



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 5, 2021 – 04:10 PM JST

PDB ID : 7COZ  
Title : Crystal Structure of double mutant Y115E Y117E human Secretory Glutaminyl Cyclase in complex with LSB-41  
Authors : Dileep, K.V.; Ihara, K.; Sakai, N.; Shirozu, M.; Zhang, K.Y.J.  
Deposited on : 2020-08-05  
Resolution : 1.85 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](mailto: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 ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.16  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.16

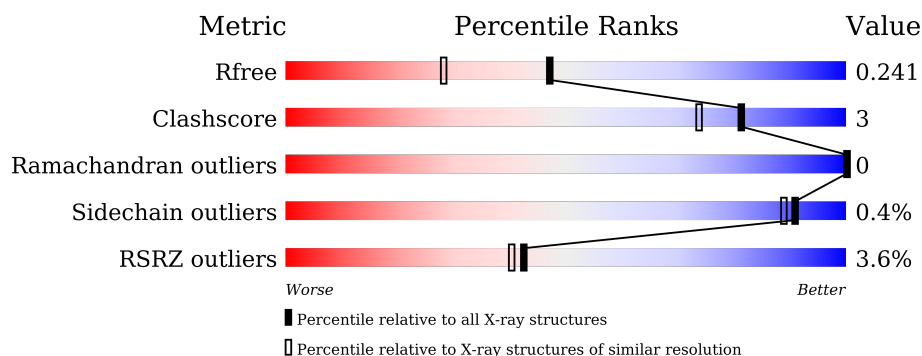
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 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))
$R_{free}$	130704	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	327	<div> <div>3%</div> <div> <div></div> <div>96%</div> <div>.</div> </div> </div>
1	B	327	<div> <div>3%</div> <div> <div></div> <div>95%</div> <div>5%</div> </div> </div>
1	C	327	<div> <div>4%</div> <div> <div></div> <div>94%</div> <div>6%</div> </div> </div>

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8762 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 Glutaminyl-peptide cyclotransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	326	Total	C	N	O	S	0	4	0
			2602	1665	444	484	9			
1	B	326	Total	C	N	O	S	0	4	0
			2604	1665	445	485	9			
1	C	326	Total	C	N	O	S	0	4	0
			2606	1667	446	484	9			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	115	GLU	TYR	engineered mutation	UNP Q16769
A	117	GLU	TYR	engineered mutation	UNP Q16769
B	115	GLU	TYR	engineered mutation	UNP Q16769
B	117	GLU	TYR	engineered mutation	UNP Q16769
C	115	GLU	TYR	engineered mutation	UNP Q16769
C	117	GLU	TYR	engineered mutation	UNP Q16769

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

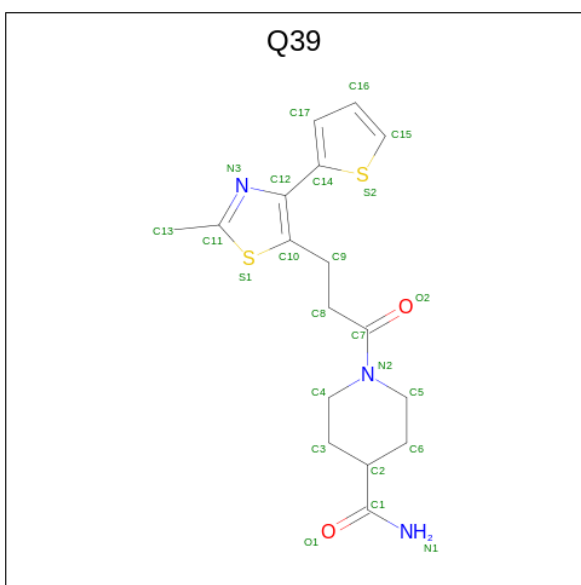
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Zn	0	0
			1	1		
2	A	1	Total	Zn	0	0
			1	1		
2	C	1	Total	Zn	0	0
			1	1		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



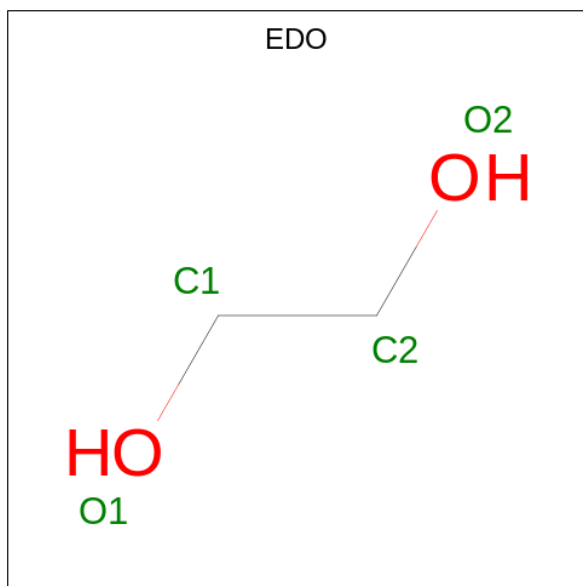
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is 1-[3-(2-methyl-4-thiophen-2-yl-1,3-thiazol-5-yl)propanoyl]piperidine-4-carboxamide (three-letter code: Q39) (formula: C<sub>17</sub>H<sub>21</sub>N<sub>3</sub>O<sub>2</sub>S<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			24	17	3	2	2		
4	B	1	Total	C	N	O	S	0	0
			24	17	3	2	2		
4	C	1	Total	C	N	O	S	0	0
			24	17	3	2	2		

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0

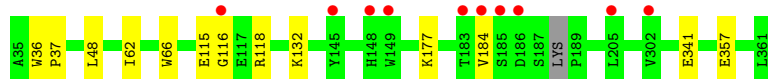
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	260	Total O 260 260	0	0
6	B	252	Total O 252 252	0	0
6	C	264	Total O 264 264	0	0

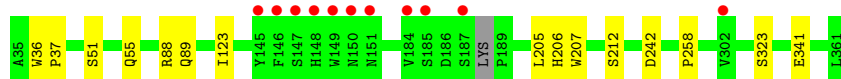
### 3 Residue-property plots [i](#)

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.

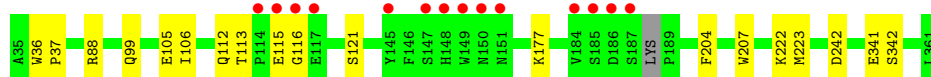
- Molecule 1: Glutaminyl-peptidase cyclotransferase



- Molecule 1: Glutaminyl-peptidase cyclotransferase



- Molecule 1: Glutaminyl-peptidase cyclotransferase



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.23Å 149.37Å 95.38Å 90.00° 97.34° 90.00°	Depositor
Resolution (Å)	43.03 – 1.85 43.03 – 1.85	Depositor EDS
% Data completeness (in resolution range)	100.0 (43.03-1.85) 100.0 (43.03-1.85)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.90 (at 1.86Å)	Xtriage
Refinement program	REFMAC 5.8.0135	Depositor
R, $R_{free}$	0.196 , 0.236 0.201 , 0.241	Depositor DCC
$R_{free}$ test set	5289 reflections (5.20%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.5	Xtriage
Anisotropy	0.100	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 48.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	8762	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.17% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, EDO, Q39, SO4

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	0.38	0/2686	0.52	0/3656
1	B	0.37	0/2685	0.53	0/3654
1	C	0.40	0/2690	0.55	0/3661
All	All	0.38	0/8061	0.53	0/10971

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 [i](#)

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	2602	0	2510	10	0
1	B	2604	0	2504	8	0
1	C	2606	0	2517	19	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
4	A	24	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	24	0	0	0	0
4	C	24	0	0	1	0
5	A	24	0	36	3	0
5	B	28	0	42	2	0
5	C	32	0	48	5	0
6	A	260	0	0	4	0
6	B	252	0	0	2	0
6	C	264	0	0	3	0
All	All	8762	0	7657	41	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 3.

All (41) 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:C:115:GLU:OE1	1:C:204:PHE:HB3	1.26	1.35
1:C:115:GLU:OE1	1:C:204:PHE:CB	2.05	1.04
1:B:89:GLN:HG3	6:B:525:HOH:O	1.68	0.92
1:C:115:GLU:OE1	1:C:204:PHE:CD2	2.27	0.87
1:C:115:GLU:OE1	1:C:204:PHE:HD2	1.64	0.77
1:C:177:LYS:NZ	6:C:501:HOH:O	2.24	0.71
1:C:115:GLU:OE1	1:C:204:PHE:CG	2.47	0.67
1:C:115:GLU:CD	1:C:204:PHE:HB3	2.13	0.67
1:C:106:ILE:HD11	1:C:121:SER:HB3	1.77	0.66
4:C:404:Q39:S1	6:C:719:HOH:O	2.56	0.61
1:A:62:ILE:HG12	1:A:341:GLU:HG2	1.83	0.60
1:A:115:GLU:HA	1:A:115:GLU:OE2	2.01	0.60
1:A:177:LYS:NZ	6:A:505:HOH:O	2.37	0.57
1:C:88:ARG:HD2	1:C:106:ILE:CD1	2.34	0.57
1:C:88:ARG:HD2	1:C:106:ILE:HD11	1.89	0.54
1:C:223:MET:HG2	5:C:410:EDO:H11	1.89	0.54
1:C:207:TRP:H	5:C:407:EDO:H12	1.73	0.53
1:A:66:TRP:CZ3	1:A:341:GLU:HG3	2.45	0.51
1:A:184:VAL:HG12	6:A:639:HOH:O	2.11	0.50
1:B:88:ARG:HG3	1:B:123:ILE:HD11	1.95	0.49
1:C:113:THR:O	1:C:116:GLY:N	2.35	0.49
1:C:222:LYS:HD3	5:C:410:EDO:H12	1.94	0.49
1:C:105[B]:GLU:OE1	5:C:410:EDO:O2	2.30	0.48
1:C:112:GLN:OE1	1:C:116:GLY:HA2	2.13	0.48
1:A:36:TRP:CG	1:A:37:PRO:HD3	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:341:GLU:HG3	1:C:342:SER:N	2.28	0.47
1:A:132:LYS:HZ1	5:A:408:EDO:H22	1.81	0.46
1:B:207:TRP:H	5:B:406:EDO:H22	1.80	0.46
1:A:132:LYS:NZ	5:A:408:EDO:H22	2.31	0.45
1:A:48:LEU:HG	1:A:357:GLU:HG2	1.99	0.45
1:A:116:GLY:O	1:A:118:ARG:HG2	2.16	0.44
1:B:51:SER:O	1:B:55:GLN:HG3	2.16	0.44
1:C:36:TRP:CG	1:C:37:PRO:HD3	2.52	0.44
1:C:99:GLN:HG3	6:C:731:HOH:O	2.16	0.43
1:B:258:PRO:HG3	1:B:323:SER:HB3	2.01	0.43
1:B:36:TRP:CG	1:B:37:PRO:HD3	2.53	0.43
5:A:408:EDO:H21	6:A:516:HOH:O	2.19	0.42
6:A:675:HOH:O	5:C:411:EDO:H21	2.20	0.42
1:B:207:TRP:CZ2	1:B:212:SER:HB2	2.56	0.41
5:B:406:EDO:H11	6:B:595:HOH:O	2.20	0.41
1:B:205:LEU:HB3	1:B:206:HIS:H	1.76	0.41

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	326/327 (100%)	313 (96%)	13 (4%)	0	100	100
1	B	326/327 (100%)	313 (96%)	13 (4%)	0	100	100
1	C	326/327 (100%)	314 (96%)	12 (4%)	0	100	100
All	All	978/981 (100%)	940 (96%)	38 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 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	282/289 (98%)	282 (100%)	0	100	100
1	B	281/289 (97%)	278 (99%)	3 (1%)	73	65
1	C	283/289 (98%)	282 (100%)	1 (0%)	91	89
All	All	846/867 (98%)	842 (100%)	4 (0%)	91	86

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	242	ASP
1	B	341[A]	GLU
1	B	341[B]	GLU
1	C	242	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	44	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 monosaccharides in this entry.

## 5.6 Ligand geometry

Of 30 ligands modelled in this entry, 3 are monoatomic - leaving 27 for Mogul analysis.

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
5	EDO	C	409	-	3,3,3	0.47	0	2,2,2	0.27	0
3	SO4	C	403	-	4,4,4	0.17	0	6,6,6	0.19	0
5	EDO	C	401	-	3,3,3	0.47	0	2,2,2	0.38	0
4	Q39	A	402	2	24,26,26	2.19	6 (25%)	23,36,36	2.22	11 (47%)
5	EDO	C	406	-	3,3,3	0.63	0	2,2,2	0.35	0
5	EDO	B	407	-	3,3,3	0.45	0	2,2,2	0.38	0
3	SO4	B	401	-	4,4,4	0.18	0	6,6,6	0.21	0
5	EDO	C	405	-	3,3,3	0.56	0	2,2,2	0.08	0
5	EDO	C	407	-	3,3,3	0.45	0	2,2,2	0.55	0
5	EDO	C	411	-	3,3,3	0.44	0	2,2,2	0.38	0
5	EDO	A	406	-	3,3,3	0.46	0	2,2,2	0.38	0
4	Q39	B	402	2	24,26,26	2.11	6 (25%)	23,36,36	1.82	6 (26%)
5	EDO	B	408	-	3,3,3	0.49	0	2,2,2	0.17	0
5	EDO	A	404	-	3,3,3	0.40	0	2,2,2	0.44	0
5	EDO	B	404	-	3,3,3	0.58	0	2,2,2	0.48	0
5	EDO	B	409	-	3,3,3	0.49	0	2,2,2	0.35	0
5	EDO	A	407	-	3,3,3	0.47	0	2,2,2	0.38	0
5	EDO	A	408	-	3,3,3	0.42	0	2,2,2	0.25	0
5	EDO	B	405	-	3,3,3	0.46	0	2,2,2	0.25	0
5	EDO	B	406	-	3,3,3	0.68	0	2,2,2	0.19	0
3	SO4	A	401	-	4,4,4	0.23	0	6,6,6	0.24	0
5	EDO	B	403	-	3,3,3	0.53	0	2,2,2	0.18	0
5	EDO	A	405	-	3,3,3	0.51	0	2,2,2	0.53	0
4	Q39	C	404	2	24,26,26	2.16	6 (25%)	23,36,36	2.12	9 (39%)
5	EDO	A	403	-	3,3,3	0.57	0	2,2,2	0.09	0
5	EDO	C	410	-	3,3,3	0.43	0	2,2,2	0.30	0
5	EDO	C	408	-	3,3,3	0.48	0	2,2,2	0.22	0

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
5	EDO	C	409	-	-	0/1/1/1	-
5	EDO	C	401	-	-	0/1/1/1	-
4	Q39	A	402	2	-	1/12/27/27	0/3/3/3
5	EDO	C	406	-	-	0/1/1/1	-
5	EDO	B	407	-	-	1/1/1/1	-
5	EDO	C	405	-	-	0/1/1/1	-
5	EDO	C	407	-	-	1/1/1/1	-
5	EDO	C	411	-	-	0/1/1/1	-
5	EDO	A	406	-	-	0/1/1/1	-
4	Q39	B	402	2	-	1/12/27/27	0/3/3/3
5	EDO	B	408	-	-	1/1/1/1	-
5	EDO	A	404	-	-	1/1/1/1	-
5	EDO	B	404	-	-	0/1/1/1	-
5	EDO	B	409	-	-	1/1/1/1	-
5	EDO	A	407	-	-	0/1/1/1	-
5	EDO	A	408	-	-	0/1/1/1	-
5	EDO	B	405	-	-	0/1/1/1	-
5	EDO	B	406	-	-	1/1/1/1	-
5	EDO	B	403	-	-	0/1/1/1	-
5	EDO	A	405	-	-	0/1/1/1	-
4	Q39	C	404	2	-	1/12/27/27	0/3/3/3
5	EDO	A	403	-	-	0/1/1/1	-
5	EDO	C	410	-	-	0/1/1/1	-
5	EDO	C	408	-	-	0/1/1/1	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	404	Q39	C7-N2	6.83	1.49	1.35
4	B	402	Q39	C7-N2	6.27	1.47	1.35
4	A	402	Q39	C7-N2	6.06	1.47	1.35
4	A	402	Q39	C9-C10	-5.33	1.48	1.50
4	B	402	Q39	C9-C10	-4.26	1.49	1.50
4	C	404	Q39	C9-C10	-4.03	1.49	1.50
4	C	404	Q39	C1-N1	3.94	1.42	1.32
4	A	402	Q39	C1-N1	3.87	1.42	1.32
4	B	402	Q39	C1-N1	3.69	1.42	1.32
4	A	402	Q39	C16-C17	3.12	1.49	1.39
4	C	404	Q39	C16-C17	2.99	1.49	1.39
4	B	402	Q39	C16-C17	2.97	1.49	1.39
4	C	404	Q39	C16-C15	2.59	1.42	1.34
4	B	402	Q39	C3-C2	-2.58	1.46	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	402	Q39	C16-C15	2.57	1.42	1.34
4	B	402	Q39	C16-C15	2.54	1.42	1.34
4	A	402	Q39	C3-C2	-2.39	1.46	1.53
4	C	404	Q39	C3-C2	-2.29	1.47	1.53

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	402	Q39	C9-C8-C7	-4.81	106.60	112.34
4	C	404	Q39	C3-C2-C1	-4.63	102.88	110.76
4	A	402	Q39	C3-C2-C1	-3.63	104.58	110.76
4	B	402	Q39	C3-C2-C1	-3.48	104.84	110.76
4	A	402	Q39	C8-C7-N2	3.45	123.41	118.01
4	C	404	Q39	C9-C8-C7	-3.34	108.34	112.34
4	A	402	Q39	C5-N2-C4	3.32	119.02	112.62
4	B	402	Q39	C9-C8-C7	-3.28	108.42	112.34
4	C	404	Q39	C8-C7-N2	3.13	122.91	118.01
4	B	402	Q39	C5-N2-C4	3.12	118.64	112.62
4	B	402	Q39	C13-C11-S1	3.03	124.19	120.12
4	C	404	Q39	C2-C1-N1	2.93	121.25	116.54
4	C	404	Q39	C13-C11-S1	2.91	124.02	120.12
4	A	402	Q39	C2-C1-N1	2.84	121.11	116.54
4	B	402	Q39	C8-C7-N2	2.83	122.43	118.01
4	C	404	Q39	C6-C2-C1	2.77	115.47	110.76
4	A	402	Q39	C6-C2-C1	2.63	115.23	110.76
4	C	404	Q39	O1-C1-N1	-2.62	118.45	123.00
4	A	402	Q39	O1-C1-N1	-2.55	118.57	123.00
4	A	402	Q39	C16-C15-S2	-2.54	110.92	112.98
4	A	402	Q39	C5-C6-C2	2.34	114.31	110.41
4	C	404	Q39	C5-N2-C4	2.22	116.91	112.62
4	B	402	Q39	C9-C10-C12	-2.19	124.95	127.66
4	A	402	Q39	C13-C11-S1	2.11	122.95	120.12
4	C	404	Q39	C5-C6-C2	2.09	113.89	110.41
4	A	402	Q39	C4-N2-C7	-2.01	116.26	122.81

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	402	Q39	C7-C8-C9-C10
4	C	404	Q39	C7-C8-C9-C10
5	B	409	EDO	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
4	A	402	Q39	C7-C8-C9-C10
5	A	404	EDO	O1-C1-C2-O2
5	C	407	EDO	O1-C1-C2-O2
5	B	408	EDO	O1-C1-C2-O2
5	B	406	EDO	O1-C1-C2-O2
5	B	407	EDO	O1-C1-C2-O2

There are no ring outliers.

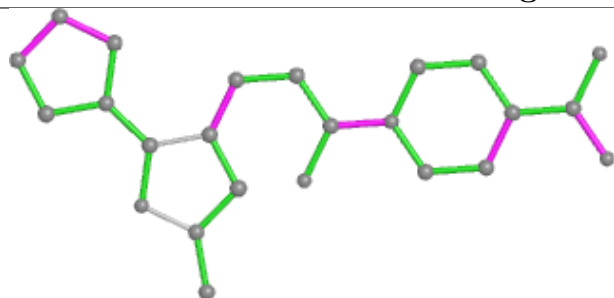
6 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	407	EDO	1	0
5	C	411	EDO	1	0
5	A	408	EDO	3	0
5	B	406	EDO	2	0
4	C	404	Q39	1	0
5	C	410	EDO	3	0

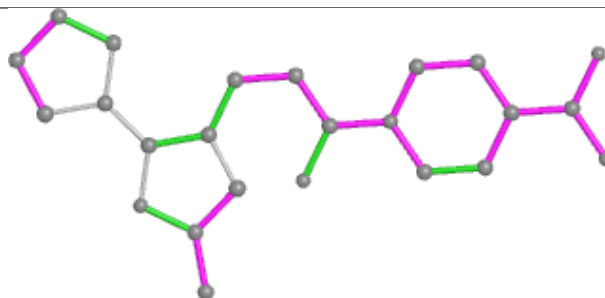
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 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.



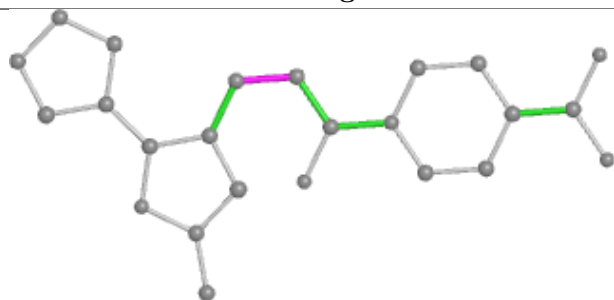
## Ligand Q39 A 402



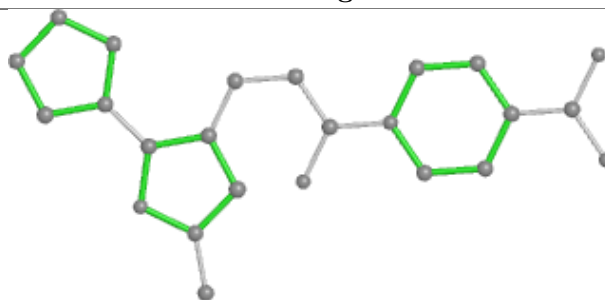
Bond lengths



Bond angles

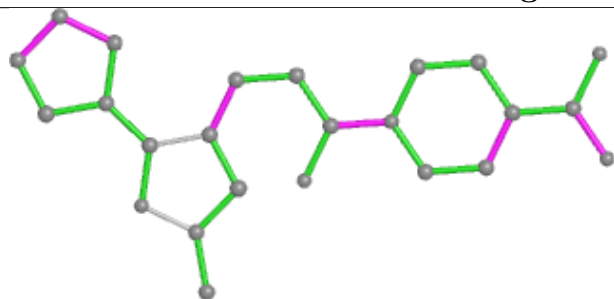


Torsions

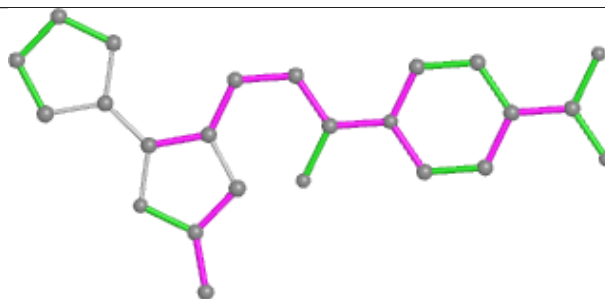


Rings

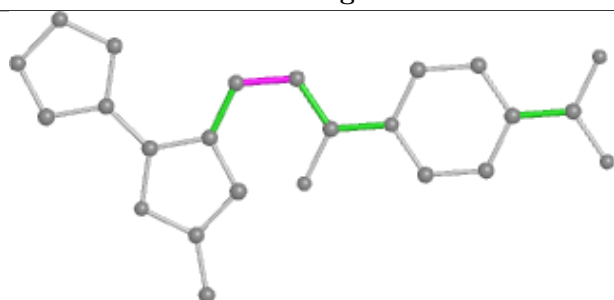
## Ligand Q39 B 402



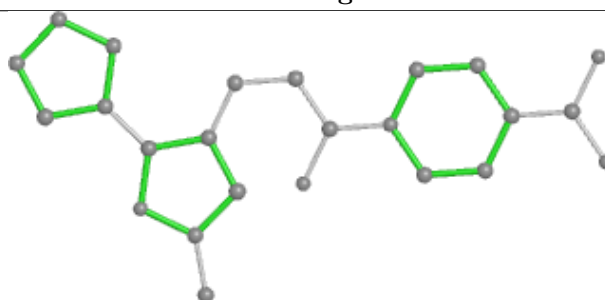
Bond lengths



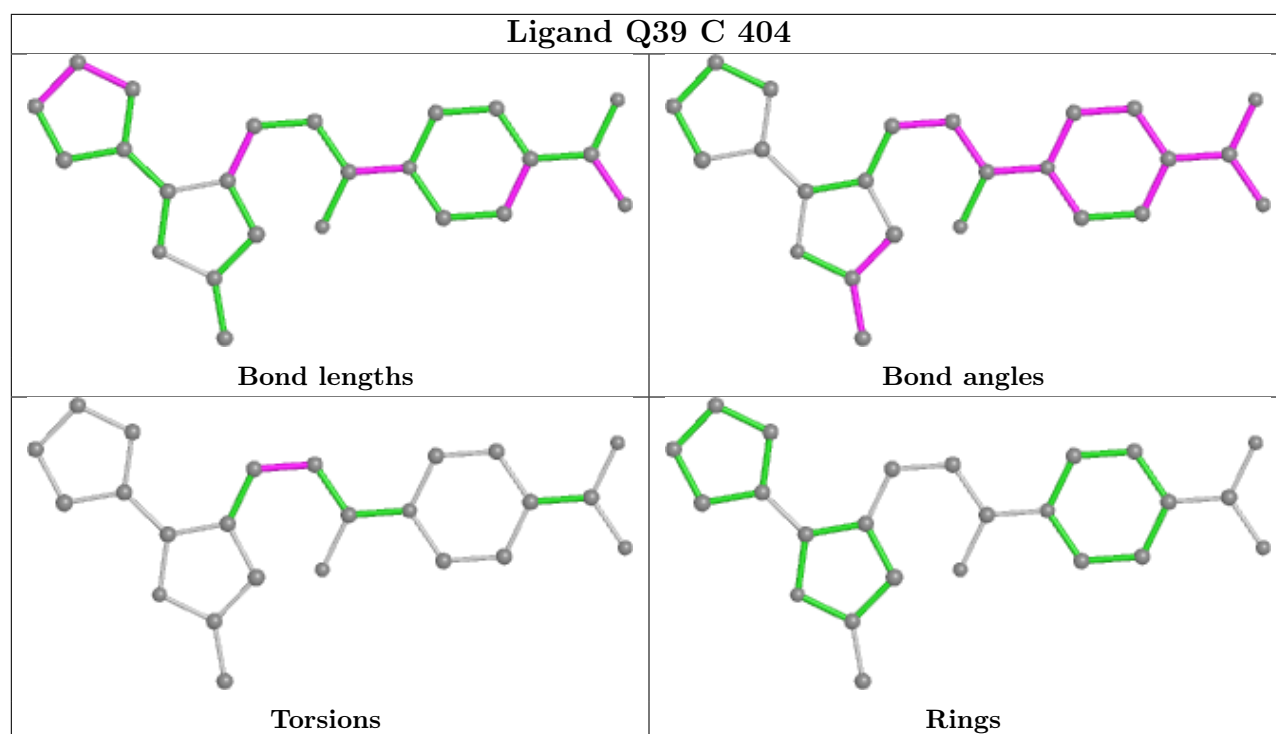
Bond angles



Torsions



Rings



## 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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	326/327 (99%)	0.06	10 (3%) 49 47	9, 18, 40, 73	0
1	B	326/327 (99%)	-0.02	11 (3%) 45 42	9, 17, 35, 77	0
1	C	326/327 (99%)	0.05	14 (4%) 35 33	9, 17, 37, 84	0
All	All	978/981 (99%)	0.03	35 (3%) 42 40	9, 17, 37, 84	0

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	149	TRP	7.5
1	A	149	TRP	6.7
1	C	184	VAL	6.2
1	C	115	GLU	4.7
1	C	149	TRP	4.6
1	B	184	VAL	4.6
1	B	150	ASN	4.2
1	C	187	SER	4.1
1	C	116	GLY	4.0
1	A	116	GLY	3.6
1	B	147	SER	3.5
1	A	184	VAL	3.3
1	B	151	ASN	3.2
1	C	147	SER	3.1
1	A	205	LEU	3.0
1	C	148	HIS	3.0
1	C	145	TYR	2.9
1	B	187	SER	2.7
1	A	148	HIS	2.6
1	B	145	TYR	2.5
1	A	185	SER	2.5
1	C	151	ASN	2.5
1	C	150	ASN	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	145	TYR	2.4
1	A	183	THR	2.4
1	A	186	ASP	2.3
1	B	185	SER	2.3
1	B	146	PHE	2.2
1	C	185	SER	2.2
1	A	302	VAL	2.2
1	C	114	PRO	2.1
1	B	148	HIS	2.1
1	B	302	VAL	2.1
1	C	186	ASP	2.1
1	C	117	GLU	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
5	EDO	C	408	4/4	0.26	0.27	54,58,59,63	0
5	EDO	B	409	4/4	0.69	0.19	40,41,42,42	0
5	EDO	C	409	4/4	0.69	0.19	47,52,53,56	0
5	EDO	B	408	4/4	0.73	0.30	34,39,43,45	0
5	EDO	B	406	4/4	0.76	0.17	22,33,34,37	0
5	EDO	C	401	4/4	0.76	0.17	36,38,39,39	0
5	EDO	C	411	4/4	0.77	0.18	47,49,50,53	0
5	EDO	C	405	4/4	0.84	0.16	23,24,24,28	0
5	EDO	C	410	4/4	0.85	0.17	31,32,34,43	0
5	EDO	A	403	4/4	0.85	0.14	27,27,29,30	0
5	EDO	A	406	4/4	0.86	0.13	34,36,36,41	0

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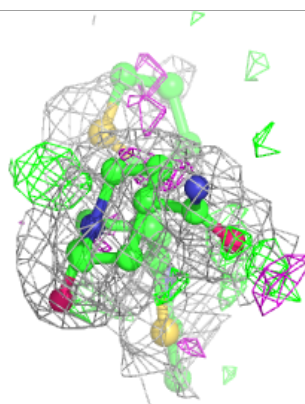
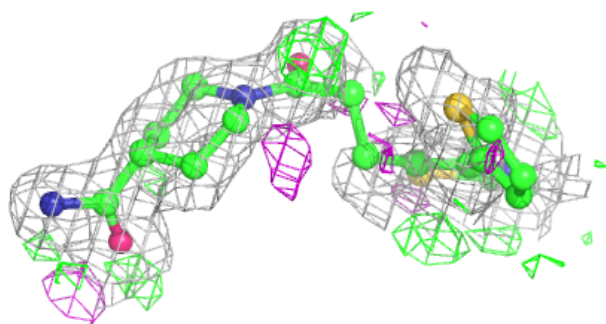
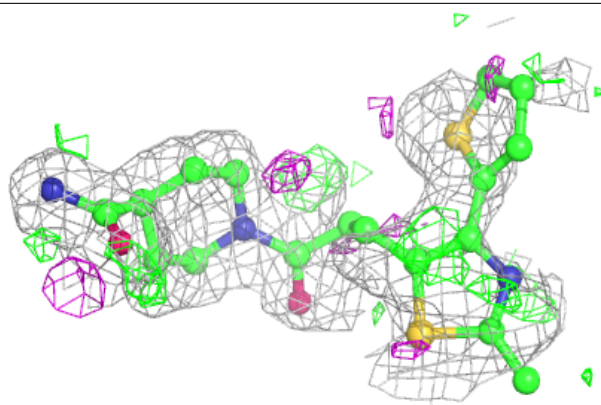
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	B	403	4/4	0.87	0.14	23,25,25,31	0
4	Q39	C	404	24/24	0.87	0.21	10,57,77,77	0
5	EDO	C	407	4/4	0.87	0.12	29,30,39,43	0
5	EDO	B	407	4/4	0.87	0.19	32,35,38,41	0
4	Q39	A	402	24/24	0.87	0.24	15,58,85,89	0
4	Q39	B	402	24/24	0.89	0.19	11,45,71,76	0
5	EDO	A	408	4/4	0.89	0.23	32,33,41,43	0
5	EDO	C	406	4/4	0.90	0.12	19,19,19,23	0
5	EDO	A	407	4/4	0.91	0.20	28,29,34,44	0
5	EDO	A	404	4/4	0.91	0.12	30,32,38,47	0
5	EDO	A	405	4/4	0.92	0.13	16,20,20,22	0
5	EDO	B	404	4/4	0.94	0.11	17,18,21,22	0
5	EDO	B	405	4/4	0.95	0.11	26,26,30,34	0
3	SO4	A	401	5/5	0.98	0.10	15,18,21,24	0
3	SO4	C	403	5/5	0.99	0.09	16,19,23,24	0
3	SO4	B	401	5/5	0.99	0.10	17,18,20,21	0
2	ZN	C	402	1/1	1.00	0.04	12,12,12,12	0
2	ZN	A	400	1/1	1.00	0.06	14,14,14,14	0
2	ZN	B	400	1/1	1.00	0.04	13,13,13,13	0

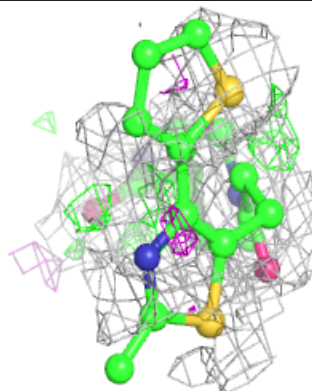
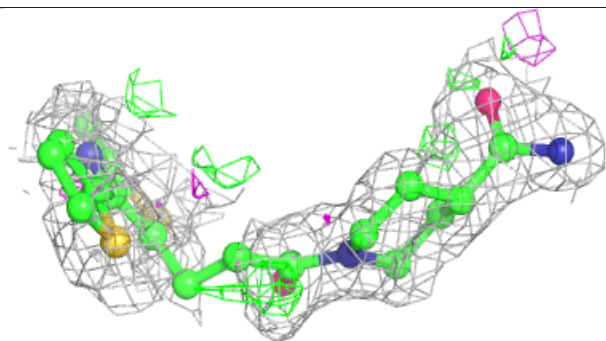
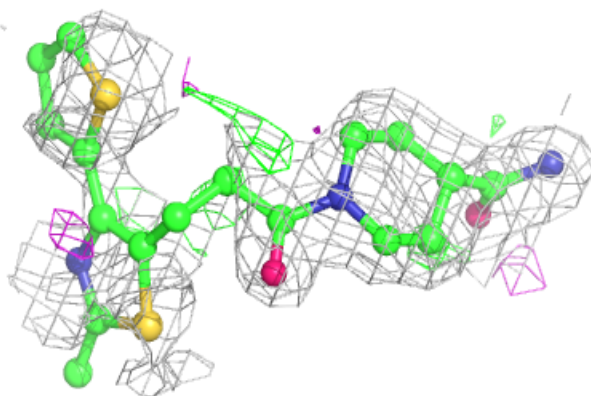
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around Q39 C 404:**

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

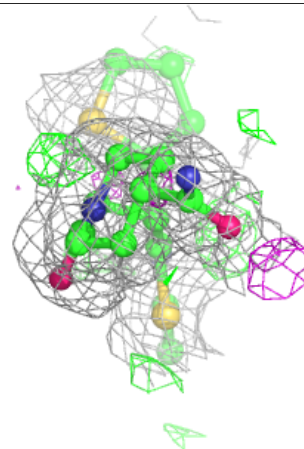
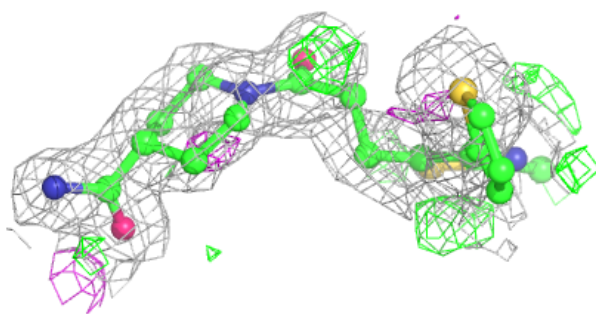
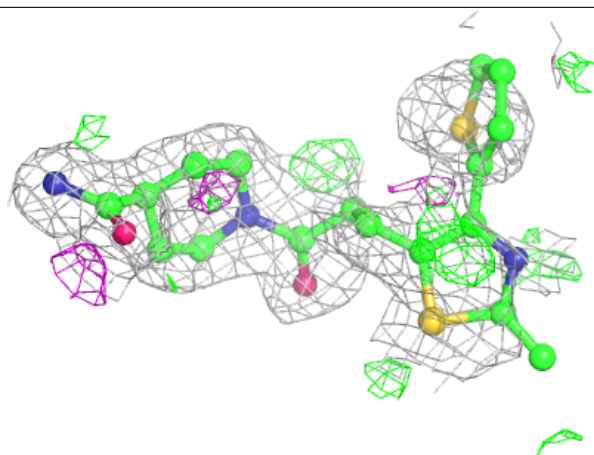
**Electron density around Q39 A 402:**

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



**Electron density around Q39 B 402:**

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



## 6.5 Other polymers ⓘ

There are no such residues in this entry.