt Removal Using QuadraPure™ Resins

QuadraPure™	Initial Ni Content <sup>c</sup> (ppm)	Final Nickel Content (ppm)	% Removal from solution
TU <sup>a</sup>	370	<1	>99.9
IDA <sup>a</sup>	370	<1	>99.9
AMPA <sup>a</sup>	370	<1	>99.9
IMDAZ <sup>b</sup>	370	<1	>99.9

#### Notes:

- <sup>a</sup> Macroporous resin
- <sup>b</sup> Microporous solvent swellable resin
- <sup>c</sup> Nickel acetyl acetonate in DCM
- QuadraPure™ TU, 0.5g resin used per 10ml of 1000ppm solution
- For QuadraPure™ AEA, MPA and IMDAZ four molar equivalents of resin functionality used on palladium.
- In these experiments the QuadraPure™ is simply added to a stirred solution of the palladium salt at room temperature. Higher efficiency would be expected in a flow through mode (cartridge packed with QuadraPure™).
- Higher rates of Pd removal can be achieved by using warm solutions.

### Guidance for Batch Process Use of QuadraPure™ TU:

**Organic Solution:** In organic solutions the resin may be used directly. Simply add 5g of resin per 100ml of 1000ppm solution and leave to gently agitate at room temperature for 3 to 6 hours (in some solvents the reaction may require much less time). The resin may then be removed by filtration. The rate of removal can be increased by adding more resin, increasing the temperature or by increasing the agitation rate.

**Aqueous Solutions:** If the metal is to be removed from an aqueous system, use 5g of resin per 100ml of 1000ppm solution. Wet the resin with methanol (3-4 ml/g dry resin) prior to addition. Gently agitate at room temperature for 16-24 hours (in some solvents the reaction may require less time) and then remove the resin by filtration.



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Technical Support: [info@reaxa.com](mailto:info@reaxa.com)

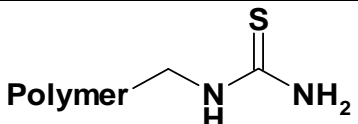
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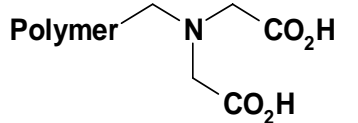
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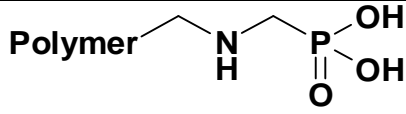


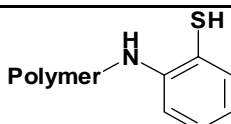
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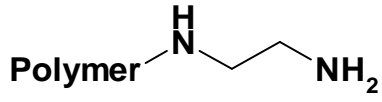
## Metal Scavenger Resins from Sigma-Aldrich

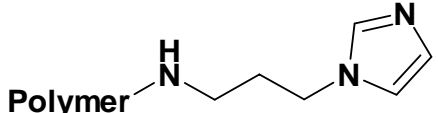
Catalog #	Name	
655422	QuadraPure™ TU	
	Size	PRICE
	5G	¥11,380
	25G	¥47,440
	100G	¥151,800

Catalog #	Name	
657026	QuadraPure™ IDA	
	Size	PRICE
	5G	¥12,020
	25G	¥53,760
	100G	¥177,100

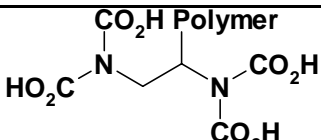
Catalog #	Name	
657611	QuadraPure™ AMPA	
	Size	PRICE
	5G	¥12,020
	25G	¥53,760
	100G	¥177,100

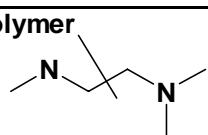
Catalog #	Name	
657662	QuadraPure™ MPA	
	Size	PRICE
	5G	¥15,180
	25G	¥60,090
	100G	¥215,000

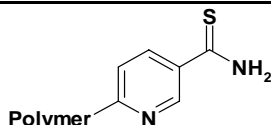
Catalog #	Name	
657646	QuadraPure™ AEA	
	Size	PRICE
	5G	¥15,180
	25G	¥60,090
	100G	¥215,000

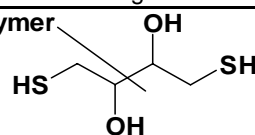
Catalog #	Name	
657654	QuadraPure™ IMDAZ	
	Size	PRICE
	5G	¥15,180
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	100G	¥215,000

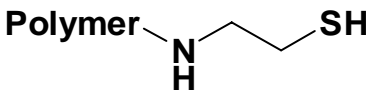
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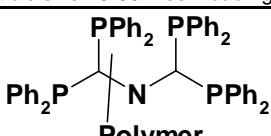
Catalog #	Name	
656844	Ethylenediaminetriacetic acid acetamide, polymer-bound	
	Size	PRICE
	5G	¥61,980
	25G	¥240,300
	100G	¥607,200

Catalog #	Name	
656836	Trimethylethylenediamine, polymer-bound	
	Size	PRICE
	5G	¥61,980
	25G	¥246,700
	100G	¥616,100

Catalog #	Name	
643904	6-Thionicotinamide, polymer-bound	
particle size 70-90 mesh loading: 2.0-3.0 mmol/g N 1 % cross-linked with DVB		
	Size	PRICE
	5G	¥15,900
	25G	¥81,000

Catalog #	Name	
641944	Dithiothreitol, polymer-bound	
particle size 100-200 mesh loading: 2.0-3.0 mmol/g S 1 % cross-linked with DVB		
	Size	PRICE
	5G	¥30,400
	25G	¥139,000

Catalog #	Name	
641022	2-Mercaptoethylamine, polymer-bound	
particle size 70-90 mesh loading: 1.0-1.5 mmol/g 1 % cross-linked with DVB		
	Size	PRICE
	5G	¥13,300
	25G	¥65,800

Catalog #	Name	
643955	Bis[(diphenylphosphanyl)methyl]amine, polymer-bound	
particle size 70-90 mesh loading: 1.0-2.0 mmol/g N 1 % cross-linked		
	Size	PRICE
	5G	¥14,200
	25G	¥67,100

お問い合わせはテクニカルサポート部へ  
sialjpts@sial.com または 03-5796-7330