



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 07:40 AM UTC

PDB ID : 4CH2 / pdb_00004ch2
Title : Low-salt crystal structure of a thrombin-GpIbalpha peptide complex
Authors : Lechtenberg, B.C.; Freund, S.M.V.; Huntington, J.A.
Deposited on : 2013-11-28
Resolution : 1.60 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 ⓘ 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 ⓘ](#)) 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

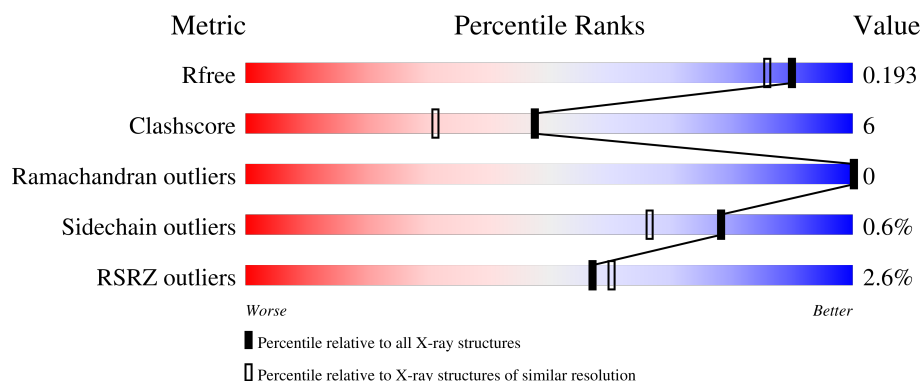
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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.



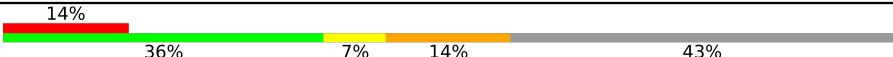
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4673 (1.60-1.60)
Clashscore	190562	4931 (1.60-1.60)
Ramachandran outliers	187476	4831 (1.60-1.60)
Sidechain outliers	187428	4830 (1.60-1.60)
RSRZ outliers	180081	4672 (1.60-1.60)

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 $\leq 5\%$. 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	36	 86% 11% 3%
1	C	36	 69% 8% 19% 3%
2	B	259	 91% 9% 3%
2	D	259	 85% 12% 3%
3	P	14	 14% 36% 50% 14%

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Mol	Chain	Length	Quality of chain
3	Q	14	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	GOL	B	1579	-	X	X	-
4	GOL	D	1580	-	X	-	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 5406 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 THROMBIN, LIGHT CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	32	Total	C	N	O	S	0	0	0
			240	150	35	54	1			
1	C	29	Total	C	N	O	S	0	1	0
			235	149	35	50	1			

- Molecule 2 is a protein called THROMBIN, HEAVY CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	258	Total	C	N	O	S	0	3	0
			2084	1336	365	369	14			
2	D	251	Total	C	N	O	S	0	15	0
			2123	1354	370	384	15			

- Molecule 3 is a protein called PLATELET GLYCOPROTEIN IB ALPHA CHAIN, RESIDUES 287-300.

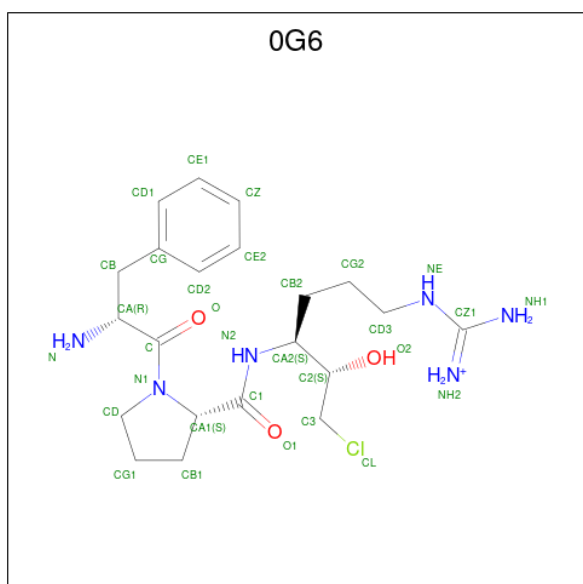
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	P	7	Total	C	N	O	P	0	0	0
			79	46	7	23	3			
3	Q	8	Total	C	N	O	P	0	0	0
			86	50	8	25	3			

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	D	1	Total	C	O	0	0
			6	3	3		
4	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is D-phenylalanyl-N-[(2S,3S)-6-{[amino(iminio)methyl]amino}-1-chloro-2-hydroxyhexan-3-yl]-L-prolinamide (CCD ID: 0G6) (formula: $C_{21}H_{34}ClN_6O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	N	O	0	0
			30	21	6	3		
5	D	1	Total	C	N	O	0	0
			30	21	6	3		

- Molecule 6 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	B	1	Total	Na	0	0
			1	1		
6	D	1	Total	Na	0	0
			1	1		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	31	Total	O	0	0
			31	31		
7	B	218	Total	O	0	0
			218	218		
7	B	2	Total	O	0	0
			2	2		
7	C	32	Total	O	0	0
			32	32		
7	D	181	Total	O	0	0
			181	181		
7	D	3	Total	O	0	0
			3	3		
7	P	5	Total	O	0	0
			5	5		
7	Q	1	Total	O	0	0
			1	1		

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: THROMBIN, LIGHT CHAIN

Chain A: 

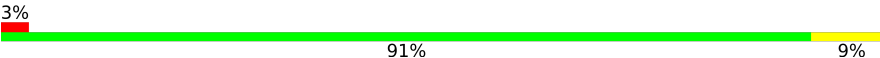


- Molecule 1: THROMBIN, LIGHT CHAIN

Chain C: 



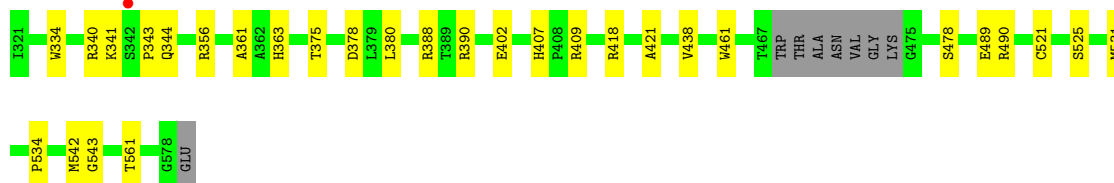
- Molecule 2: THROMBIN, HEAVY CHAIN

Chain B: 



- Molecule 2: THROMBIN, HEAVY CHAIN

Chain D: 



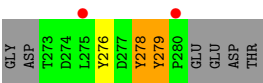
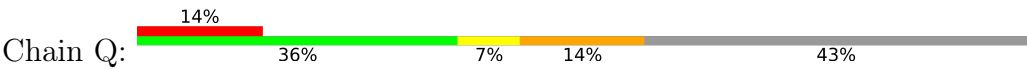
- Molecule 3: PLATELET GLYCOPROTEIN IB ALPHA CHAIN, RESIDUES 287-300

Chain P: 





● Molecule 3: PLATELET GLYCOPROTEIN IB ALPHA CHAIN, RESIDUES 287-300



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	149.57Å 50.56Å 76.28Å 90.00° 97.15° 90.00°	Depositor
Resolution (Å)	37.10 – 1.60 37.10 – 1.60	Depositor EDS
% Data completeness (in resolution range)	96.5 (37.10-1.60) 96.5 (37.10-1.60)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.86 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.155 , 0.187 (Not available) , 0.193	Depositor DCC
R_{free} test set	3646 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	13.6	Xtriage
Anisotropy	0.205	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 41.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5406	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.40% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 0G6, PTR, GOL, NA

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	1.35	1/243 (0.4%)	1.08	0/326
1	C	1.28	0/237	1.16	0/318
2	B	1.26	6/2141 (0.3%)	1.12	3/2902 (0.1%)
2	D	1.21	5/2180 (0.2%)	1.08	0/2951
3	P	1.14	0/29	1.07	0/35
3	Q	0.98	0/36	0.86	0/45
All	All	1.24	12/4866 (0.2%)	1.10	3/6577 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	B	0	1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	316	TYR	CZ-OH	6.53	1.51	1.38
2	B	450	LEU	CA-C	-5.97	1.46	1.53
2	B	342	SER	N-CA	5.71	1.52	1.46
2	D	521	CYS	C-O	5.61	1.30	1.23
2	D	525	SER	CB-OG	5.54	1.53	1.42
2	B	338	LEU	CA-CB	-5.48	1.45	1.53
2	D	534	PRO	N-CA	-5.43	1.40	1.47
2	D	361	ALA	C-O	5.38	1.30	1.23
2	D	421	ALA	N-CA	-5.32	1.39	1.45
2	B	447	ALA	N-CA	-5.08	1.40	1.46
2	B	446	ALA	N-CA	-5.07	1.40	1.46
2	B	568	LYS	N-CA	5.00	1.52	1.46

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	476	GLN	CA-C-N	11.40	131.15	120.21
2	B	476	GLN	C-N-CA	11.40	131.15	120.21
2	B	368	PRO	N-CA-C	6.35	118.44	110.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	475	GLY	Peptide

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	240	0	203	0	0
1	C	235	0	220	2	0
2	B	2084	0	2018	16	1
2	D	2123	0	2043	26	0
3	P	79	0	47	2	0
3	Q	86	0	53	4	0
4	A	6	0	8	0	0
4	B	6	0	8	5	0
4	D	12	0	16	2	0
5	B	30	0	31	3	0
5	D	30	0	31	3	0
6	B	1	0	0	0	0
6	D	1	0	0	0	0
7	A	31	0	0	0	0
7	B	220	0	0	6	0
7	C	32	0	0	0	0
7	D	184	0	0	4	1
7	P	5	0	0	0	0
7	Q	1	0	0	0	0
All	All	5406	0	4678	52	1

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 6.

All (52) 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)
2:B:461[B]:TRP:HZ3	2:B:478:SER:O	1.22	1.16
2:B:461[B]:TRP:CZ3	2:B:478:SER:O	2.00	1.13
2:D:461[B]:TRP:HZ3	2:D:478[B]:SER:O	1.39	1.06
2:D:461[B]:TRP:CZ3	2:D:478[B]:SER:O	2.15	0.97
2:B:363:HIS:CD2	5:B:1001:0G6:C3	2.62	0.81
2:D:363:HIS:CD2	5:D:1001:0G6:C3	2.66	0.78
2:D:409:ARG:HD2	3:Q:279:PTR:CD2	2.18	0.73
3:P:274:ASP:CG	3:P:275:LEU:H	2.01	0.69
2:B:330:GLY:H	4:B:1579:GOL:H12	1.59	0.66
2:D:375[B]:THR:CG2	7:D:2038:HOH:O	2.44	0.65
2:D:375[B]:THR:HG23	7:D:2038:HOH:O	1.97	0.65
2:B:388:ARG:HG3	2:B:461[B]:TRP:CZ3	2.33	0.64
4:B:1579:GOL:H31	7:B:2014:HOH:O	1.98	0.63
2:B:461[B]:TRP:CH2	2:B:478:SER:O	2.51	0.62
2:B:330:GLY:H	4:B:1579:GOL:C1	2.12	0.62
2:D:461[B]:TRP:HZ3	2:D:478[B]:SER:C	2.06	0.62
4:B:1579:GOL:H12	7:B:2101:HOH:O	2.04	0.57
2:D:388:ARG:HG3	2:D:461[B]:TRP:CZ3	2.40	0.56
2:D:363:HIS:NE2	5:D:1001:0G6:C2	2.65	0.56
2:D:409:ARG:HD2	3:Q:279:PTR:HD2	1.87	0.55
1:C:290:GLU:HG2	1:C:291:ALA:N	2.22	0.55
2:B:461[B]:TRP:HZ3	2:B:478:SER:C	2.09	0.54
2:D:489[B]:GLU:H	2:D:489[B]:GLU:CD	2.16	0.54
2:D:490:ARG:NH2	4:D:1580:GOL:H2	2.23	0.53
3:P:274:ASP:CG	3:P:275:LEU:N	2.68	0.52
2:B:363:HIS:CE1	5:B:1001:0G6:C3	2.77	0.51
2:D:461[B]:TRP:CH2	2:D:478[B]:SER:O	2.61	0.51
2:B:363:HIS:NE2	5:B:1001:0G6:C2	2.63	0.50
3:Q:278:PTR:O2P	3:Q:278:PTR:HE1	2.12	0.50
2:D:375[B]:THR:HG22	2:D:378:ASP:CG	2.37	0.49
2:D:407:HIS:CE1	2:D:418:ARG:HD3	2.48	0.48
1:C:290:GLU:HG2	1:C:291:ALA:H	1.77	0.48
2:B:451:GLN:NE2	7:B:2118:HOH:O	2.23	0.47
2:D:375[B]:THR:HG22	2:D:378:ASP:OD2	2.15	0.47
2:D:490:ARG:HH21	4:D:1580:GOL:H2	1.80	0.46
2:B:543:GLY:HA2	2:B:561:THR:O	2.15	0.46
2:B:327:ALA:O	2:B:386:HIS:HE1	1.99	0.46
4:B:1579:GOL:C1	7:B:2101:HOH:O	2.64	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:323:GLU:CG	7:B:2004:HOH:O	2.65	0.44
2:D:356[A]:ARG:NH2	2:D:402:GLU:OE1	2.51	0.44
2:B:443[B]:ARG:HG3	7:B:2105:HOH:O	2.18	0.43
5:D:1001:OG6:CD1	5:D:1001:OG6:HD3	2.48	0.43
2:D:531:MET:SD	2:D:542:MET:HG3	2.59	0.42
2:D:341:LYS:HG2	2:D:380:LEU:HD23	2.01	0.42
3:Q:279:PTR:CD1	3:Q:279:PTR:C	2.98	0.41
2:D:375[B]:THR:HG21	7:D:2038:HOH:O	2.16	0.41
2:D:340:ARG:HD2	2:D:343:PRO:O	2.20	0.41
2:D:334:TRP:CG	2:D:438:VAL:HB	2.56	0.41
2:B:407:HIS:CE1	2:B:418:ARG:HD3	2.55	0.40
2:D:390[B]:ARG:NE	7:D:2050:HOH:O	2.53	0.40
2:D:543:GLY:HA2	2:D:561:THR:O	2.21	0.40
2:D:340:ARG:O	2:D:344:GLN:HA	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:443[B]:ARG:NH2	7:D:2044:HOH:O[4_445]	2.17	0.03

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	30/36 (83%)	29 (97%)	1 (3%)	0	100	100
1	C	28/36 (78%)	27 (96%)	1 (4%)	0	100	100
2	B	259/259 (100%)	252 (97%)	7 (3%)	0	100	100
2	D	262/259 (101%)	257 (98%)	5 (2%)	0	100	100
3	P	2/14 (14%)	2 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	Q	3/14 (21%)	3 (100%)	0	0	100	100
All	All	584/618 (94%)	570 (98%)	14 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	23/31 (74%)	23 (100%)	0	100	100
1	C	25/31 (81%)	22 (88%)	3 (12%)	5	0
2	B	217/225 (96%)	217 (100%)	0	100	100
2	D	225/225 (100%)	225 (100%)	0	100	100
3	P	4/10 (40%)	4 (100%)	0	100	100
3	Q	5/10 (50%)	5 (100%)	0	100	100
All	All	499/532 (94%)	496 (99%)	3 (1%)	78	66

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	290	GLU
1	C	301	LYS
1	C	306	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

6 non-standard protein/DNA/RNA residues are 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	PTR	P	276	3	15,16,17	1.26	2 (13%)	17,22,24	1.69	4 (23%)
3	PTR	Q	278	3	15,16,17	0.77	0	17,22,24	1.32	2 (11%)
3	PTR	P	279	3	15,16,17	0.96	0	17,22,24	1.50	2 (11%)
3	PTR	Q	276	3	15,16,17	1.25	2 (13%)	17,22,24	1.47	2 (11%)
3	PTR	P	278	3	15,16,17	1.08	1 (6%)	17,22,24	1.44	2 (11%)
3	PTR	Q	279	3	15,16,17	0.80	0	17,22,24	1.36	2 (11%)

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	PTR	P	276	3	-	2/10/11/13	0/1/1/1
3	PTR	Q	278	3	-	1/10/11/13	0/1/1/1
3	PTR	P	279	3	-	0/10/11/13	0/1/1/1
3	PTR	Q	276	3	-	0/10/11/13	0/1/1/1
3	PTR	P	278	3	-	0/10/11/13	0/1/1/1
3	PTR	Q	279	3	-	0/10/11/13	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	Q	276	PTR	P-O3P	-2.45	1.45	1.54
3	Q	276	PTR	CE1-CZ	2.35	1.43	1.38
3	P	276	PTR	CB-CG	-2.13	1.46	1.51
3	P	278	PTR	P-O1P	2.12	1.57	1.50
3	P	276	PTR	P-OH	2.08	1.63	1.59

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	P	276	PTR	CD2-CE2-CZ	4.01	124.31	119.73
3	Q	276	PTR	O3P-P-O2P	3.50	120.91	107.80
3	P	279	PTR	OH-P-O1P	-3.47	97.90	109.48
3	Q	279	PTR	O3P-P-OH	-3.41	95.24	105.32
3	Q	279	PTR	O3P-P-O2P	3.03	119.17	107.80
3	P	276	PTR	O2P-P-OH	-2.85	96.89	105.32
3	P	278	PTR	O3P-P-OH	2.57	112.92	105.32
3	P	276	PTR	CE2-CZ-CE1	-2.35	116.73	120.16
3	Q	276	PTR	OH-CZ-CE1	2.31	126.15	119.22
3	Q	278	PTR	OH-CZ-CE1	2.26	125.99	119.22
3	P	276	PTR	O3P-P-O1P	2.21	119.44	110.83
3	P	278	PTR	O2P-P-O1P	2.04	118.78	110.83
3	P	279	PTR	P-OH-CZ	2.03	131.13	123.88
3	Q	278	PTR	OH-P-O1P	-2.03	102.72	109.48

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	P	276	PTR	O-C-CA-CB
3	P	276	PTR	CZ-OH-P-O2P
3	Q	278	PTR	CZ-OH-P-O2P

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	Q	278	PTR	1	0
3	Q	279	PTR	3	0

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 2 are monoatomic - leaving 6 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	$\# Z > 2$
4	GOL	D	1579	-	5,5,5	0.91	0	5,5,5	1.38	1 (20%)
4	GOL	B	1579	-	5,5,5	1.04	0	5,5,5	2.45	3 (60%)
5	0G6	B	1001	2	30,31,32	1.13	2 (6%)	37,41,42	1.29	4 (10%)
5	0G6	D	1001	2	30,31,32	1.51	2 (6%)	37,41,42	1.33	5 (13%)
4	GOL	D	1580	-	5,5,5	0.76	0	5,5,5	2.14	3 (60%)
4	GOL	A	1317	-	5,5,5	0.48	0	5,5,5	0.33	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
4	GOL	D	1579	-	-	4/4/4/4	-
4	GOL	B	1579	-	-	4/4/4/4	-
5	0G6	B	1001	2	-	0/31/41/43	0/2/2/2
5	0G6	D	1001	2	-	0/31/41/43	0/2/2/2
4	GOL	D	1580	-	-	4/4/4/4	-
4	GOL	A	1317	-	-	2/4/4/4	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	1001	0G6	C1-N2	6.50	1.48	1.34
5	B	1001	0G6	O1-C1	3.46	1.30	1.23
5	B	1001	0G6	CA2-N2	2.64	1.50	1.46
5	D	1001	0G6	CD3-NE	2.09	1.50	1.46

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1579	GOL	C3-C2-C1	3.65	125.18	111.80
5	B	1001	0G6	CZ-CE1-CD1	-3.24	116.24	120.24
4	B	1579	GOL	O2-C2-C3	-3.18	96.00	109.18
5	D	1001	0G6	CA2-N2-C1	-3.04	117.97	123.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	1580	GOL	C3-C2-C1	2.99	122.78	111.80
5	B	1001	OG6	NE-CZ1-NH2	-2.98	115.56	120.67
5	B	1001	OG6	CZ-CE2-CD2	2.77	123.65	120.24
5	B	1001	OG6	CE1-CD1-CG	2.62	124.30	120.61
5	D	1001	OG6	O2-C2-C3	-2.60	101.92	109.68
5	D	1001	OG6	NE-CZ1-NH2	-2.59	116.22	120.67
4	B	1579	GOL	O1-C1-C2	2.29	120.70	110.38
4	D	1579	GOL	O2-C2-C3	2.22	118.38	109.18
5	D	1001	OG6	C2-CA2-N2	2.15	114.81	110.90
4	D	1580	GOL	O3-C3-C2	2.04	119.58	110.38
4	D	1580	GOL	O2-C2-C1	-2.04	100.73	109.18
5	D	1001	OG6	CG2-CB2-CA2	2.01	117.78	113.94

There are no chirality outliers.

All (14) torsion outliers are listed below:

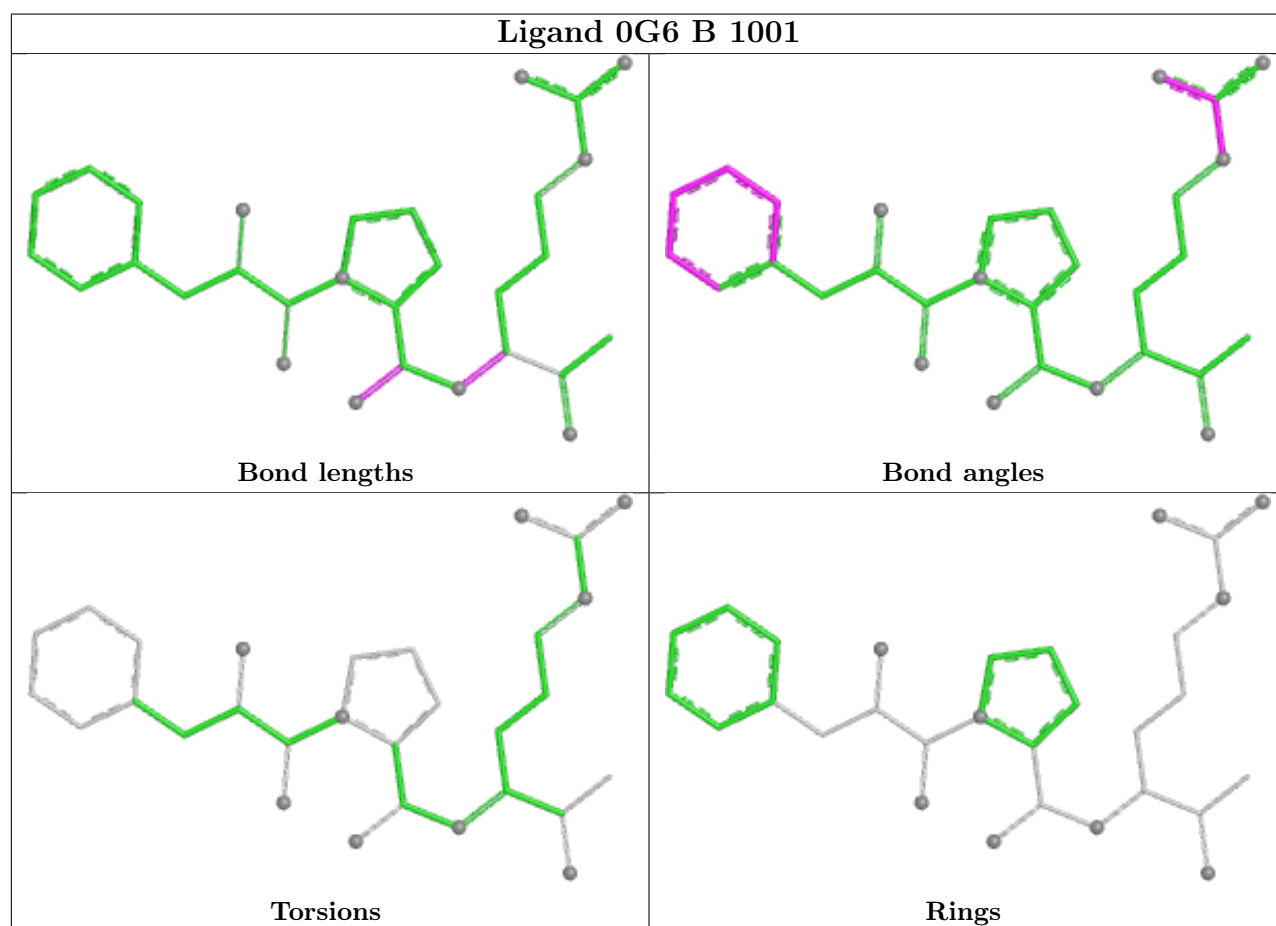
Mol	Chain	Res	Type	Atoms
4	B	1579	GOL	O1-C1-C2-C3
4	B	1579	GOL	C1-C2-C3-O3
4	B	1579	GOL	O2-C2-C3-O3
4	D	1580	GOL	O1-C1-C2-C3
4	D	1580	GOL	C1-C2-C3-O3
4	A	1317	GOL	O1-C1-C2-C3
4	D	1579	GOL	O1-C1-C2-C3
4	D	1579	GOL	C1-C2-C3-O3
4	B	1579	GOL	O1-C1-C2-O2
4	D	1580	GOL	O1-C1-C2-O2
4	D	1580	GOL	O2-C2-C3-O3
4	A	1317	GOL	O1-C1-C2-O2
4	D	1579	GOL	O2-C2-C3-O3
4	D	1579	GOL	O1-C1-C2-O2

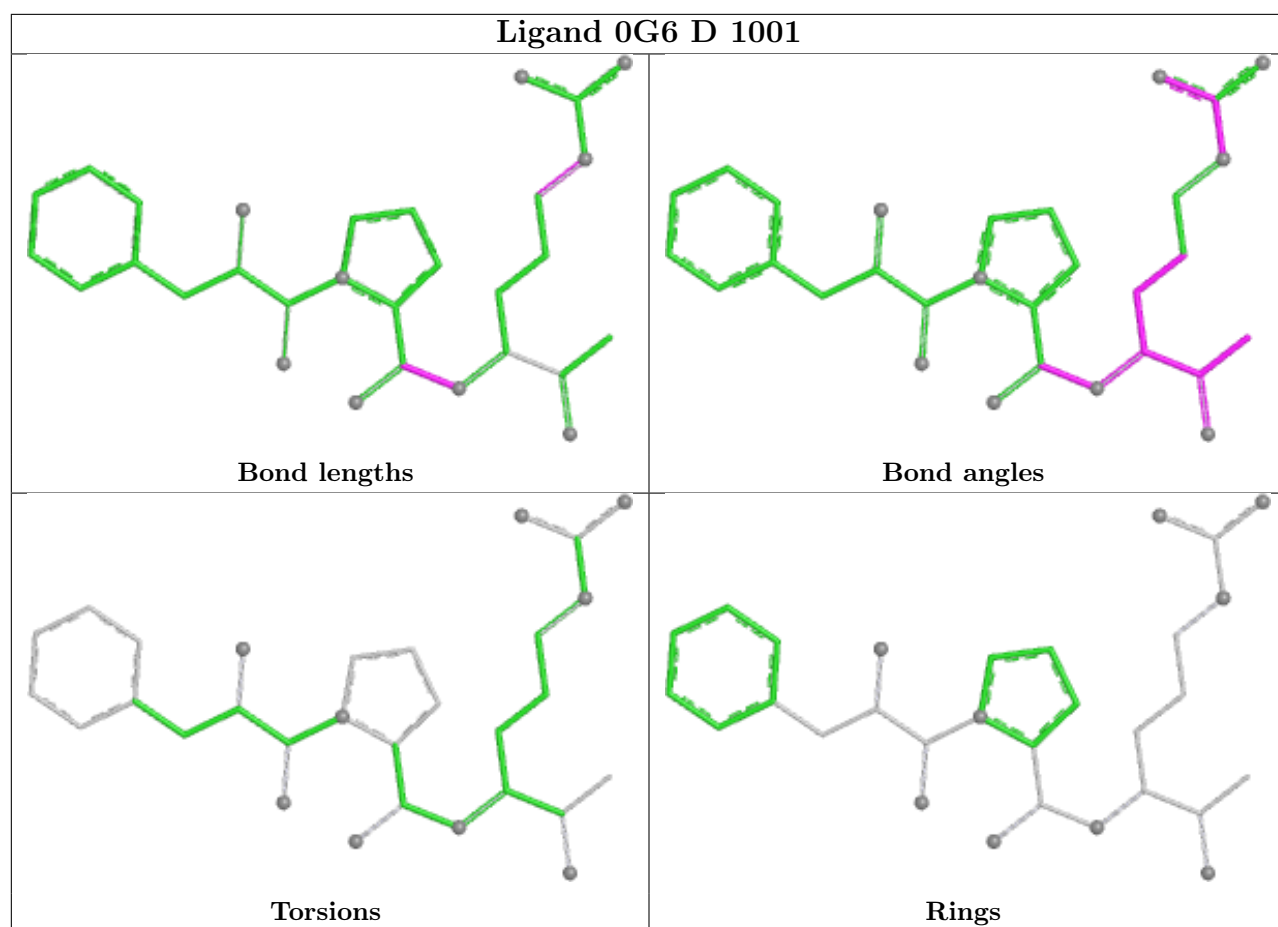
There are no ring outliers.

4 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1579	GOL	5	0
5	B	1001	OG6	3	0
5	D	1001	OG6	3	0
4	D	1580	GOL	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 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.





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, 95th 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	32/36 (88%)	-0.20	0	100	100	12, 18, 26, 32	0
1	C	29/36 (80%)	-0.25	1 (3%)	48	50	6, 13, 26, 35	1 (3%)
2	B	258/259 (99%)	-0.32	9 (3%)	47	49	5, 15, 29, 55	3 (1%)
2	D	251/259 (96%)	-0.40	1 (0%)	88	91	4, 14, 25, 40	15 (5%)
3	P	4/14 (28%)	1.25	2 (50%)	0	0	15, 24, 38, 46	0
3	Q	5/14 (35%)	1.77	2 (40%)	1	0	19, 33, 40, 46	0
All	All	579/618 (93%)	-0.32	15 (2%)	57	60	4, 14, 29, 55	19 (3%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	390	ARG	4.2
2	B	578	GLY	4.1
2	B	391	TYR	3.7
3	Q	275	LEU	3.3
2	B	577	PHE	3.3
2	D	342	SER	3.1
2	B	389	THR	2.8
3	Q	280	PRO	2.8
3	P	280	PRO	2.7
1	C	290	GLU	2.6
2	B	387	SER	2.3
2	B	393	ARG	2.2
2	B	475	GLY	2.1
2	B	342	SER	2.1
3	P	274	ASP	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [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, 95th 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	PTR	Q	279	16/17	0.84	0.13	29,35,55,59	0
3	PTR	P	279	16/17	0.86	0.12	25,33,65,66	0
3	PTR	Q	278	16/17	0.87	0.12	28,45,59,62	0
3	PTR	P	278	16/17	0.90	0.11	21,25,43,46	0
3	PTR	Q	276	16/17	0.95	0.07	20,23,28,31	0
3	PTR	P	276	16/17	0.96	0.06	14,17,21,23	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

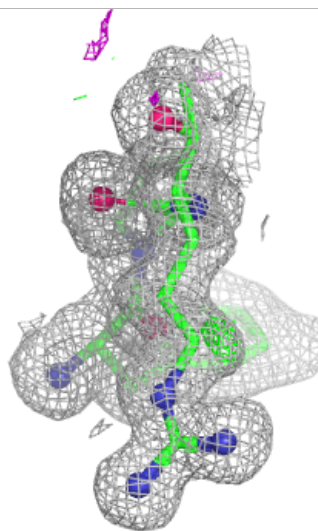
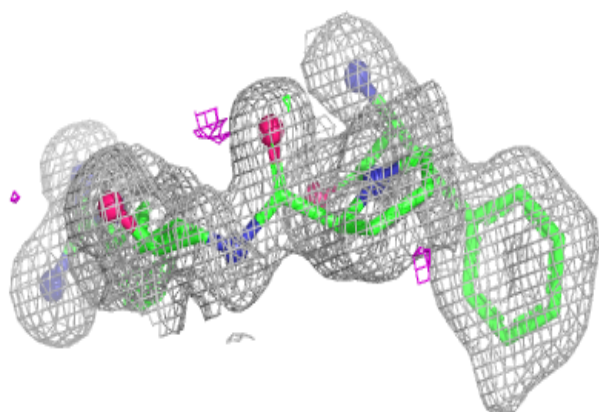
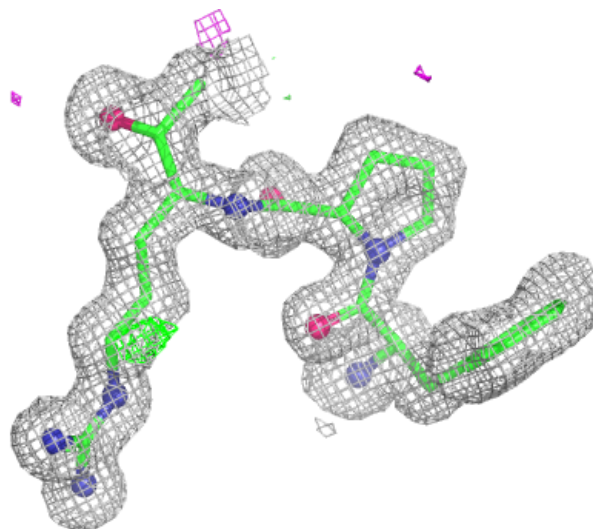
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	GOL	A	1317	6/6	0.88	0.12	23,36,37,40	0
4	GOL	D	1580	6/6	0.88	0.11	22,28,31,40	0
4	GOL	D	1579	6/6	0.90	0.10	19,26,30,32	0
4	GOL	B	1579	6/6	0.92	0.10	21,27,37,40	0
5	OG6	D	1001	30/31	0.97	0.05	9,11,15,15	0
5	OG6	B	1001	30/31	0.98	0.04	6,9,12,12	0
6	NA	D	3001	1/1	0.98	0.05	14,14,14,14	0
6	NA	B	3001	1/1	0.99	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.

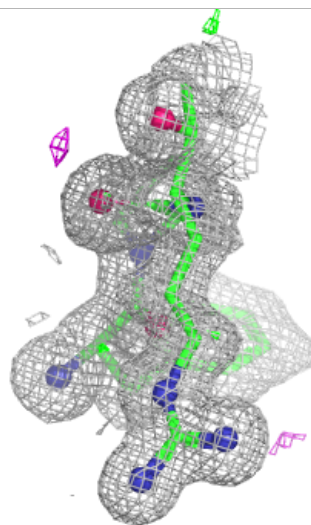
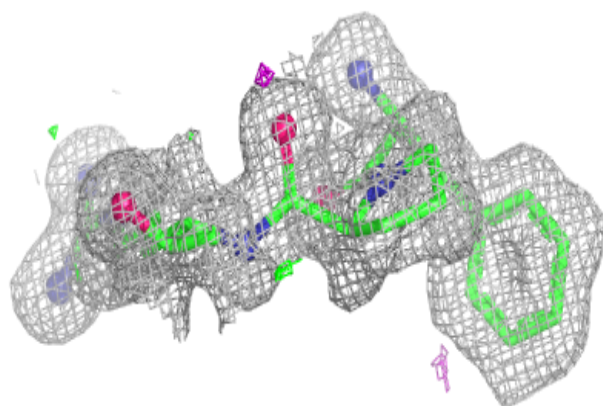
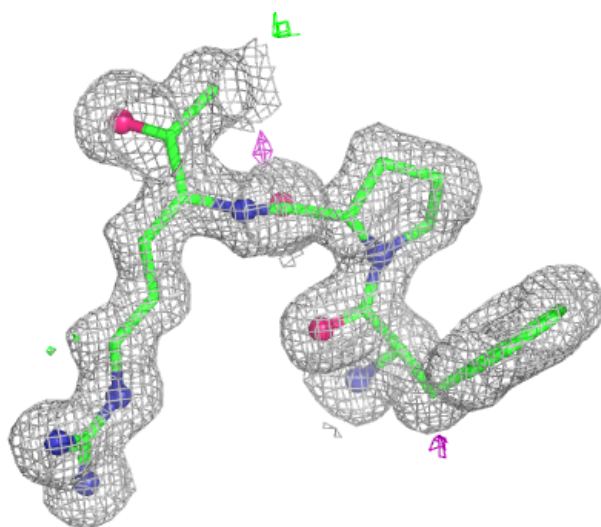
Electron density around 0G6 D 1001:

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



Electron density around 0G6 B 1001:

$2mF_o-DF_c$ (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.