



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 04:09 AM UTC

PDB ID : 1QIP / pdb_00001qip
Title : HUMAN GLYOXALASE I COMPLEXED WITH S-P-NITROBENZYLOXY
CARBONYLGLUTATHIONE
Authors : Cameron, A.D.; Ridderstrom, M.; Olin, B.; Mannervik, B.
Deposited on : 1999-06-14
Resolution : 1.72 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

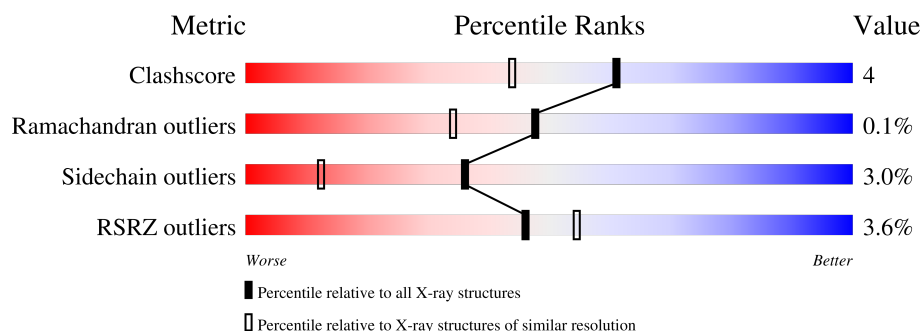
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.72 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))
Clashscore	190562	1049 (1.72-1.72)
Ramachandran outliers	187476	1041 (1.72-1.72)
Sidechain outliers	187428	1041 (1.72-1.72)
RSRZ outliers	180081	1039 (1.72-1.72)

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	183	% 85% 9% • •
1	B	183	6% 88% 10% •
1	C	183	2% 87% 8% • •
1	D	183	5% 91% 9% •

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
3	GNB	A	1002	X	-	-	-
3	GNB	B	1001	X	-	-	-
3	GNB	C	1004	X	-	-	-
3	GNB	D	1003	X	-	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6756 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 PROTEIN (LACTOYLGLUTATHIONE LYASE).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	176	Total	C	N	O	S	15	0	0
			1400	892	229	269	10			
1	B	183	Total	C	N	O	S	28	0	0
			1450	923	237	280	10			
1	C	176	Total	C	N	O	S	16	0	0
			1399	892	229	268	10			
1	D	183	Total	C	N	O	S	16	0	0
			1450	923	237	280	10			

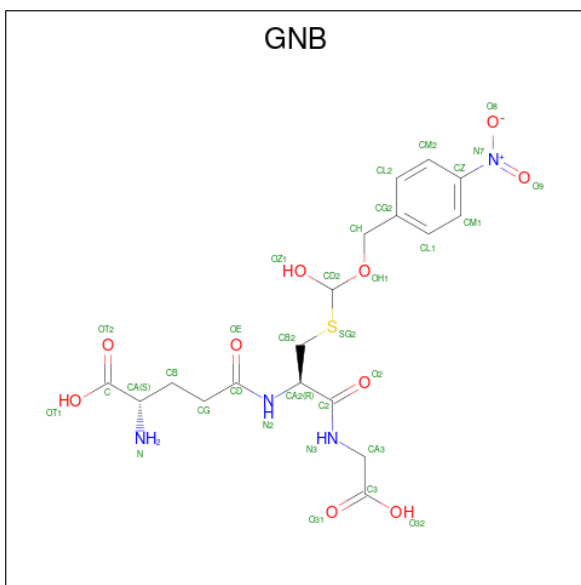
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	110	GLU	ALA	variant	UNP Q04760
B	110	GLU	ALA	variant	UNP Q04760
C	110	GLU	ALA	variant	UNP Q04760
D	110	GLU	ALA	variant	UNP Q04760

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

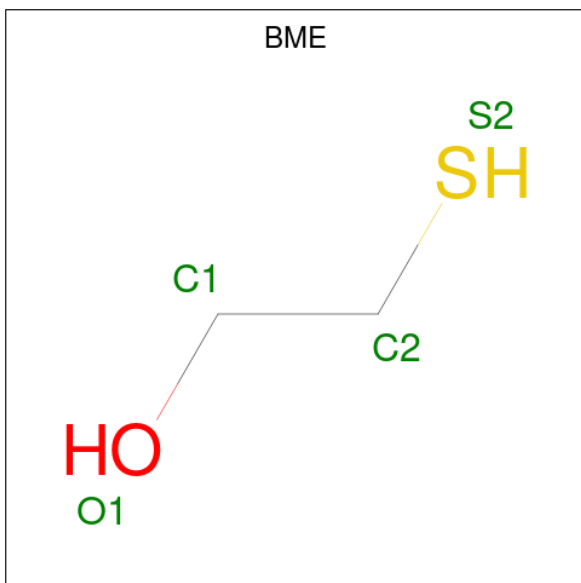
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		
2	C	1	Total	Zn	0	0
			1	1		
2	D	1	Total	Zn	0	0
			1	1		

- Molecule 3 is S-P-NITROBENZYLOXYCARBONYLGLUTATHIONE (CCD ID: GNB) (formula: C₁₈H₂₄N₄O₁₀S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 33	C 18	N 4	O 10	S 1	0	0
3	B	1	Total 33	C 18	N 4	O 10	S 1	0	0
3	C	1	Total 33	C 18	N 4	O 10	S 1	0	0
3	D	1	Total 33	C 18	N 4	O 10	S 1	0	0

- Molecule 4 is BETA-MERCAPTOETHANOL (CCD ID: BME) (formula: $\text{C}_2\text{H}_6\text{OS}$).



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

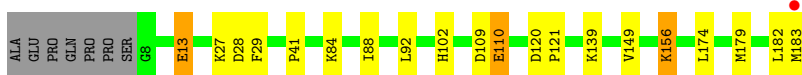
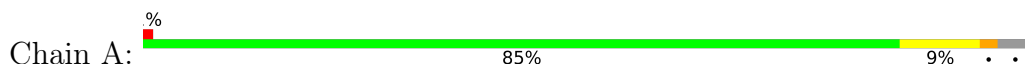
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	227	Total O 227 227	0	0
5	B	224	Total O 224 224	0	0
5	C	229	Total O 229 229	0	0
5	D	225	Total O 225 225	0	0

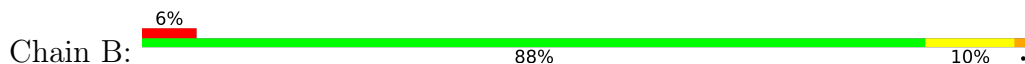
3 Residue-property plots [i](#)

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.

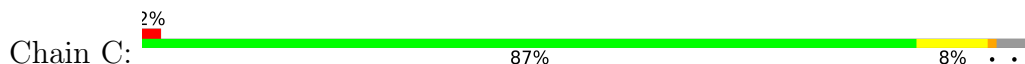
- Molecule 1: PROTEIN (LACTOYLGLUTATHIONE LYASE)



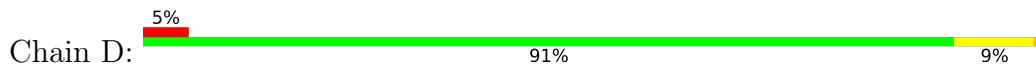
- Molecule 1: PROTEIN (LACTOYLGLUTATHIONE LYASE)



- Molecule 1: PROTEIN (LACTOYLGLUTATHIONE LYASE)



- Molecule 1: PROTEIN (LACTOYLGLUTATHIONE LYASE)



4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α , β , γ	67.30Å 67.30Å 167.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 1.72 30.00 – 1.72	Depositor EDS
% Data completeness (in resolution range)	100.0 (30.00-1.72) 99.8 (30.00-1.72)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.86 (at 1.72Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.180 , 0.210 0.171 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	15.3	Xtriage
Anisotropy	0.459	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 45.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.048 for h,-k,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6756	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.83% 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: GNB, BME, ZN

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	0.52	0/1432	1.21	6/1930 (0.3%)
1	B	0.56	2/1485 (0.1%)	1.18	3/2005 (0.1%)
1	C	0.49	0/1431	1.19	4/1930 (0.2%)
1	D	0.73	1/1485 (0.1%)	1.40	6/2005 (0.3%)
All	All	0.58	3/5833 (0.1%)	1.25	19/7870 (0.2%)

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
1	D	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	182	LEU	C-N	20.06	1.61	1.33
1	B	83	GLU	CB-CG	5.39	1.68	1.52
1	B	156	LYS	CG-CD	5.02	1.67	1.52

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	182	LEU	O-C-N	-34.31	82.61	122.75
1	B	149	VAL	N-CA-C	-8.12	104.83	111.81
1	D	149	VAL	N-CA-C	-6.82	105.94	111.81
1	C	156	LYS	N-CA-C	6.49	118.14	111.14
1	A	109	ASP	CA-C-O	6.41	127.59	120.92
1	C	67	PHE	CA-CB-CG	6.30	120.10	113.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	29	PHE	CA-CB-CG	6.27	120.07	113.80
1	A	149	VAL	N-CA-C	-6.07	105.15	111.58
1	A	109	ASP	CA-C-N	5.89	128.76	120.28
1	A	109	ASP	C-N-CA	5.89	128.76	120.28
1	B	126	HIS	CA-CB-CG	5.81	119.61	113.80
1	C	149	VAL	N-CA-C	-5.64	105.61	111.58
1	A	156	LYS	N-CA-C	5.58	117.16	111.14
1	D	61	ASP	CA-CB-CG	-5.46	107.14	112.60
1	D	84	LYS	N-CA-C	5.40	117.60	111.02
1	D	11	THR	N-CA-C	-5.14	104.08	110.41
1	D	126	HIS	CA-CB-CG	5.10	118.90	113.80
1	B	165	ASP	CA-CB-CG	5.06	117.66	112.60
1	C	126	HIS	CA-CB-CG	5.05	118.85	113.80

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	182	LEU	Mainchain

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	1400	0	1374	16	0
1	B	1450	0	1422	14	0
1	C	1399	0	1374	11	0
1	D	1450	0	1422	9	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	33	0	20	5	0
3	B	33	0	20	4	0
3	C	33	0	20	1	0
3	D	33	0	20	3	0
4	A	4	0	5	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	4	0	5	0	0
4	C	4	0	5	0	0
4	D	4	0	5	0	0
5	A	227	0	0	0	0
5	B	224	0	0	0	0
5	C	229	0	0	1	0
5	D	225	0	0	0	0
All	All	6756	0	5692	47	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 (47) 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:48:TYR:HB3	1:C:54:MET:HE2	1.37	1.05
1:C:54:MET:HE3	1:C:72:LEU:HB3	1.50	0.91
1:A:179:MET:HG3	1:B:92:LEU:HD12	1.51	0.90
1:A:183:MET:OXT	1:A:183:MET:HG3	1.78	0.84
1:A:88:ILE:HG12	3:A:1002:GNB:O8	1.92	0.70
1:A:92:LEU:HD13	1:B:179:MET:HG3	1.74	0.69
1:C:179:MET:HG3	1:D:92:LEU:HD13	1.76	0.66
1:B:88:ILE:HG23	3:B:1001:GNB:O9	1.95	0.66
1:D:88:ILE:HG12	3:D:1003:GNB:O8	1.97	0.65
1:C:48:TYR:CB	1:C:54:MET:HE2	2.21	0.64
1:A:110:GLU:H	1:A:110:GLU:CD	2.06	0.63
1:C:48:TYR:HB3	1:C:54:MET:CE	2.23	0.62
1:B:2:GLU:H	1:B:3:PRO:HD2	1.64	0.62
1:B:2:GLU:HB3	1:B:3:PRO:HD3	1.86	0.57
1:D:88:ILE:HG23	3:D:1003:GNB:O9	2.05	0.56
1:D:1:ALA:O	1:D:2:GLU:HB2	2.05	0.56
1:A:156:LYS:HG3	1:A:183:MET:HE1	1.89	0.54
1:C:54:MET:HE3	1:C:72:LEU:CB	2.31	0.54
1:B:165:ASP:HB2	1:B:166:PRO:CD	2.39	0.53
1:A:88:ILE:HG23	3:A:1002:GNB:O9	2.09	0.52
1:B:88:ILE:HG12	3:B:1001:GNB:O8	2.09	0.52
1:D:2:GLU:N	1:D:3:PRO:CD	2.74	0.50
1:A:182:LEU:O	1:A:183:MET:CB	2.61	0.49
1:D:30:LEU:HD13	1:D:95:LYS:HB3	1.95	0.49
1:B:2:GLU:HB3	1:B:3:PRO:CD	2.43	0.48
1:C:147:LYS:N	1:C:147:LYS:HD2	2.28	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:2:GLU:N	1:D:3:PRO:HD3	2.30	0.47
1:C:139:LYS:HD3	5:C:1193:HOH:O	2.14	0.47
1:A:92:LEU:HD11	3:A:1002:GNB:CM1	2.45	0.46
1:B:88:ILE:HG23	3:B:1001:GNB:N7	2.31	0.46
1:D:88:ILE:HG23	3:D:1003:GNB:N7	2.31	0.46
1:A:88:ILE:HG23	3:A:1002:GNB:N7	2.32	0.45
1:A:27:LYS:O	1:A:28:ASP:HB2	2.15	0.45
3:A:1002:GNB:HA32	1:B:162:PHE:CE1	2.50	0.45
1:A:13:GLU:H	1:A:13:GLU:CD	2.25	0.45
1:C:54:MET:CE	1:C:72:LEU:HB3	2.35	0.44
1:C:88:ILE:HG23	3:C:1004:GNB:O9	2.18	0.44
1:A:182:LEU:HD12	3:B:1001:GNB:HC1	2.00	0.43
1:A:156:LYS:HG3	1:A:183:MET:CE	2.48	0.43
1:A:120:ASP:HA	1:A:121:PRO:HA	1.85	0.42
1:A:41:PRO:HD3	1:A:102:HIS:CD2	2.54	0.42
1:B:57:ILE:O	1:B:87:LYS:HE2	2.20	0.41
1:B:149:VAL:HG23	1:B:164:GLN:HG3	2.02	0.41
1:B:5:PRO:HA	1:B:6:PRO:HD3	1.91	0.41
1:D:41:PRO:HD3	1:D:102:HIS:CD2	2.56	0.41
1:B:165:ASP:HB2	1:B:166:PRO:HD2	2.00	0.40
1:C:13:GLU:CD	1:C:13:GLU:H	2.30	0.40

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	174/183 (95%)	171 (98%)	3 (2%)	0	100	100
1	B	181/183 (99%)	176 (97%)	4 (2%)	1 (1%)	21	9
1	C	174/183 (95%)	171 (98%)	3 (2%)	0	100	100
1	D	181/183 (99%)	175 (97%)	6 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	710/732 (97%)	693 (98%)	16 (2%)	1 (0%)	48 34

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	2	GLU

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	153/159 (96%)	148 (97%)	5 (3%)	33 10
1	B	159/159 (100%)	153 (96%)	6 (4%)	29 8
1	C	153/159 (96%)	147 (96%)	6 (4%)	28 7
1	D	159/159 (100%)	157 (99%)	2 (1%)	61 43
All	All	624/636 (98%)	605 (97%)	19 (3%)	36 12

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	GLU
1	A	84	LYS
1	A	110	GLU
1	A	139	LYS
1	A	174	LEU
1	B	84	LYS
1	B	92	LEU
1	B	139	LYS
1	B	174	LEU
1	B	181	THR
1	B	183	MET
1	C	13	GLU
1	C	107	GLU
1	C	147	LYS

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Mol	Chain	Res	Type
1	C	174	LEU
1	C	181	THR
1	C	183	MET
1	D	181	THR
1	D	183	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	177	ASN
1	B	115	HIS
1	C	58	GLN
1	D	78	ASN
1	D	115	HIS

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](#)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 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
3	GNB	A	1002	-	30,33,33	1.47	4 (13%)	35,43,43	1.83	11 (31%)
4	BME	D	204	-	3,3,3	0.97	0	2,2,2	0.41	0
3	GNB	B	1001	-	30,33,33	1.47	4 (13%)	35,43,43	2.05	8 (22%)
4	BME	C	204	-	3,3,3	0.95	0	2,2,2	0.57	0
3	GNB	C	1004	-	30,33,33	1.40	3 (10%)	35,43,43	1.70	4 (11%)
3	GNB	D	1003	-	30,33,33	1.42	3 (10%)	35,43,43	1.51	6 (17%)
4	BME	A	204	-	3,3,3	0.99	0	2,2,2	0.65	0
4	BME	B	204	-	3,3,3	0.95	0	2,2,2	0.19	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
3	GNB	A	1002	-	1/1/8/10	5/30/36/36	0/1/1/1
4	BME	D	204	-	-	1/1/1/1	-
3	GNB	B	1001	-	1/1/8/10	4/30/36/36	0/1/1/1
4	BME	C	204	-	-	1/1/1/1	-
3	GNB	C	1004	-	1/1/8/10	5/30/36/36	0/1/1/1
3	GNB	D	1003	-	1/1/8/10	4/30/36/36	0/1/1/1
4	BME	A	204	-	-	0/1/1/1	-
4	BME	B	204	-	-	0/1/1/1	-

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1002	GNB	O9-N7	4.67	1.30	1.22
3	C	1004	GNB	O9-N7	4.55	1.30	1.22
3	D	1003	GNB	O9-N7	4.29	1.30	1.22
3	B	1001	GNB	O9-N7	4.07	1.29	1.22
3	B	1001	GNB	CB2-SG2	2.82	1.84	1.82
3	D	1003	GNB	OZ1-CD2	-2.36	1.22	1.42
3	B	1001	GNB	CA2-N2	2.33	1.50	1.45
3	C	1004	GNB	OZ1-CD2	-2.32	1.23	1.42
3	A	1002	GNB	OZ1-CD2	-2.28	1.23	1.42
3	A	1002	GNB	CA2-N2	2.23	1.50	1.45
3	B	1001	GNB	OZ1-CD2	-2.15	1.24	1.42
3	D	1003	GNB	CA2-N2	2.15	1.50	1.45
3	A	1002	GNB	CB2-SG2	2.08	1.84	1.82
3	C	1004	GNB	CA2-N2	2.02	1.50	1.45

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1004	GNB	CB2-SG2-CD2	5.41	110.14	100.12
3	B	1001	GNB	CH-OH1-CD2	5.36	123.27	114.01
3	B	1001	GNB	O9-N7-CZ	5.12	125.87	118.82
3	C	1004	GNB	O9-N7-CZ	4.84	125.48	118.82
3	B	1001	GNB	CH-CG2-CL1	-4.64	109.94	120.64
3	A	1002	GNB	O9-N7-CZ	4.21	124.62	118.82
3	A	1002	GNB	CA2-C2-N3	3.96	125.05	116.54
3	D	1003	GNB	O9-N7-CZ	3.83	124.08	118.82
3	A	1002	GNB	C3-CA3-N3	3.71	124.58	113.06
3	D	1003	GNB	CH-CG2-CL1	-3.53	112.50	120.64
3	B	1001	GNB	OH1-CH-CG2	-3.46	101.97	109.91
3	C	1004	GNB	CM1-CZ-N7	3.06	122.01	119.34
3	B	1001	GNB	CH-CG2-CL2	2.98	127.51	120.64
3	A	1002	GNB	O2-C2-N3	-2.96	116.72	122.98
3	B	1001	GNB	CL2-CG2-CL1	2.89	122.53	118.23
3	C	1004	GNB	CH-OH1-CD2	2.87	118.97	114.01
3	B	1001	GNB	CA2-N2-CD	-2.84	114.55	121.68
3	D	1003	GNB	CL2-CG2-CL1	2.78	122.37	118.23
3	A	1002	GNB	CH-CG2-CL1	-2.59	114.69	120.64
3	B	1001	GNB	CM2-CL2-CG2	-2.53	117.67	121.00
3	A	1002	GNB	O32-C3-CA3	2.43	122.03	112.81
3	D	1003	GNB	CB2-SG2-CD2	2.37	104.52	100.12
3	A	1002	GNB	CH-OH1-CD2	-2.21	110.19	114.01
3	D	1003	GNB	OH1-CH-CG2	-2.19	104.88	109.91
3	A	1002	GNB	CL2-CG2-CL1	2.19	121.49	118.23
3	D	1003	GNB	CM2-CL2-CG2	-2.14	118.18	121.00
3	A	1002	GNB	OE-CD-CG	-2.11	118.20	122.02
3	A	1002	GNB	CB2-SG2-CD2	2.10	104.01	100.12
3	A	1002	GNB	CB2-CA2-C2	2.04	114.07	109.46

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	A	1002	GNB	CD2
3	B	1001	GNB	CD2
3	C	1004	GNB	CD2
3	D	1003	GNB	CD2

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1002	GNB	O31-C3-CA3-N3
3	A	1002	GNB	O32-C3-CA3-N3
3	A	1002	GNB	CM1-CZ-N7-O9
3	A	1002	GNB	CM2-CZ-N7-O9
3	B	1001	GNB	CM1-CZ-N7-O9
3	B	1001	GNB	CM2-CZ-N7-O9
3	C	1004	GNB	CM1-CZ-N7-O9
3	C	1004	GNB	CM2-CZ-N7-O9
3	D	1003	GNB	O31-C3-CA3-N3
3	D	1003	GNB	O32-C3-CA3-N3
3	D	1003	GNB	CM1-CZ-N7-O9
3	D	1003	GNB	CM2-CZ-N7-O9
4	C	204	BME	O1-C1-C2-S2
4	D	204	BME	O1-C1-C2-S2
3	C	1004	GNB	O31-C3-CA3-N3
3	C	1004	GNB	O32-C3-CA3-N3
3	B	1001	GNB	O32-C3-CA3-N3
3	B	1001	GNB	O31-C3-CA3-N3
3	A	1002	GNB	OT1-C-CA-N
3	C	1004	GNB	OT1-C-CA-N

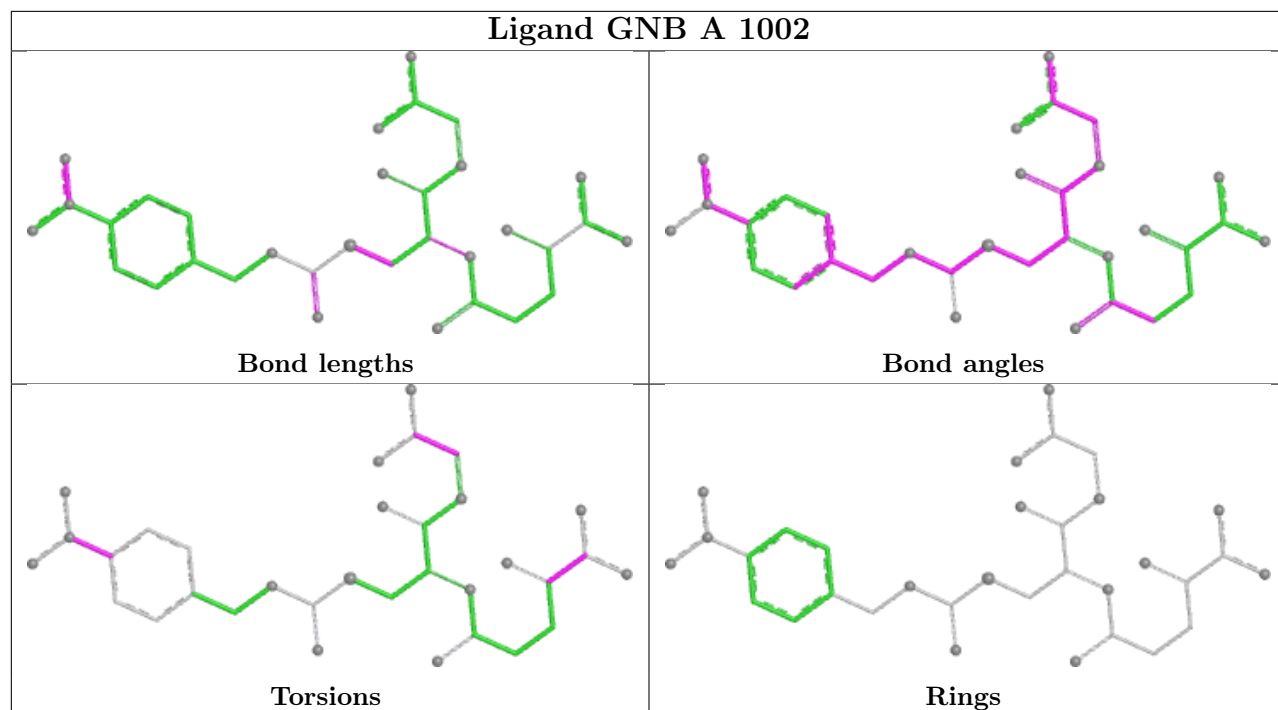
There are no ring outliers.

4 monomers are involved in 13 short contacts:

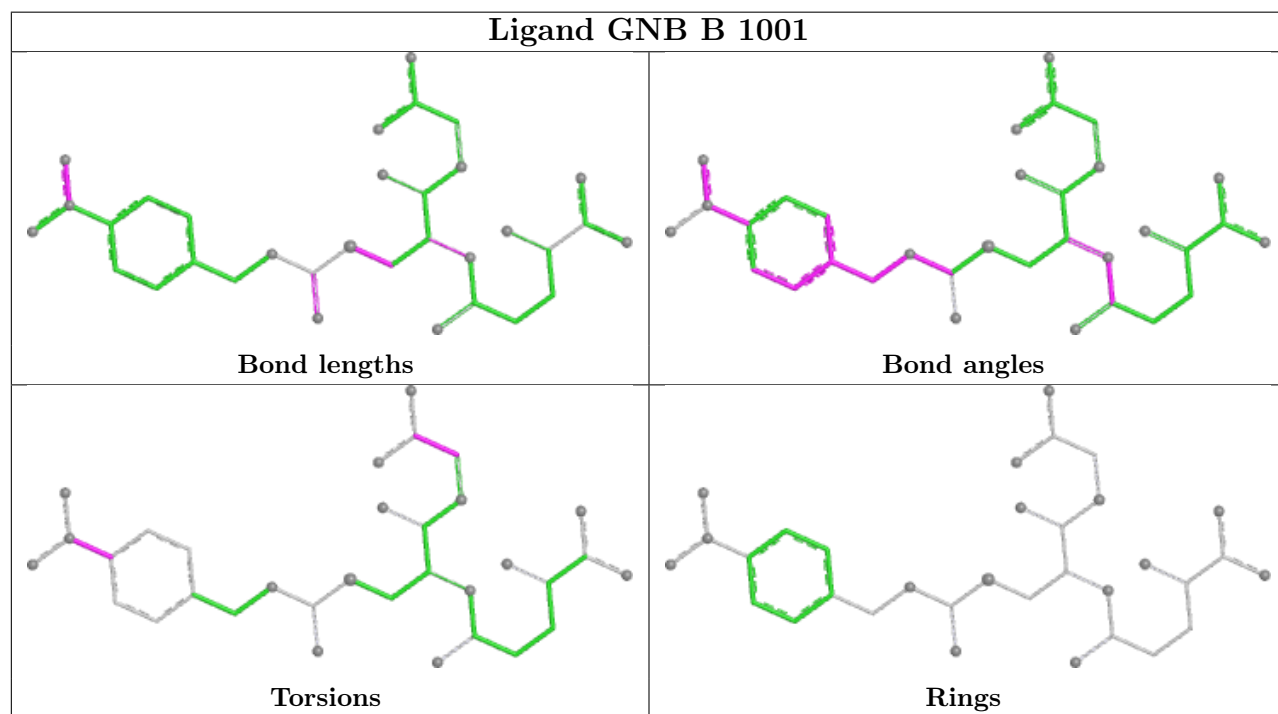
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1002	GNB	5	0
3	B	1001	GNB	4	0
3	C	1004	GNB	1	0
3	D	1003	GNB	3	0

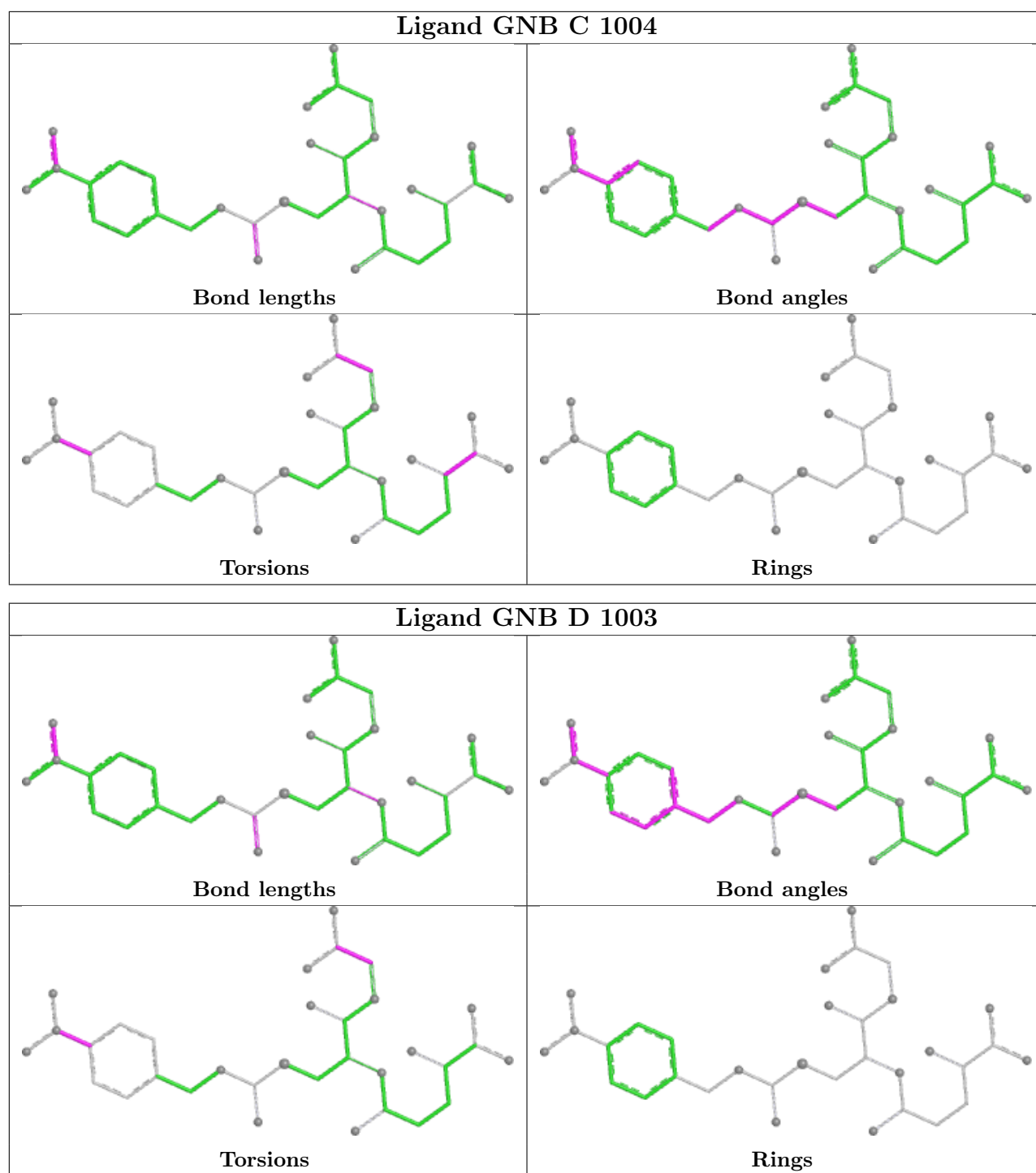
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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 GNB A 1002



Ligand GNB B 1001





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	D	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	D	182:LEU	C	183:MET	N	1.61

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	176/183 (96%)	-0.08	1 (0%) 85 89	9, 15, 29, 45	5 (2%)
1	B	183/183 (100%)	0.11	11 (6%) 27 33	2, 16, 35, 50	7 (3%)
1	C	175/183 (95%)	-0.08	4 (2%) 61 69	10, 16, 28, 48	2 (1%)
1	D	183/183 (100%)	0.09	10 (5%) 30 37	2, 16, 37, 51	3 (1%)
All	All	717/732 (97%)	0.01	26 (3%) 46 54	2, 16, 33, 51	17 (2%)

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	183	MET	12.5
1	B	1	ALA	7.1
1	D	2	GLU	5.6
1	D	3	PRO	5.4
1	A	183	MET	5.1
1	D	183	MET	4.9
1	D	6	PRO	4.7
1	D	5	PRO	4.7
1	D	8	GLY	4.5
1	D	7	SER	4.4
1	D	1	ALA	4.2
1	B	182	LEU	4.0
1	D	182	LEU	3.7
1	B	8	GLY	3.2
1	B	3	PRO	3.2
1	D	4	GLN	3.1
1	C	182	LEU	3.0
1	B	2	GLU	2.7
1	B	6	PRO	2.7
1	B	5	PRO	2.7
1	C	181	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	181	THR	2.5
1	C	110	GLU	2.3
1	B	7	SER	2.3
1	B	111	THR	2.3
1	C	8	GLY	2.2

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

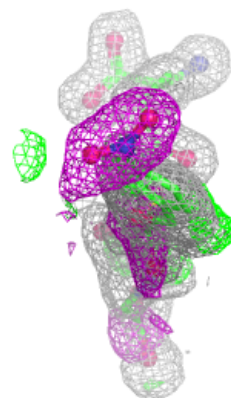
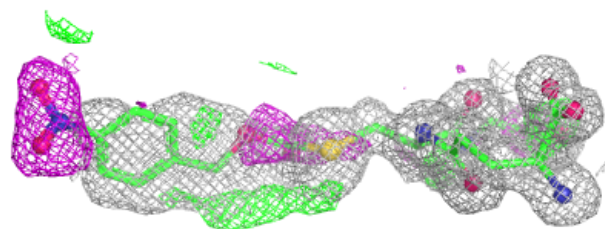
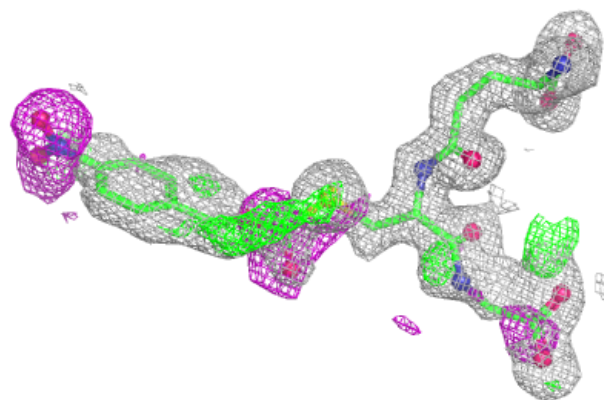
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	GNB	A	1002	33/33	0.83	0.15	15,28,41,43	0
3	GNB	B	1001	33/33	0.83	0.16	18,31,45,46	0
3	GNB	D	1003	33/33	0.87	0.12	18,32,42,43	0
4	BME	D	204	4/4	0.87	0.16	32,34,34,35	0
3	GNB	C	1004	33/33	0.89	0.13	15,30,43,44	0
4	BME	C	204	4/4	0.91	0.15	34,35,35,35	0
4	BME	A	204	4/4	0.92	0.13	29,32,32,32	0
4	BME	B	204	4/4	0.93	0.12	31,33,34,36	0
2	ZN	A	902	1/1	0.99	0.02	12,12,12,12	0
2	ZN	B	901	1/1	0.99	0.02	13,13,13,13	0
2	ZN	C	904	1/1	0.99	0.03	13,13,13,13	0
2	ZN	D	903	1/1	0.99	0.03	14,14,14,14	0

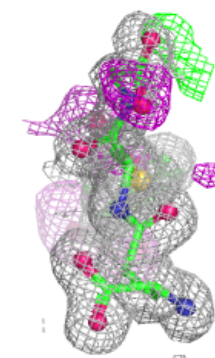
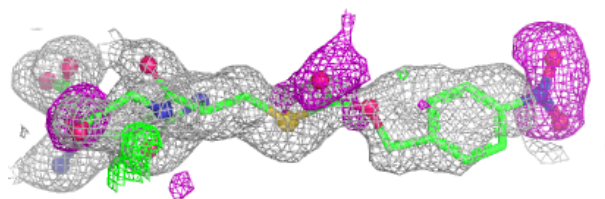
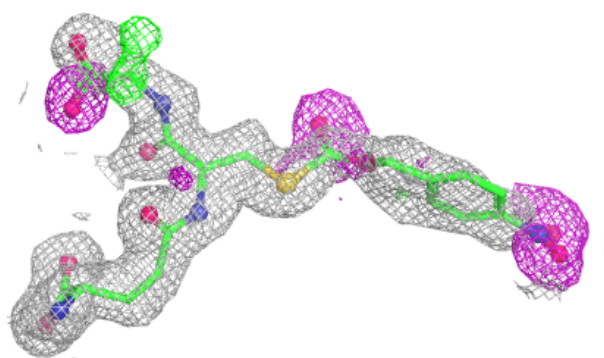
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GNB A 1002:

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

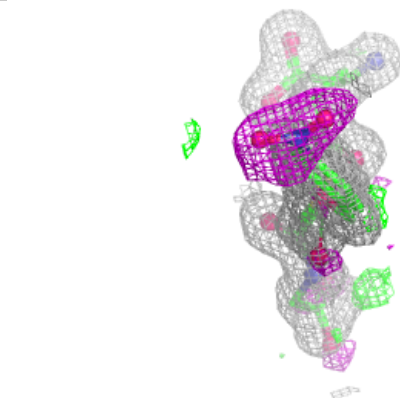
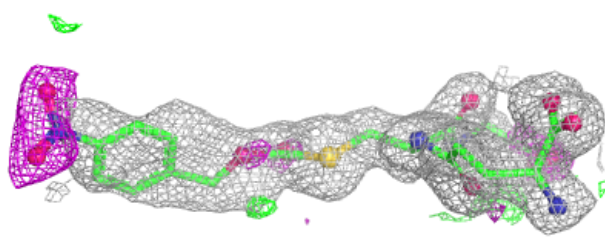
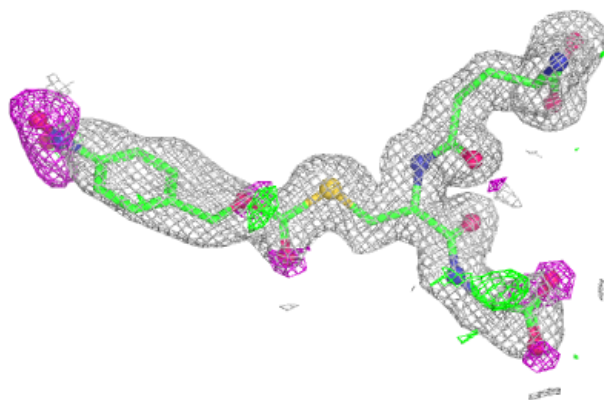
**Electron density around GNB B 1001:**

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

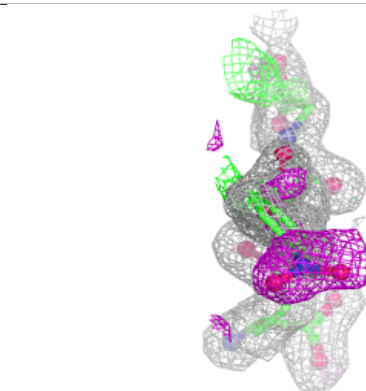
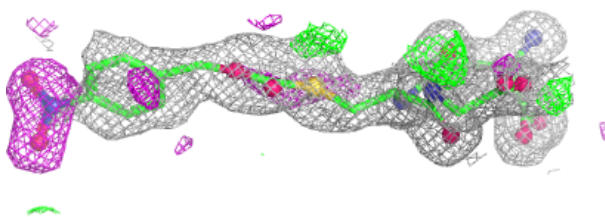
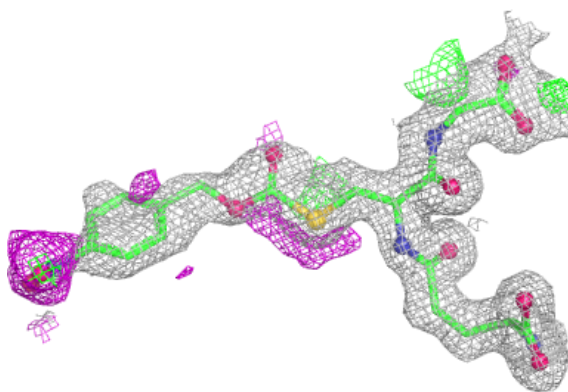


Electron density around GNB D 1003:

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

**Electron density around GNB C 1004:**

$2mF_o-DF_c$ (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.