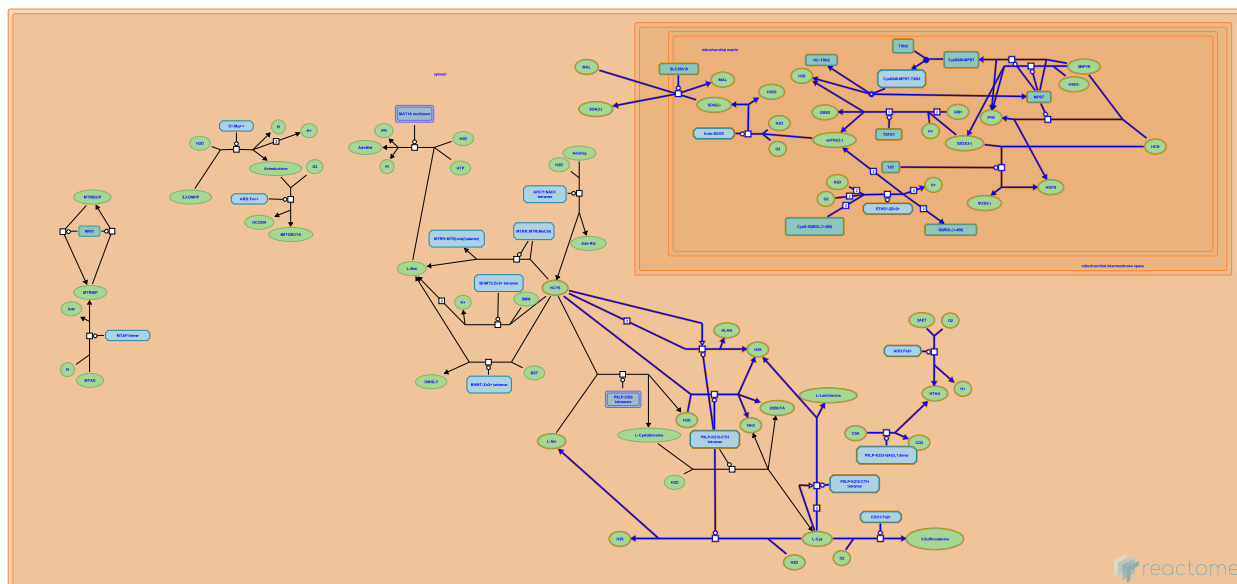


Degradation of cysteine and homocysteine



European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

The contents of this document may be freely copied and distributed in any media, provided the authors, plus the institutions, are credited, as stated under the terms of [Creative Commons Attribution 4.0 International \(CC BY 4.0\) License](https://creativecommons.org/licenses/by/4.0/). For more information see our [license](https://creativecommons.org/licenses/by/4.0/).

Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

Literature references

- Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics*, 18, 142. [↗](#)
- Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics*, 33, 3461-3467. [↗](#)
- Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res*, 46, D649-D655. [↗](#)
- Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology*, 14, e1005968. [↗](#)

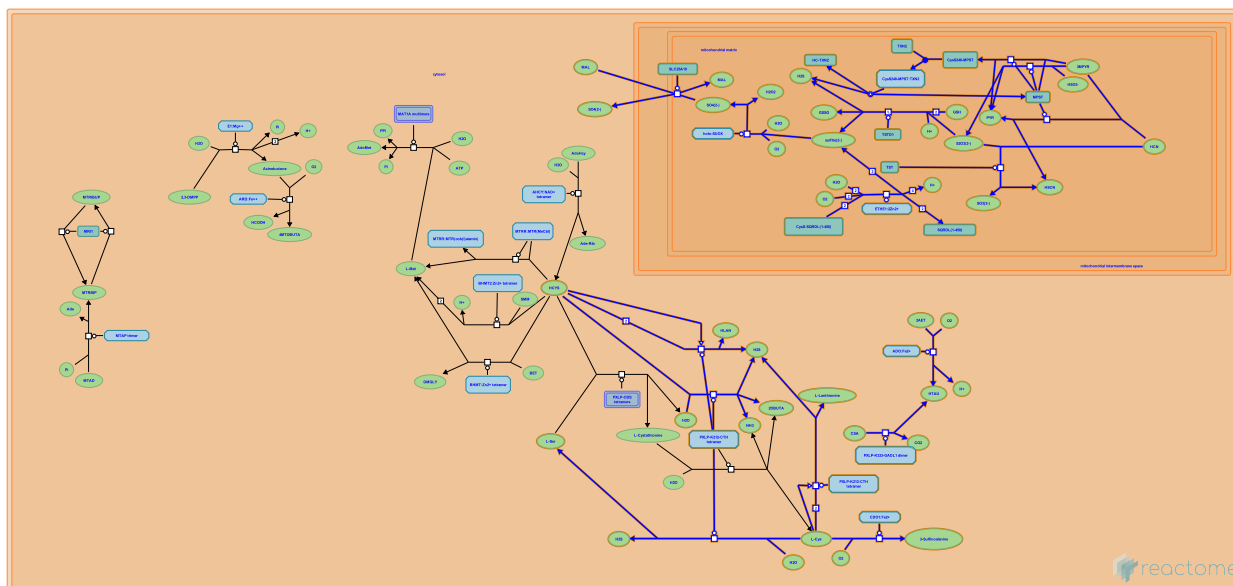
Reactome database release: 70

This document contains 2 pathways and 13 reactions ([see Table of Contents](#))

Degradation of cysteine and homocysteine ↗

Stable identifier: R-CFA-1614558

Inferred from: [Degradation of cysteine and homocysteine \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Homocysteine is degraded to oxobutanoate and H2S ↗

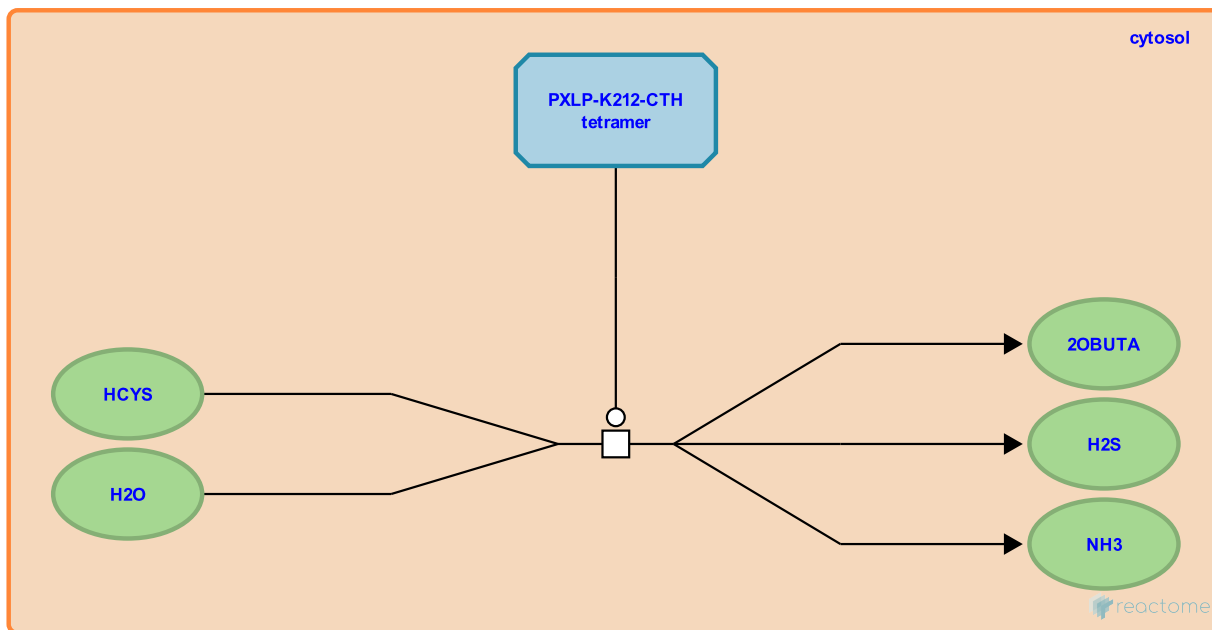
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-1614631

Type: transition

Compartments: cytosol

Inferred from: [Homocysteine is degraded to oxobutanoate and H2S \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Cysteine is degraded to serine and H2S ↗

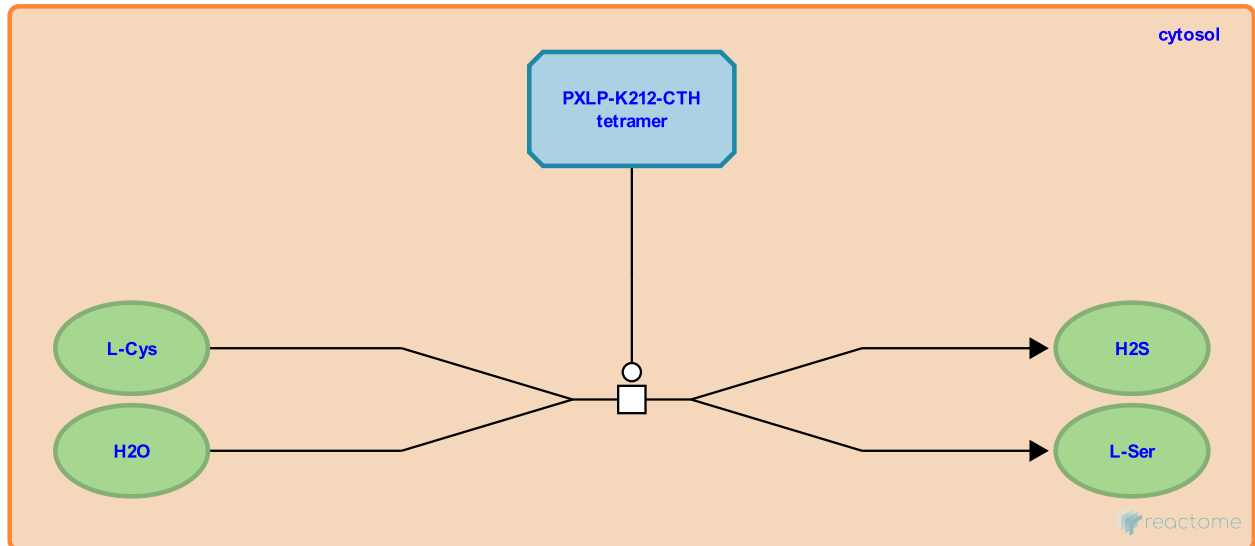
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-1614614

Type: transition

Compartments: cytosol

Inferred from: [Cysteine is degraded to serine and H2S \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

CDO1:Fe2+ oxidises L-Cys to 3-Sulfinioalanine ↗

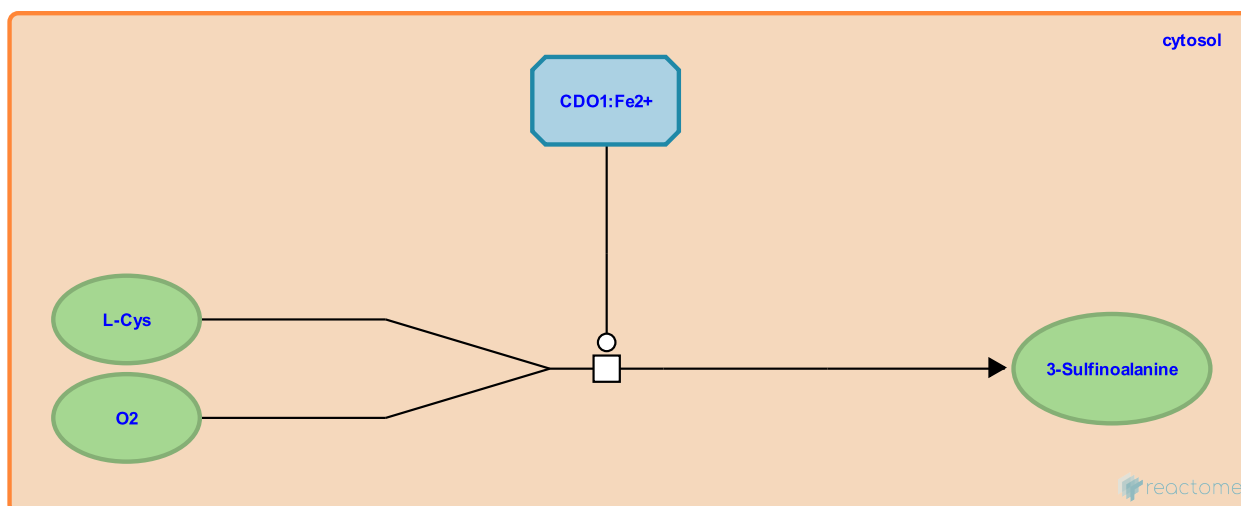
Location: Degradation of cysteine and homocysteine

Stable identifier: R-CFA-1614645

Type: transition

Compartments: cytosol

Inferred from: CDO1:Fe2+ oxidises L-Cys to 3-Sulfinioalanine (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

ADO oxidises 2AET to HTAU ↗

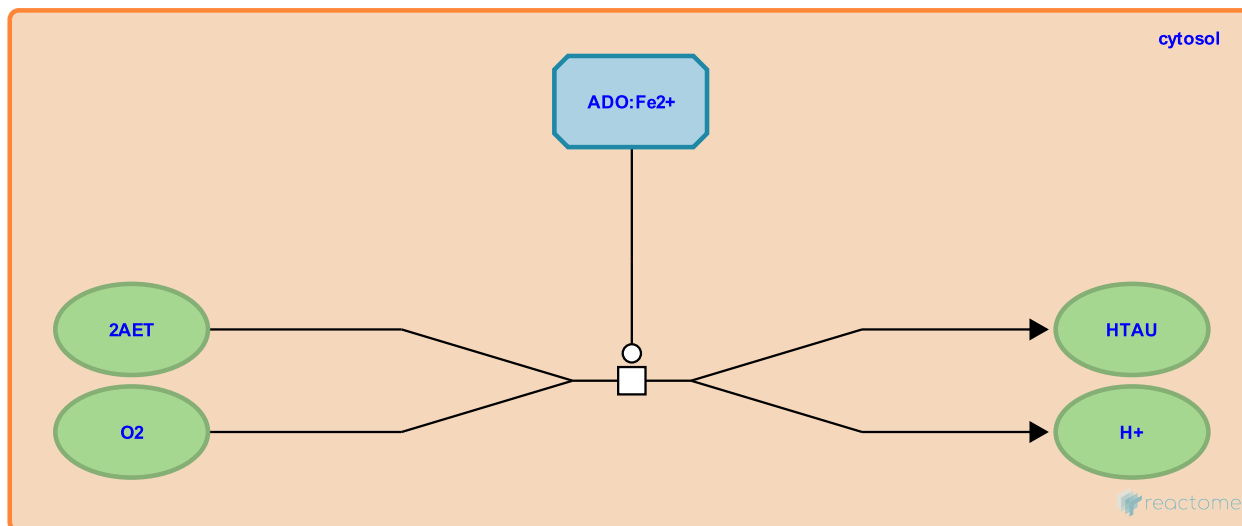
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-6814153

Type: transition

Compartments: cytosol

Inferred from: [ADO oxidises 2AET to HTAU \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

PXLP-K333-GADL1 decarboxylates CSA to HTAU ↗

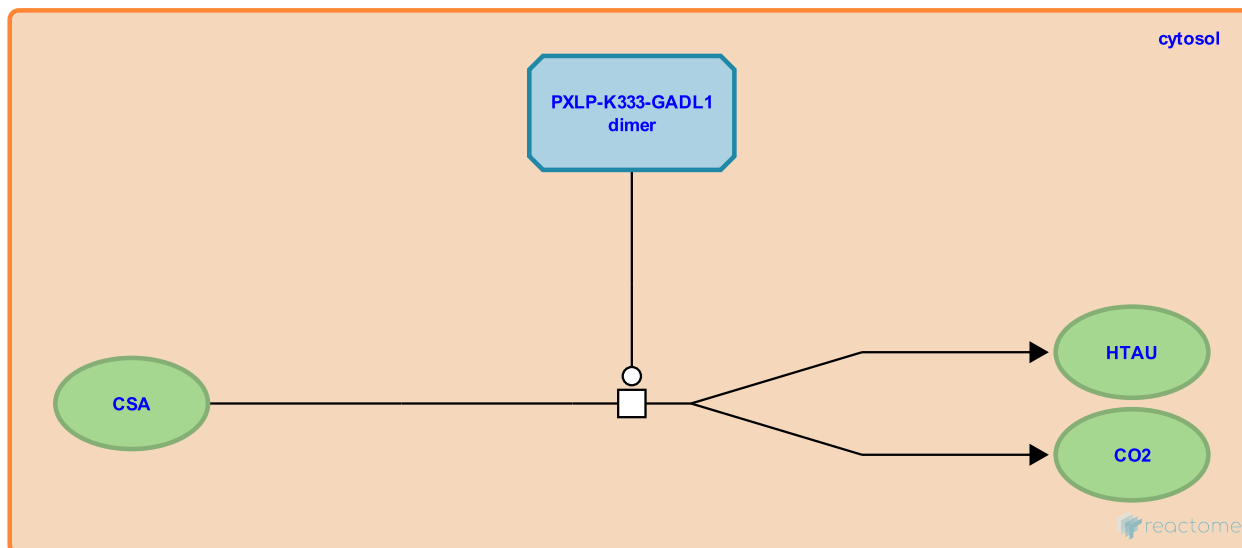
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-6814165

Type: transition

Compartments: cytosol

Inferred from: [PXLP-K333-GADL1 decarboxylates CSA to HTAU \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Excess homocysteine yields homolanthionine and H2S ↗

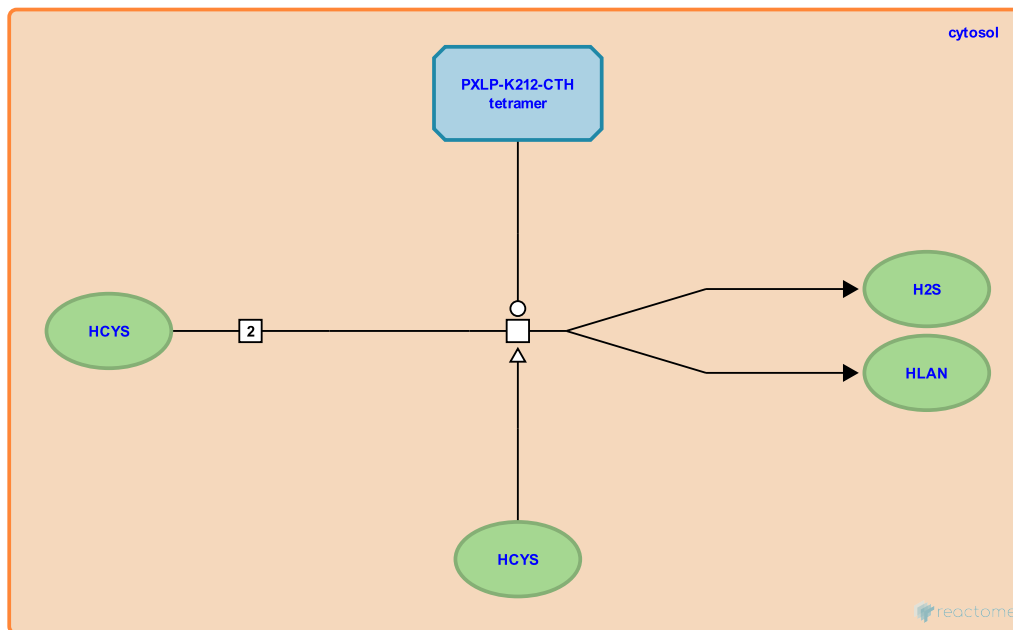
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-1614567

Type: transition

Compartments: cytosol

Inferred from: [Excess homocysteine yields homolanthionine and H2S \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Excess cysteine yields lanthionine and H2S ↗

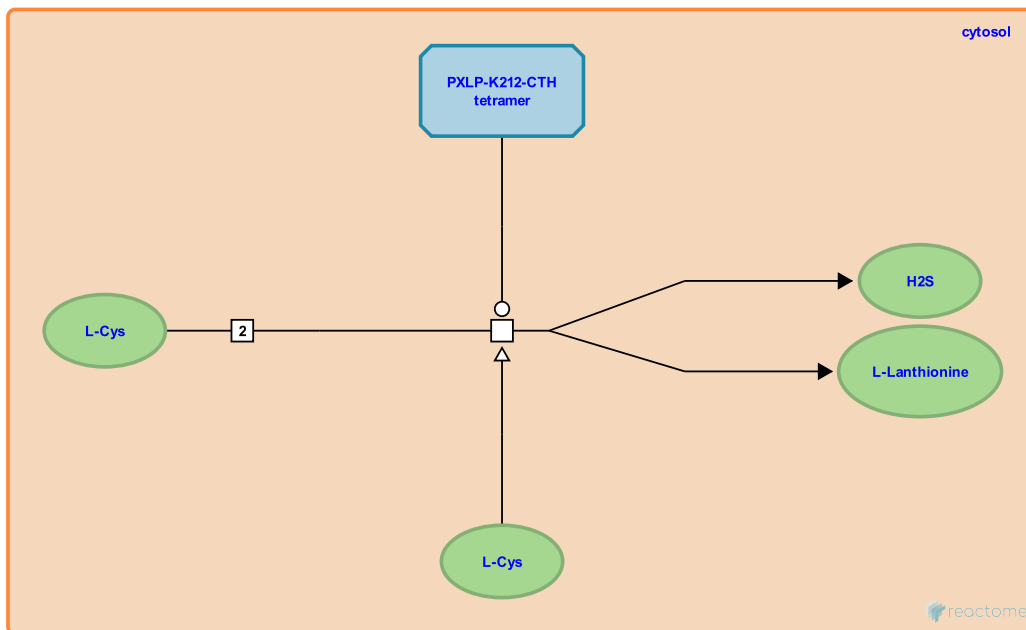
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-1614591

Type: transition

Compartments: cytosol

Inferred from: [Excess cysteine yields lanthionine and H2S \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

MPST transfers sulfur atom from 3MPYR to form CysS248-MPST ↗

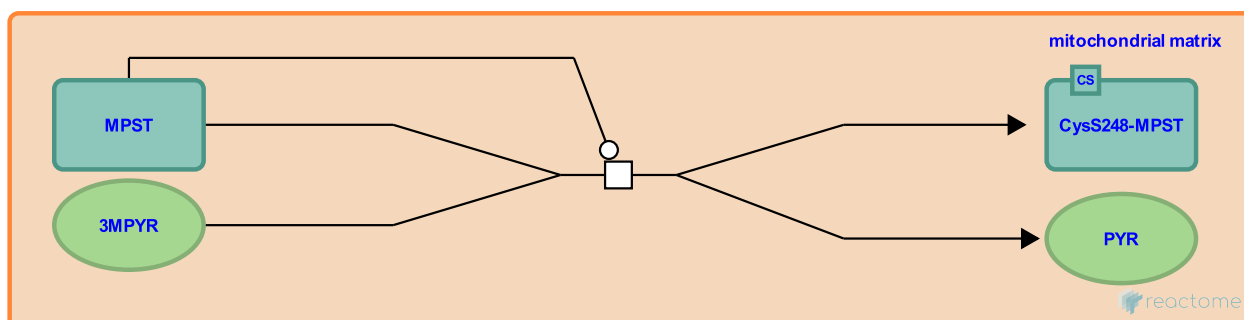
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-9034756

Type: transition

Compartments: mitochondrial matrix

Inferred from: [MPST transfers sulfur atom from 3MPYR to form CysS248-MPST \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Followed by: [TXN2 binds CysS248-MPST](#)

TXN2 binds CysS248-MPST ↗

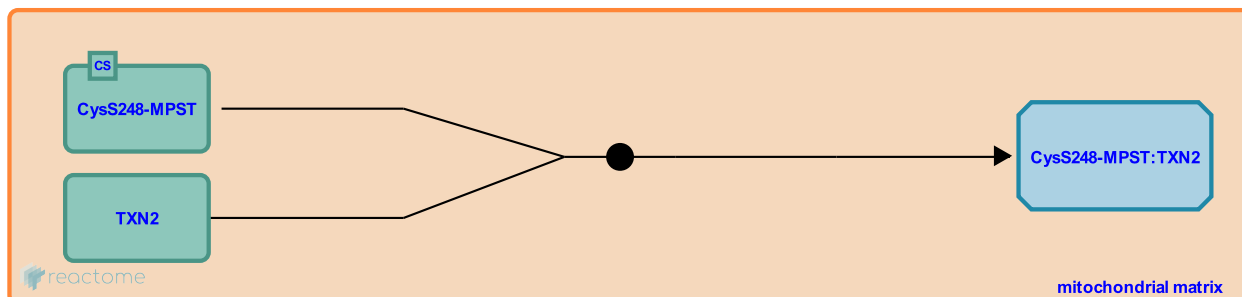
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-9035227

Type: binding

Compartments: mitochondrial matrix

Inferred from: [TXN2 binds CysS248-MPST \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Preceded by: [MPST transfers sulfur atom from 3MPYR to form CysS248-MPST](#)

Followed by: [CysS248-MPST:TXN2 dissociates](#)

CysS248-MPST:TXN2 dissociates ↗

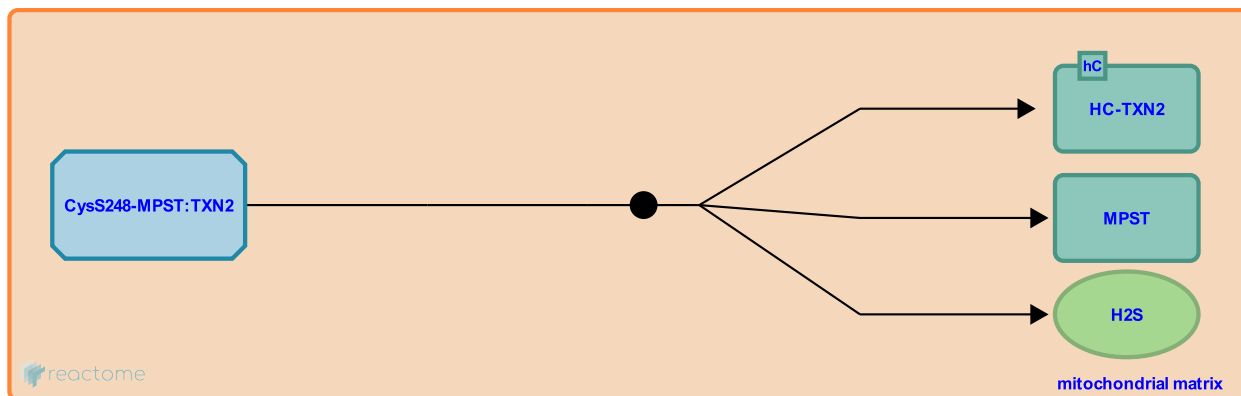
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-9035484

Type: dissociation

Compartments: mitochondrial matrix

Inferred from: [CysS248-MPST:TXN2 dissociates \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Preceded by: [TXN2 binds CysS248-MPST](#)

MPST transfers sulfur atom from 3MPYR to HSO3⁻ to form S2O3(2⁻) and PYR ↗

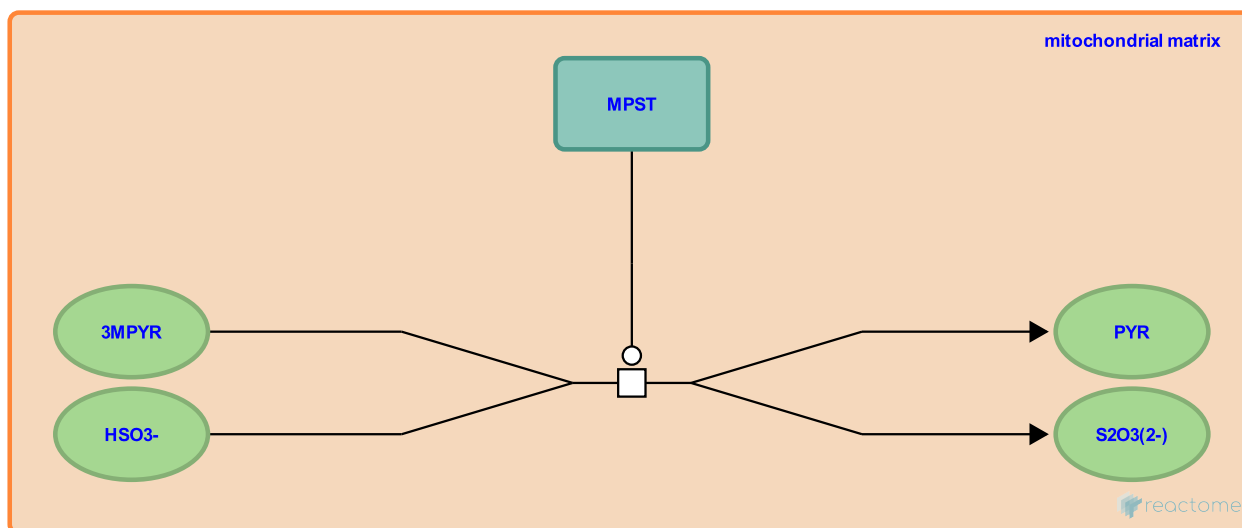
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-9012721

Type: transition

Compartments: mitochondrial matrix

Inferred from: [MPST transfers sulfur atom from 3MPYR to HSO3⁻ to form S2O3\(2⁻\) and PYR \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Followed by: [TST transfers sulfur from S2O3\(2⁻\) to HCN to form HSCN](#)

MPST transfers sulfur from 3MPYR to HCN to form HSCN ↗

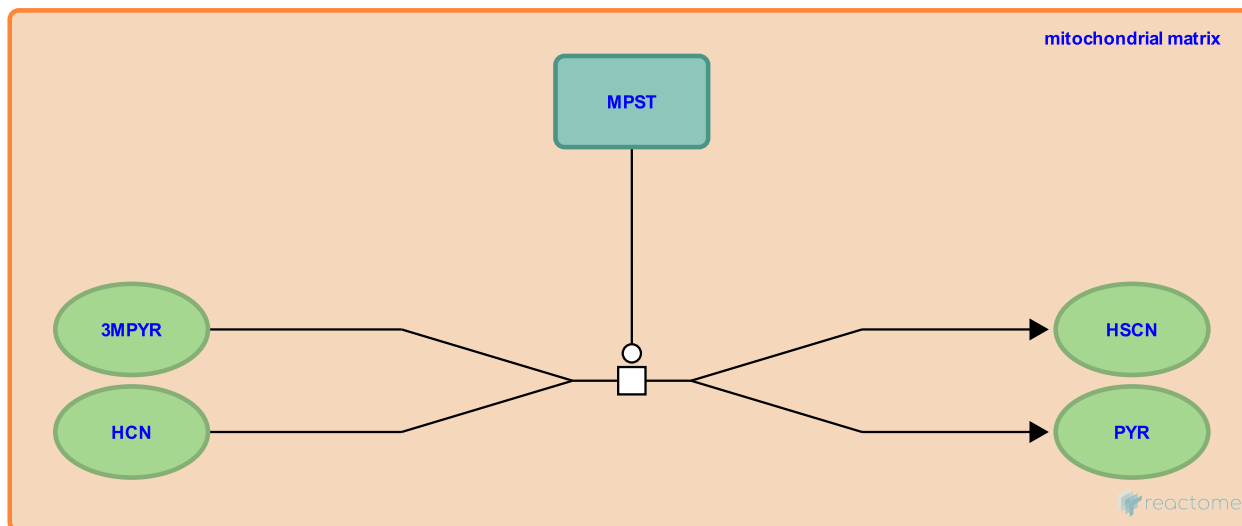
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-9013471

Type: transition

Compartments: mitochondrial matrix

Inferred from: [MPST transfers sulfur from 3MPYR to HCN to form HSCN \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

TST transfers sulfur from S2O3(2-) to HCN to form HSCN ↗

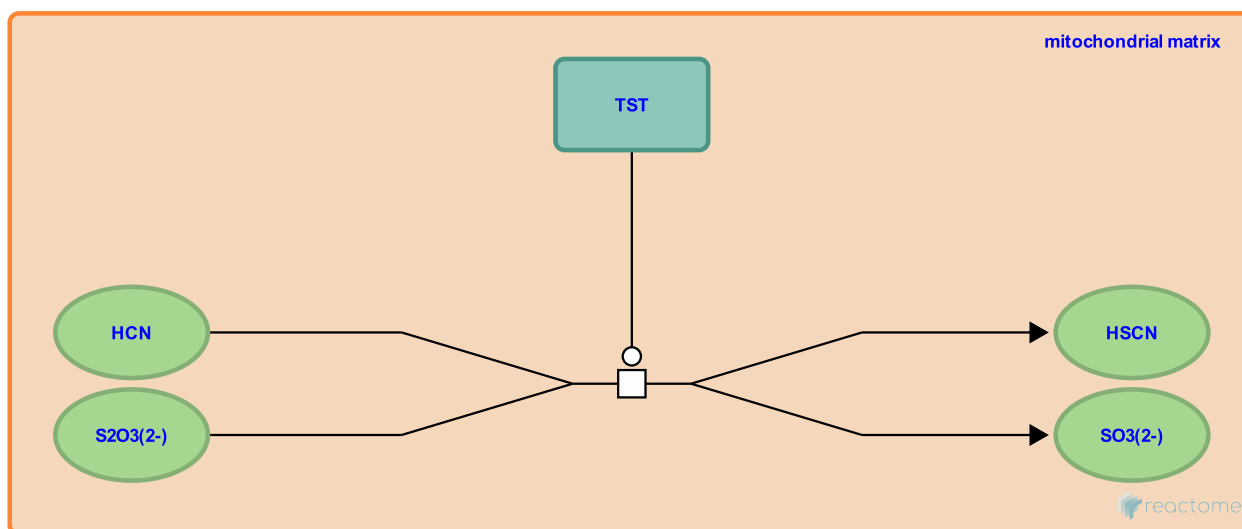
Location: [Degradation of cysteine and homocysteine](#)

Stable identifier: R-CFA-9013198

Type: transition

Compartments: mitochondrial matrix

Inferred from: [TST transfers sulfur from S2O3\(2-\) to HCN to form HSCN \(Homo sapiens\)](#)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

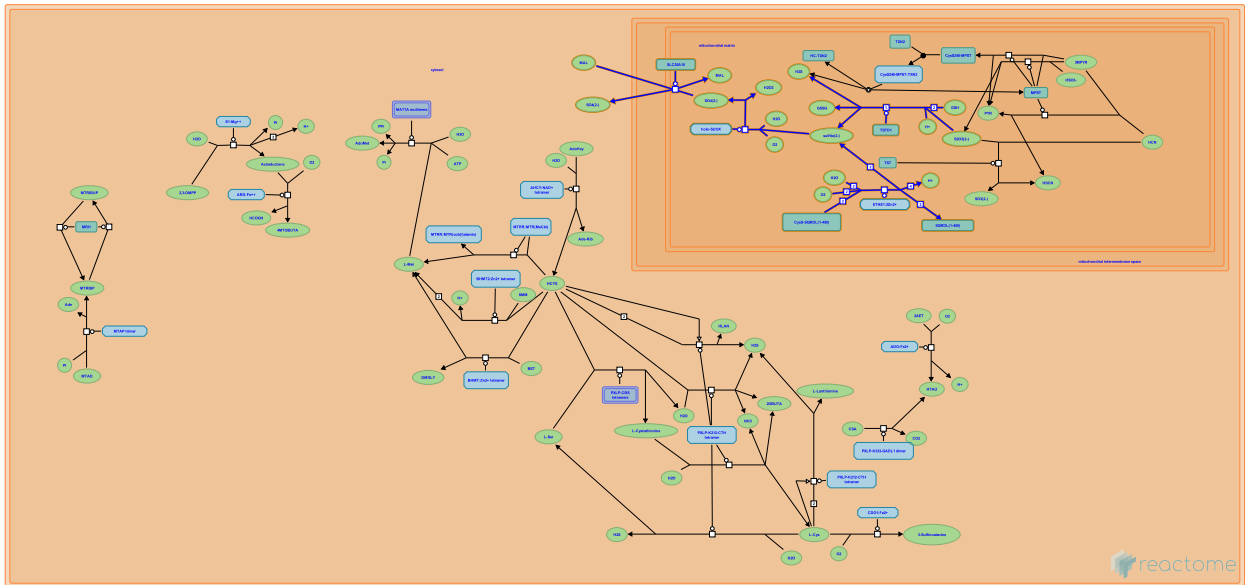
Preceded by: [MPST transfers sulfur atom from 3MPYR to HSO3- to form S2O3\(2-\) and PYR](#)

Sulfide oxidation to sulfate ↗

Location: Degradation of cysteine and homocysteine

Stable identifier: R-CFA-1614517

Inferred from: Sulfide oxidation to sulfate (Homo sapiens)



This event has been computationally inferred from an event that has been demonstrated in another species.

The inference is based on the homology mapping from PANTHER. Briefly, reactions for which all involved PhysicalEntities (in input, output and catalyst) have a mapped orthologue/paralogue (for complexes at least 75% of components must have a mapping) are inferred to the other species. High level events are also inferred for these events to allow for easier navigation.

[More details and caveats of the event inference in Reactome.](/electronic_inference_compara.html) For details on PANTHER see also: <http://www.pantherdb.org/about.jsp>

Table of Contents

Introduction	1
⚡ Degradation of cysteine and homocysteine	2
↳ Homocysteine is degraded to oxobutanoate and H ₂ S	3
↳ Cysteine is degraded to serine and H ₂ S	4
↳ CDO1:Fe ²⁺ oxidises L-Cys to 3-Sulfinoalanine	5
↳ ADO oxidises 2AET to HTAU	6
↳ PXLK-K333-GADL1 decarboxylates CSA to HTAU	7
↳ Excess homocysteine yields homolanthionine and H ₂ S	8
↳ Excess cysteine yields lanthionine and H ₂ S	9
↳ MPST transfers sulfur atom from 3MPYR to form CysS248-MPST	10
↳ TXN2 binds CysS248-MPST	11
↳ CysS248-MPST:TXN2 dissociates	12
↳ MPST transfers sulfur atom from 3MPYR to HSO ₃ ⁻ to form S ₂ O ₃ ⁽²⁻⁾ and PYR	13
↳ MPST transfers sulfur from 3MPYR to HCN to form HSCN	14
↳ TST transfers sulfur from S ₂ O ₃ ⁽²⁻⁾ to HCN to form HSCN	15
⚡ Sulfide oxidation to sulfate	16
Table of Contents	17