Full wwPDB X-ray Structure Validation Report (i)

Mar 5, 2026 – 03:36 PM UTC

PDB ID	:	1RWM / pdb_00001rwm
Title	:	Crystal structure of human caspase-1 in complex with 4-oxo-3-[2-(5-{[4-(quinoxalin-2-ylamino)-benzoylamino]-methyl}-thiophen-2-yl)-acetylamino]-pentanoic acid
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Deposited on	:	2003-12-16
Resolution	:	2.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (i)) were used in the production of this report:

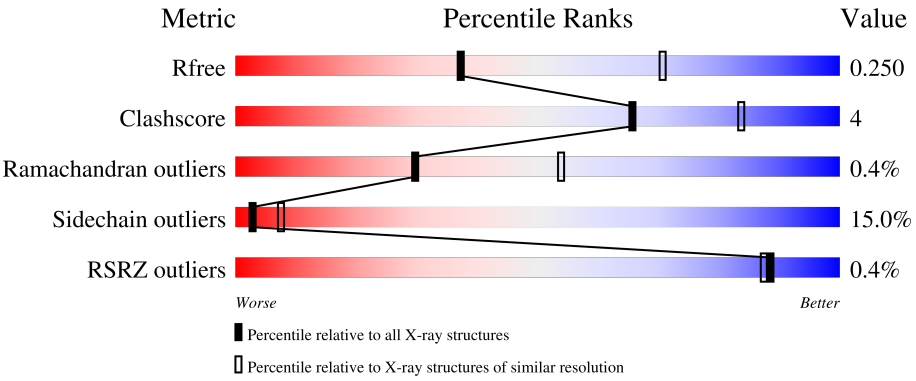
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

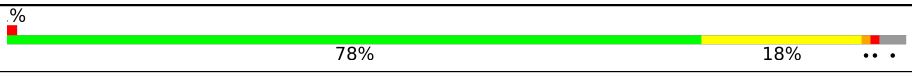
The reported resolution of this entry is 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	178	
2	B	88	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 2175 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

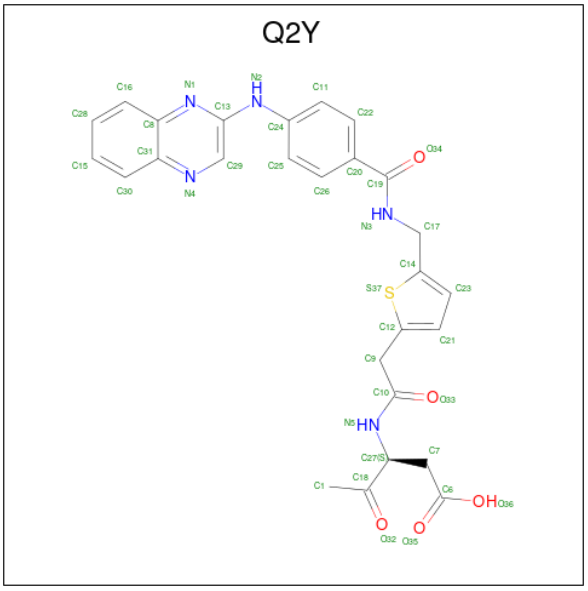
- Molecule 1 is a protein called Interleukin-1 beta convertase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	173	Total	C	N	O	S	0	0	0
			1351	844	235	261	11			

- Molecule 2 is a protein called Interleukin-1 beta convertase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	88	Total	C	N	O	S	0	0	0
			718	457	126	128	7			

- Molecule 3 is 4-OXO-3-[2-(5-{[4-(QUINOXALIN-2-YLAMINO)-BENZOYLAMINO]-METHYL}-THIOPHEN-2-YL)-ACETYLAMINO]-PENTANOIC ACID (CCD ID: Q2Y) (formula: $C_{27}H_{25}N_5O_5S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			37	26	5	5	1		

- Molecule 4 is water.

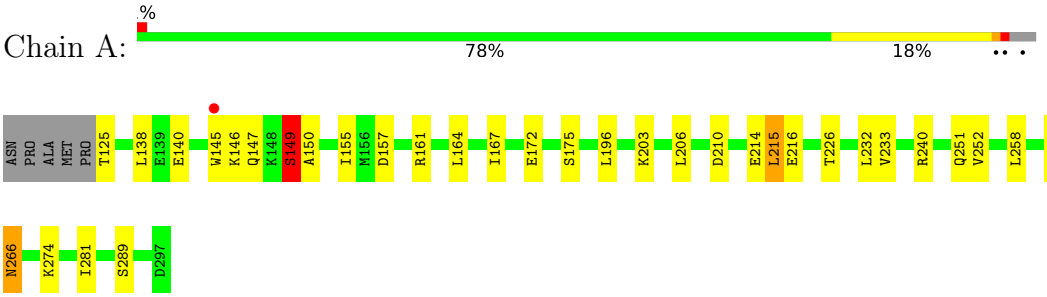
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	44	Total O 44 44	0	0
4	B	25	Total O 25 25	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

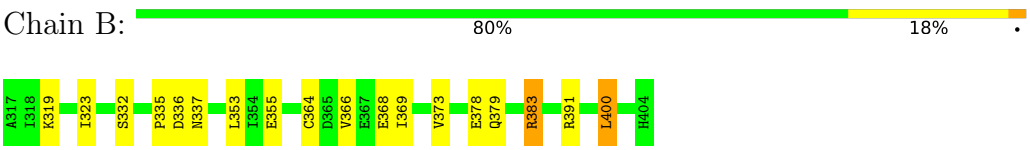
- Molecule 1: Interleukin-1 beta convertase

Chain A:



- Molecule 2: Interleukin-1 beta convertase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	63.22Å 63.22Å 161.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.70 20.00 – 2.70	Depositor EDS
% Data completeness (in resolution range)	96.3 (20.00-2.70) 96.0 (20.00-2.70)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.14 (at 2.71Å)	Xtriage
Refinement program	REFMAC 5.1.19	Depositor
R, R_{free}	0.199 , 0.254 0.196 , 0.250	Depositor DCC
R_{free} test set	441 reflections (4.75%)	wwPDB-VP
Wilson B-factor (Å^2)	36.1	Xtriage
Anisotropy	0.580	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 44.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.46$, $< L^2 > = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	2175	wwPDB-VP
Average B, all atoms (Å^2)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.10% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: Q2Y

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.41	0/1373	0.83	0/1848
2	B	0.41	0/738	0.84	0/995
All	All	0.41	0/2111	0.83	0/2843

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1351	0	1361	10	0
2	B	718	0	693	8	0
3	A	37	0	21	2	0
4	A	44	0	0	0	0
4	B	25	0	0	1	0
All	All	2175	0	2075	16	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (16) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:266:ASN:HB2	2:B:323:ILE:O	1.94	0.67
3:A:501:Q2Y:N1	3:A:501:Q2Y:H25	2.12	0.65
2:B:335:PRO:O	2:B:336:ASP:HB2	2.01	0.59
1:A:266:ASN:HD22	1:A:266:ASN:C	2.11	0.59
1:A:289:SER:HB2	2:B:337:ASN:HD22	1.73	0.54
1:A:167:ILE:HG12	1:A:233:VAL:HB	1.92	0.51
2:B:379:GLN:HB2	4:B:10:HOH:O	2.11	0.50
1:A:203:LYS:HB3	1:A:206:LEU:HD11	1.95	0.48
1:A:203:LYS:HG3	1:A:214:GLU:HG2	1.96	0.47
3:A:501:Q2Y:H16	2:B:383:ARG:HB2	1.97	0.47
1:A:196:LEU:HD22	2:B:400:LEU:HG	1.99	0.45
2:B:366:VAL:HA	2:B:369:ILE:HD12	2.00	0.44
2:B:369:ILE:O	2:B:373:VAL:HG23	2.19	0.42
1:A:206:LEU:HB3	1:A:210:ASP:HB3	2.02	0.42
1:A:149:SER:HB2	1:A:150:ALA:H	1.65	0.42
1:A:215:LEU:HD21	1:A:261:ILE:HG23	2.03	0.41

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	171/178 (96%)	166 (97%)	4 (2%)	1 (1%)	21 44
2	B	86/88 (98%)	84 (98%)	2 (2%)	0	100 100
All	All	257/266 (97%)	250 (97%)	6 (2%)	1 (0%)	30 54

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	149	SER

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	154/158 (98%)	129 (84%)	25 (16%)	2 6
2	B	79/79 (100%)	69 (87%)	10 (13%)	4 11
All	All	233/237 (98%)	198 (85%)	35 (15%)	3 7

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	125	THR
1	A	138	LEU
1	A	140	GLU
1	A	145	TRP
1	A	146	LYS
1	A	147	GLN
1	A	149	SER
1	A	155	ILE
1	A	157	ASP
1	A	161	ARG
1	A	164	LEU
1	A	172	GLU
1	A	175	SER
1	A	215	LEU
1	A	216	GLU
1	A	226	THR
1	A	232	LEU
1	A	240	ARG
1	A	251	GLN
1	A	252	VAL
1	A	258	LEU
1	A	263	ASN
1	A	266	ASN
1	A	274	LYS
1	A	281	ILE
2	B	319	LYS
2	B	332	SER

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Mol	Chain	Res	Type
2	B	353	LEU
2	B	355	GLU
2	B	364	CYS
2	B	368	GLU
2	B	378	GLU
2	B	383	ARG
2	B	391	ARG
2	B	400	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	170	ASN
1	A	195	ASN
1	A	251	GLN
1	A	259	ASN
1	A	266	ASN
1	A	269	ASN
2	B	337	ASN
2	B	358	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	Q2Y	A	501	1	39,40,41	1.12	2 (5%)	53,54,56	1.58	8 (15%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	Q2Y	A	501	1	-	5/26/27/29	0/4/4/4

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	501	Q2Y	C14-S37	-2.44	1.65	1.73
3	A	501	Q2Y	C12-S37	-2.28	1.66	1.73

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	501	Q2Y	C29-C13-N1	-7.30	118.83	121.96
3	A	501	Q2Y	C9-C12-S37	3.31	126.02	120.32
3	A	501	Q2Y	C29-N4-C31	3.10	120.54	116.96
3	A	501	Q2Y	C13-N1-C8	2.75	121.21	117.32
3	A	501	Q2Y	O32-C18-C27	-2.61	118.05	124.77
3	A	501	Q2Y	C17-C14-S37	2.39	126.06	120.70
3	A	501	Q2Y	C13-C29-N4	-2.20	120.18	122.57
3	A	501	Q2Y	C20-C19-N3	2.11	121.50	117.12

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	501	Q2Y	C18-C27-C7-C6
3	A	501	Q2Y	O33-C10-N5-C27
3	A	501	Q2Y	C9-C10-N5-C27

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Mol	Chain	Res	Type	Atoms
3	A	501	Q2Y	N5-C27-C7-C6
3	A	501	Q2Y	C23-C14-C17-N3

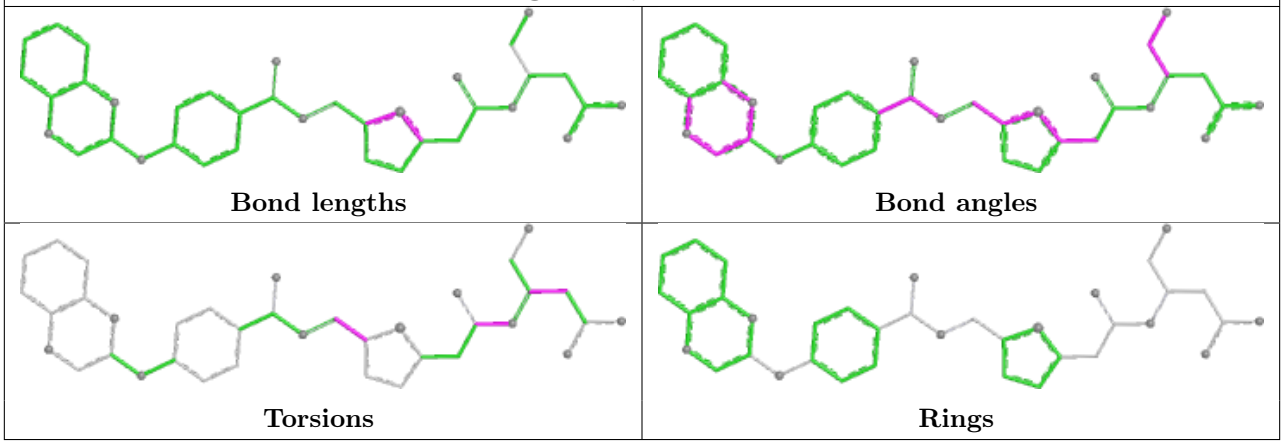
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	501	Q2Y	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand Q2Y A 501



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	173/178 (97%)	-0.34	1 (0%) 85 85	12, 32, 75, 97	0
2	B	88/88 (100%)	-0.57	0 100 100	11, 26, 49, 64	0
All	All	261/266 (98%)	-0.41	1 (0%) 88 87	11, 30, 66, 97	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	145	TRP	2.9

6.2 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

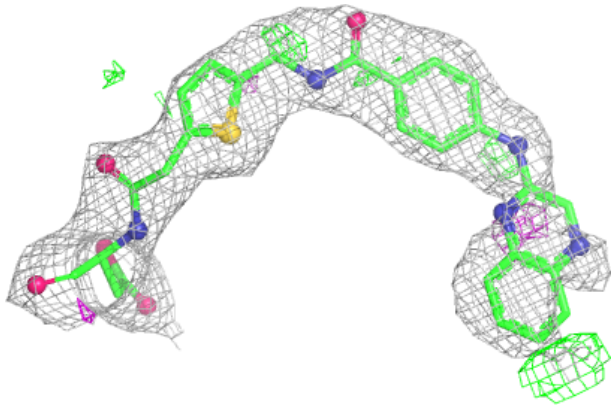
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	Q2Y	A	501	37/38	0.85	0.13	31,45,71,72	0

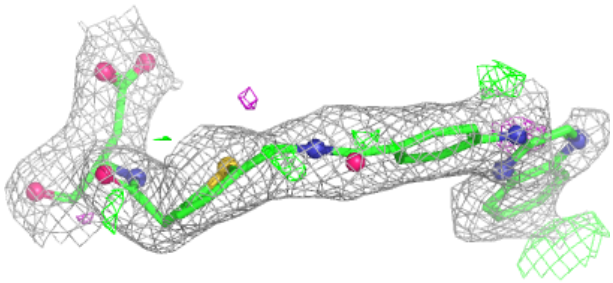
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers

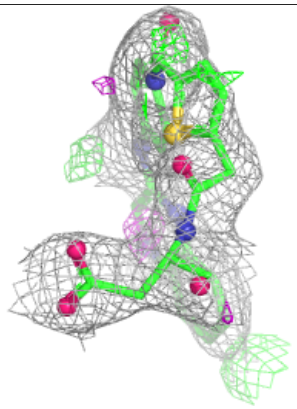
as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Q2Y A 501:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)







6.5 Other polymers (i)

There are no such residues in this entry.