



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 06:02 AM UTC

PDB ID : 3AEJ / pdb_00003aej
Title : Reaction intermediate structure of Entamoeba histolytica methionine gamma-lyase 1 tetramer containing Michaelis complex and methionine-pyridoxal-5'-phosphate
Authors : Karaki, T.; Sato, D.; Shimizu, A.; Nozaki, T.; Harada, S.
Deposited on : 2010-02-10
Resolution : 2.59 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

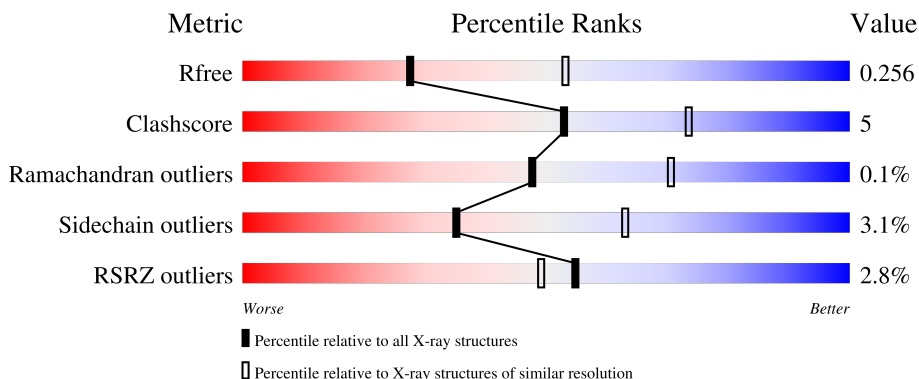
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.59 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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	389	2% 88% 10% ..
1	B	389	4% 88% 11% ..
1	D	389	3% 89% 9% ..
2	C	389	2% 85% 13% ..

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 12308 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 Methionine gamma-lyase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	387	Total	C	N	O	S	0	1	0
			2952	1878	497	553	24			
1	B	386	Total	C	N	O	S	0	1	0
			2937	1867	495	551	24			
1	D	384	Total	C	N	O	S	0	0	0
			2920	1857	492	548	23			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	308	LEU	SER	SEE REMARK 999	UNP Q86D28
B	808	LEU	SER	SEE REMARK 999	UNP Q86D28
D	1808	LEU	SER	SEE REMARK 999	UNP Q86D28

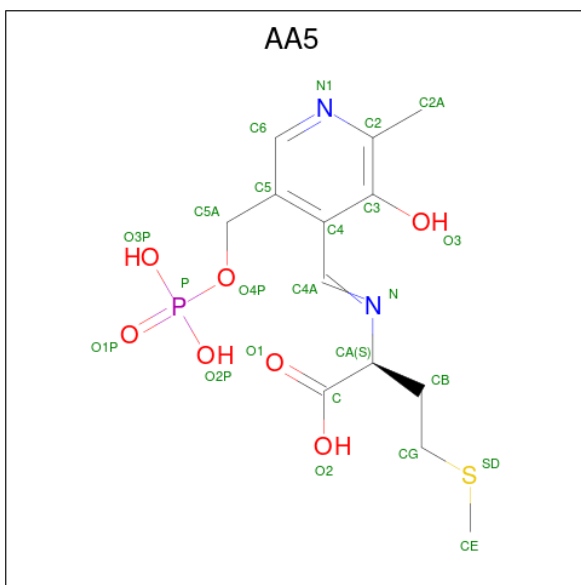
- Molecule 2 is a protein called Methionine gamma-lyase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	387	Total	C	N	O	P S	0	1	0
			2967	1886	498	558	1 24			

There is a discrepancy between the modelled and reference sequences:

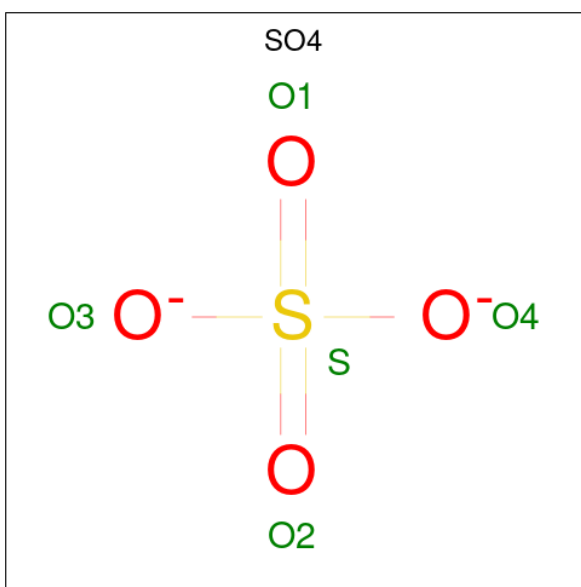
Chain	Residue	Modelled	Actual	Comment	Reference
C	1308	LEU	SER	SEE REMARK 999	UNP Q86D28

- Molecule 3 is N-[(3-HYDROXY-2-METHYL-5-{{[(TRIHYDROXYPHOSPHORANYL)OXY]METHYL}PYRIDIN-4-YL)METHYLENE]METHIONINE (CCD ID: AA5) (formula: C₁₃H₁₉N₂O₇PS).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	S	0	0
			24	13	2	7	1	1		
3	B	1	Total	C	N	O	P	S	0	0
			24	13	2	7	1	1		
3	D	1	Total	C	N	O	P	S	0	0
			24	13	2	7	1	1		

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

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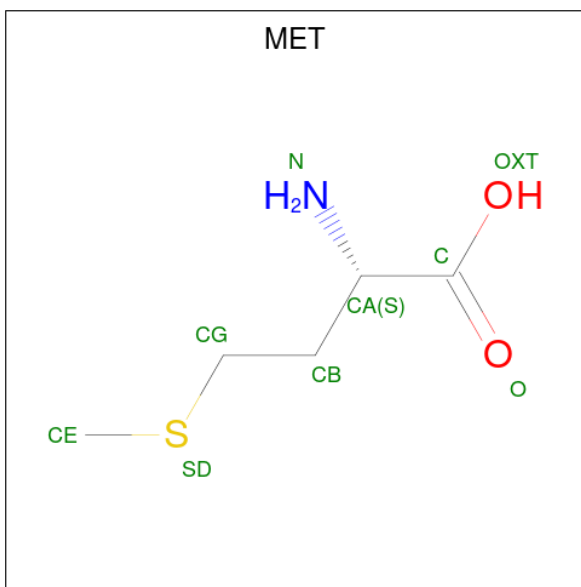
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is METHIONINE (CCD ID: MET) (formula: $C_5H_{11}NO_2S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	C	1	Total	C	N	O	S	0	0
			9	5	1	2	1		

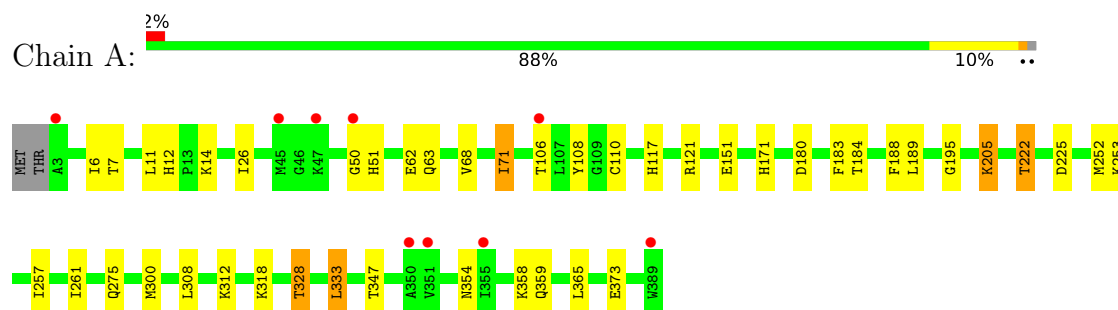
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	123	Total	O	0	0
			123	123		
7	B	78	Total	O	0	0
			78	78		
7	C	134	Total	O	0	0
			134	134		
7	D	84	Total	O	0	0
			84	84		

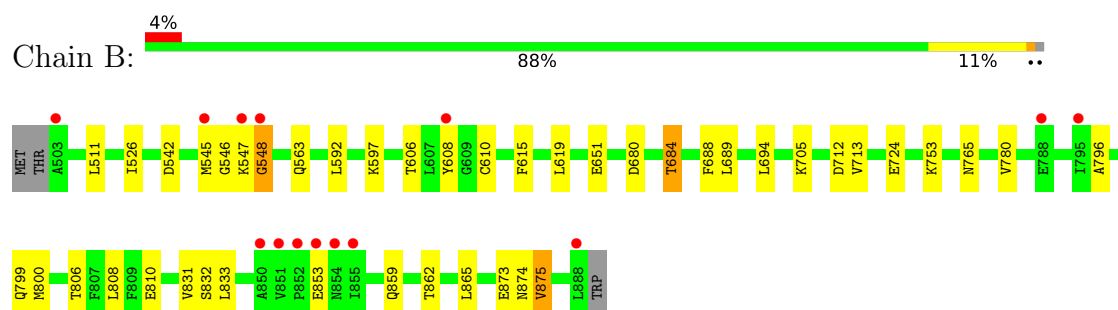
3 Residue-property plots [i](#)

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.

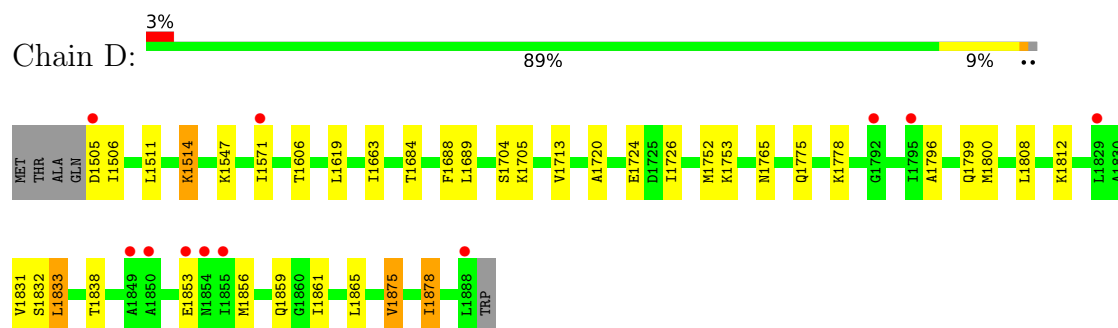
- Molecule 1: Methionine gamma-lyase



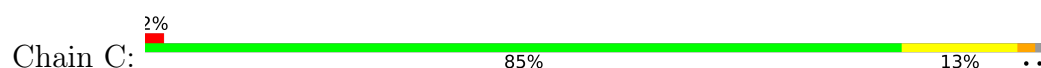
- Molecule 1: Methionine gamma-lyase

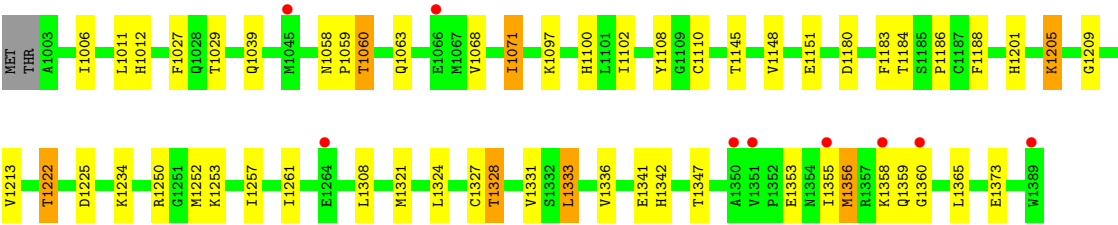


- Molecule 1: Methionine gamma-lyase



- Molecule 2: Methionine gamma-lyase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	98.74Å 85.36Å 113.66Å 90.00° 101.92° 90.00°	Depositor
Resolution (Å)	39.04 – 2.59 39.04 – 2.59	Depositor EDS
% Data completeness (in resolution range)	99.4 (39.04-2.59) 99.7 (39.04-2.59)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.87 (at 2.58Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.209 , 0.256 0.208 , 0.256	Depositor DCC
R_{free} test set	2924 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	26.7	Xtriage
Anisotropy	0.355	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 35.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	12308	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.55% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, LLP, AA5, 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	0.42	0/3018	0.78	0/4080
1	B	0.42	0/3001	0.78	0/4057
1	D	0.42	0/2981	0.78	0/4030
2	C	0.42	0/3008	0.80	0/4066
All	All	0.42	0/12008	0.79	0/16233

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	2952	0	2957	33	0
1	B	2937	0	2947	30	0
1	D	2920	0	2929	23	0
2	C	2967	0	2960	43	0
3	A	24	0	16	5	0
3	B	24	0	15	1	0
3	D	24	0	15	1	0
4	A	5	0	0	0	0
4	B	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	C	5	0	0	0	0
4	D	5	0	0	0	0
5	A	6	0	8	1	0
5	C	6	0	8	0	0
6	C	9	0	8	4	0
7	A	123	0	0	3	0
7	B	78	0	0	1	0
7	C	134	0	0	3	0
7	D	84	0	0	0	0
All	All	12308	0	11863	118	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 5.

All (118) 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:C:1353:GLU:HA	2:C:1356:MET:HB3	1.66	0.78
2:C:1071:ILE:HD11	2:C:1252:MET:HE1	1.67	0.76
1:D:1808:LEU:HD21	1:D:1865:LEU:HD13	1.69	0.73
2:C:1347:THR:HG22	6:C:2003:MET:HB3	1.70	0.73
1:A:261:ILE:HD11	2:C:1257:ILE:HG12	1.72	0.70
1:B:874:ASN:HB2	1:D:1505:ASP:HB2	1.72	0.70
1:A:71:ILE:HD11	1:A:252:MET:CE	2.22	0.69
1:B:651:GLU:HG2	1:B:680:ASP:HB3	1.72	0.69
2:C:1071:ILE:HD11	2:C:1252:MET:CE	2.24	0.68
2:C:1321:MET:HE1	2:C:1342:HIS:HB2	1.74	0.68
2:C:1308:LEU:HD21	2:C:1365:LEU:HD13	1.74	0.68
1:A:71:ILE:HD11	1:A:252:MET:HE1	1.75	0.67
1:B:545:MET:H	1:B:546:GLY:HA2	1.62	0.64
1:D:1808:LEU:HD11	1:D:1865:LEU:HB3	1.80	0.63
1:A:11:LEU:HD12	2:C:1373:GLU:HG3	1.79	0.62
1:B:610:CYS:SG	2:C:1234:LYS:NZ	2.71	0.62
1:D:1511:LEU:HD23	1:D:1753:LYS:HD2	1.80	0.62
1:D:1606:THR:HA	1:D:1859:GLN:HE21	1.65	0.61
1:A:222:THR:HG22	1:A:225:ASP:H	1.66	0.60
1:D:1506:ILE:HG21	1:D:1571:ILE:HD13	1.82	0.60
1:D:1705:LYS:HE3	3:D:2004:AA5:H4A	1.83	0.59
1:A:205:LYS:HG2	1:A:333:LEU:HG	1.83	0.59
1:A:257:ILE:HG12	2:C:1261:ILE:HD11	1.85	0.59
1:B:873:GLU:HG3	1:D:1511:LEU:HD12	1.85	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:308:LEU:HD21	1:A:365:LEU:HD13	1.84	0.58
1:A:51:HIS:HE1	1:A:62:GLU:OE1	1.88	0.57
1:A:328:THR:HG22	7:A:3014:HOH:O	2.05	0.56
1:D:1684:THR:HG22	1:D:1688:PHE:HB2	1.86	0.56
1:A:373:GLU:HG3	2:C:1011:LEU:HD12	1.86	0.56
2:C:1068:VAL:HA	2:C:1071:ILE:HD11	1.86	0.56
2:C:1222:THR:HG22	2:C:1225:ASP:H	1.70	0.56
1:B:808:LEU:HD11	1:B:865:LEU:HB3	1.87	0.56
1:A:184:THR:HG22	1:A:188:PHE:HB2	1.87	0.55
2:C:1328:THR:HG22	7:C:3001:HOH:O	2.06	0.55
1:B:608:TYR:CE1	3:B:2002:AA5:HB1	2.41	0.55
2:C:1184:THR:HG22	2:C:1188:PHE:HB2	1.89	0.54
1:B:545:MET:N	1:B:546:GLY:HA2	2.18	0.54
2:C:1308:LEU:HD11	2:C:1365:LEU:HB3	1.90	0.54
1:A:11:LEU:HD22	2:C:1336:VAL:HG12	1.90	0.53
1:B:808:LEU:HD21	1:B:865:LEU:HD13	1.91	0.53
1:D:1514:LYS:HD3	1:D:1514:LYS:H	1.75	0.52
1:A:151:GLU:HG2	1:A:180:ASP:HB3	1.92	0.52
1:D:1838:THR:HG21	1:D:1878:ILE:HD13	1.92	0.51
1:A:205:LYS:NZ	3:A:2001:AA5:HA	2.26	0.51
1:B:542:ASP:HB3	1:B:547:LYS:O	2.11	0.51
1:B:592:LEU:HD21	1:B:619:LEU:HD22	1.92	0.50
2:C:1027:PHE:H	2:C:1060:THR:HG21	1.76	0.50
1:B:511:LEU:HD23	1:B:753:LYS:HG3	1.93	0.50
1:B:705:LYS:HD2	1:B:833:LEU:HG	1.93	0.50
1:A:205:LYS:NZ	3:A:2001:AA5:H4A	2.27	0.50
1:B:597:LYS:HE3	2:C:1097:LYS:HE3	1.94	0.50
7:B:3010:HOH:O	2:C:1331:VAL:HG22	2.11	0.50
1:B:606:THR:HA	1:B:859:GLN:HE21	1.76	0.50
2:C:1068:VAL:HA	2:C:1071:ILE:CD1	2.42	0.49
2:C:1359:GLN:N	2:C:1360:GLY:HA2	2.26	0.49
1:D:1704:SER:HB2	1:D:1705:LYS:HE2	1.94	0.49
2:C:1027:PHE:H	2:C:1060:THR:CG2	2.25	0.49
2:C:1250:ARG:O	2:C:1253:LYS:HB2	2.13	0.49
1:B:862:THR:H	1:B:865:LEU:HD12	1.79	0.48
1:A:205:LYS:HZ1	3:A:2001:AA5:HA	1.76	0.48
2:C:1108:TYR:HE1	6:C:2003:MET:HB2	1.78	0.48
1:A:6:ILE:HG12	1:A:71:ILE:HG23	1.95	0.48
1:B:542:ASP:O	1:B:546:GLY:HA2	2.14	0.48
1:A:68:VAL:HA	1:A:71:ILE:CD1	2.45	0.47
1:A:171:HIS:CE1	1:A:195:GLY:O	2.68	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:108:TYR:CE2	1:A:110:CYS:HB2	2.50	0.47
1:A:205:LYS:HZ2	3:A:2001:AA5:H4A	1.79	0.47
2:C:1205:LLP:H4'1	6:C:2003:MET:N	2.30	0.47
1:D:1663:ILE:H	1:D:1799:GLN:HE22	1.61	0.47
1:A:71:ILE:HD11	1:A:252:MET:HE2	1.97	0.46
2:C:1102:ILE:O	2:C:1148:VAL:HA	2.14	0.46
2:C:1108:TYR:CE2	2:C:1110:CYS:HB2	2.50	0.46
1:D:1689:LEU:HD13	1:D:1800:MET:HG2	1.96	0.46
1:B:608:TYR:CE2	1:B:610:CYS:HB2	2.50	0.46
1:A:12:HIS:HE1	7:C:3001:HOH:O	1.99	0.46
1:A:7:THR:O	1:A:11:LEU:HG	2.16	0.45
1:D:1778:LYS:HA	1:D:1812:LYS:HE3	1.97	0.45
2:C:1006:ILE:HG12	2:C:1071:ILE:HG23	1.98	0.45
1:D:1720:ALA:HB3	1:D:1726:ILE:HB	1.98	0.45
1:D:1705:LYS:HD2	1:D:1833:LEU:HG	1.97	0.45
7:A:3014:HOH:O	2:C:1012:HIS:HE1	2.00	0.45
2:C:1321:MET:CE	2:C:1342:HIS:HB2	2.46	0.45
2:C:1100:HIS:HB3	2:C:1145:THR:HA	1.99	0.45
1:A:106:THR:HG22	1:A:359:GLN:HG2	1.99	0.45
2:C:1151:GLU:HG2	2:C:1180:ASP:HB3	1.99	0.44
1:D:1796:ALA:HB1	1:D:1800:MET:HE2	2.00	0.44
1:B:689:LEU:HD13	1:B:800:MET:HG2	1.99	0.44
2:C:1186:PRO:HD3	2:C:1201:HIS:CE1	2.52	0.44
1:A:68:VAL:HA	1:A:71:ILE:HD11	2.00	0.44
2:C:1108:TYR:CE1	6:C:2003:MET:HB2	2.52	0.44
2:C:1205:LLP:HD3	2:C:1333:LEU:HG	1.98	0.44
1:A:347:THR:HG22	3:A:2001:AA5:HG2	2.00	0.43
1:B:684:THR:HG22	1:B:688:PHE:HB2	1.99	0.43
1:A:26:ILE:HB	1:B:526:ILE:HB	1.98	0.43
1:D:1514:LYS:H	1:D:1514:LYS:CD	2.31	0.43
2:C:1331:VAL:HG12	2:C:1341:GLU:HG3	2.00	0.43
1:B:712:ASP:HA	2:C:1029:THR:HA	2.00	0.43
2:C:1058:ASN:HA	2:C:1059:PRO:HD3	1.94	0.43
2:C:1222:THR:HG21	7:C:3403:HOH:O	2.18	0.43
1:A:253:LYS:HE3	7:A:3083:HOH:O	2.18	0.42
2:C:1209:GLY:O	2:C:1336:VAL:HG23	2.20	0.42
1:A:189:LEU:HD13	1:A:300:MET:HG2	2.01	0.42
1:B:694:LEU:HD13	1:B:799:GLN:HE21	1.84	0.42
1:D:1765:ASN:ND2	1:D:1875:VAL:HG22	2.35	0.42
1:B:765:ASN:ND2	1:B:875:VAL:HG22	2.35	0.41
1:A:312:LYS:HD3	5:A:2009:GOL:H31	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:806:THR:HG21	1:B:833:LEU:HD22	2.02	0.41
1:A:117:HIS:O	1:A:121:ARG:HG3	2.21	0.41
1:D:1853:GLU:H	1:D:1853:GLU:CD	2.28	0.41
1:B:615:PHE:HA	1:B:619:LEU:HG	2.02	0.41
2:C:1324:LEU:HD13	2:C:1327:CYS:HB2	2.03	0.41
1:B:831:VAL:O	1:B:832:SER:HB3	2.19	0.41
1:B:547:LYS:HA	1:B:548:GLY:HA2	1.74	0.40
1:D:1831:VAL:O	1:D:1832:SER:HB3	2.22	0.40
1:B:780:VAL:HB	1:B:810:GLU:HB3	2.04	0.40
1:B:796:ALA:HB1	1:B:800:MET:HE2	2.04	0.40
2:C:1355:ILE:HA	2:C:1358:LYS:HE2	2.03	0.40
1:D:1506:ILE:CG2	1:D:1571:ILE:HD13	2.51	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	386/389 (99%)	376 (97%)	9 (2%)	1 (0%)	36	58
1	B	385/389 (99%)	376 (98%)	8 (2%)	1 (0%)	36	58
1	D	382/389 (98%)	371 (97%)	11 (3%)	0	100	100
2	C	385/389 (99%)	377 (98%)	8 (2%)	0	100	100
All	All	1538/1556 (99%)	1500 (98%)	36 (2%)	2 (0%)	48	70

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	50	GLY
1	B	548	GLY

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	321/322 (100%)	309 (96%)	12 (4%)	30	57
1	B	320/322 (99%)	314 (98%)	6 (2%)	50	75
1	D	318/322 (99%)	306 (96%)	12 (4%)	29	56
2	C	320/321 (100%)	310 (97%)	10 (3%)	35	63
All	All	1279/1287 (99%)	1239 (97%)	40 (3%)	35	63

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	LYS
1	A	63	GLN
1	A	71	ILE
1	A	183	PHE
1	A	205	LYS
1	A	222	THR
1	A	275	GLN
1	A	318	LYS
1	A	328	THR
1	A	333	LEU
1	A	354	ASN
1	A	358	LYS
1	B	563	GLN
1	B	684	THR
1	B	713	VAL
1	B	724	GLU
1	B	853	GLU
1	B	875	VAL
2	C	1039	GLN
2	C	1060	THR
2	C	1063	GLN
2	C	1071	ILE
2	C	1183	PHE
2	C	1213	VAL

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Mol	Chain	Res	Type
2	C	1222	THR
2	C	1328	THR
2	C	1333	LEU
2	C	1356	MET
1	D	1514	LYS
1	D	1547	LYS
1	D	1619	LEU
1	D	1713	VAL
1	D	1724	GLU
1	D	1752	MET
1	D	1775	GLN
1	D	1833	LEU
1	D	1856	MET
1	D	1861	ILE
1	D	1875	VAL
1	D	1878	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (39) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	51	HIS
1	A	58	ASN
1	A	100	HIS
1	A	171	HIS
1	A	265	ASN
1	A	275	GLN
1	A	293	HIS
1	A	299	GLN
1	A	354	ASN
1	A	374	ASN
1	B	528	GLN
1	B	600	HIS
1	B	760	GLN
1	B	765	ASN
1	B	783	ASN
1	B	799	GLN
1	B	842	HIS
1	B	874	ASN
2	C	1063	GLN
2	C	1100	HIS
2	C	1117	HIS
2	C	1265	ASN

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Mol	Chain	Res	Type
2	C	1283	ASN
2	C	1293	HIS
2	C	1299	GLN
2	C	1323	HIS
2	C	1354	ASN
2	C	1359	GLN
1	D	1528	GLN
1	D	1600	HIS
1	D	1617	HIS
1	D	1765	ASN
1	D	1775	GLN
1	D	1783	ASN
1	D	1793	HIS
1	D	1799	GLN
1	D	1854	ASN
1	D	1859	GLN
1	D	1874	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue 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	$\# Z > 2$
2	LLP	C	1205	2	23,24,25	1.76	5 (21%)	25,32,34	1.75	4 (16%)

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
2	LLP	C	1205	2	-	7/16/17/19	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1205	LLP	O3-C3	-5.79	1.23	1.36
2	C	1205	LLP	C2-N1	2.83	1.38	1.33
2	C	1205	LLP	C6-N1	2.28	1.39	1.34
2	C	1205	LLP	C4-C4'	2.06	1.51	1.46
2	C	1205	LLP	C4'-NZ	2.04	1.34	1.27

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1205	LLP	OP4-C5'-C5	6.33	121.22	109.36
2	C	1205	LLP	C4-C4'-NZ	-3.10	109.72	124.04
2	C	1205	LLP	C5-C6-N1	-2.27	120.14	123.83
2	C	1205	LLP	CE-NZ-C4'	-2.17	111.77	118.72

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	1205	LLP	O-C-CA-CB
2	C	1205	LLP	C4-C4'-NZ-CE
2	C	1205	LLP	C3-C4-C4'-NZ
2	C	1205	LLP	CD-CE-NZ-C4'
2	C	1205	LLP	C5'-OP4-P-OP2
2	C	1205	LLP	C5-C4-C4'-NZ
2	C	1205	LLP	N-CA-CB-CG

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1205	LLP	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry

10 ligands 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
4	SO4	D	2008	-	4,4,4	0.23	0	6,6,6	0.08	0
5	GOL	C	2010	-	5,5,5	0.36	0	5,5,5	0.29	0
4	SO4	B	2006	-	4,4,4	0.23	0	6,6,6	0.06	0
6	MET	C	2003	-	7,8,8	0.96	1 (14%)	5,9,9	1.36	1 (20%)
5	GOL	A	2009	-	5,5,5	0.37	0	5,5,5	0.43	0
3	AA5	D	2004	-	24,24,24	2.04	2 (8%)	30,33,33	1.43	2 (6%)
3	AA5	A	2001	-	24,24,24	2.03	2 (8%)	30,33,33	1.50	4 (13%)
4	SO4	A	2005	-	4,4,4	0.23	0	6,6,6	0.08	0
3	AA5	B	2002	-	24,24,24	2.12	2 (8%)	30,33,33	1.67	3 (10%)
4	SO4	C	2007	-	4,4,4	0.23	0	6,6,6	0.08	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	GOL	C	2010	-	-	2/4/4/4	-
6	MET	C	2003	-	-	3/8/8/8	-
5	GOL	A	2009	-	-	2/4/4/4	-
3	AA5	D	2004	-	-	8/19/19/19	0/1/1/1
3	AA5	A	2001	-	-	9/19/19/19	0/1/1/1
3	AA5	B	2002	-	-	6/19/19/19	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	2002	AA5	C3-C2	8.03	1.49	1.41
3	A	2001	AA5	C3-C2	7.84	1.49	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	2004	AA5	C3-C2	7.77	1.49	1.41
3	B	2002	AA5	C4-C3	5.16	1.49	1.41
3	D	2004	AA5	C4-C3	4.74	1.48	1.41
3	A	2001	AA5	C4-C3	4.73	1.48	1.41
6	C	2003	MET	OXT-C	-2.48	1.22	1.30

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	2002	AA5	CA-N-C4A	5.67	125.19	116.77
3	B	2002	AA5	C4-C3-C2	-4.41	117.66	120.14
3	A	2001	AA5	C4-C3-C2	-4.19	117.79	120.14
3	D	2004	AA5	C4-C3-C2	-4.14	117.81	120.14
3	D	2004	AA5	CB-CA-C	3.49	115.29	109.48
3	A	2001	AA5	CB-CA-C	3.19	114.78	109.48
6	C	2003	MET	OXT-C-O	-3.01	117.25	124.08
3	B	2002	AA5	CB-CA-C	2.66	113.90	109.48
3	A	2001	AA5	CA-N-C4A	2.49	120.47	116.77
3	A	2001	AA5	C5-C4-C4A	2.05	124.63	121.47

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	2001	AA5	O1-C-CA-CB
3	A	2001	AA5	N-CA-CB-CG
3	A	2001	AA5	C-CA-CB-CG
3	A	2001	AA5	C3-C4-C4A-N
3	A	2001	AA5	C5A-O4P-P-O3P
3	B	2002	AA5	CB-CA-N-C4A
3	B	2002	AA5	N-CA-CB-CG
3	B	2002	AA5	C-CA-CB-CG
3	D	2004	AA5	N-CA-CB-CG
3	D	2004	AA5	C-CA-CB-CG
3	D	2004	AA5	C5A-O4P-P-O2P
3	D	2004	AA5	C5A-O4P-P-O3P
5	A	2009	GOL	O1-C1-C2-C3
3	D	2004	AA5	C3-C4-C4A-N
5	C	2010	GOL	O1-C1-C2-C3
5	A	2009	GOL	O1-C1-C2-O2
3	B	2002	AA5	CB-CG-SD-CE
3	D	2004	AA5	C5A-O4P-P-O1P

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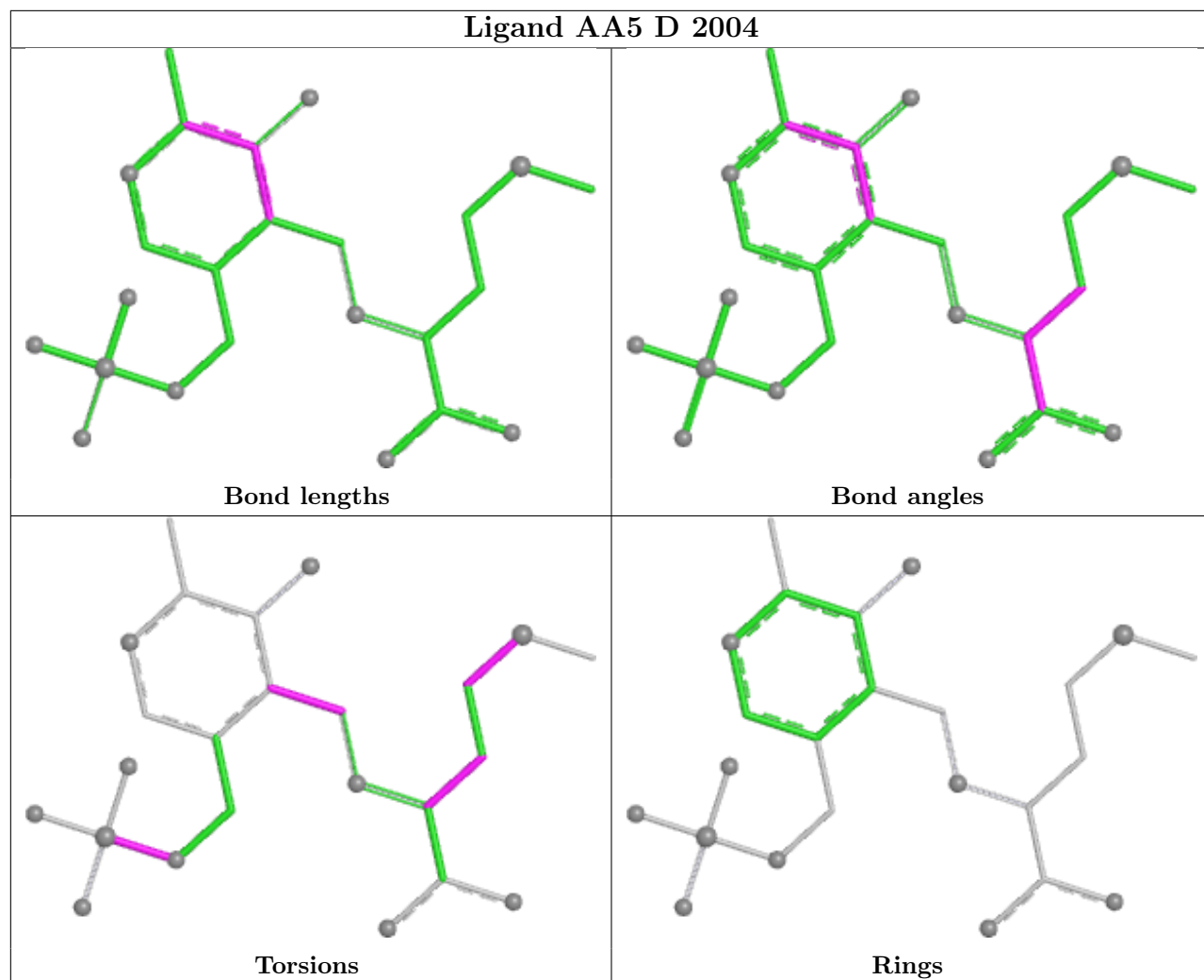
Mol	Chain	Res	Type	Atoms
3	A	2001	AA5	CB-CG-SD-CE
3	A	2001	AA5	O2-C-CA-CB
3	A	2001	AA5	C5A-O4P-P-O2P
3	D	2004	AA5	C5-C4-C4A-N
3	D	2004	AA5	CB-CG-SD-CE
3	B	2002	AA5	O1-C-CA-CB
3	B	2002	AA5	O2-C-CA-CB
6	C	2003	MET	CA-CB-CG-SD
6	C	2003	MET	OXT-C-CA-N
5	C	2010	GOL	O1-C1-C2-O2
3	A	2001	AA5	O1-C-CA-N
6	C	2003	MET	O-C-CA-N

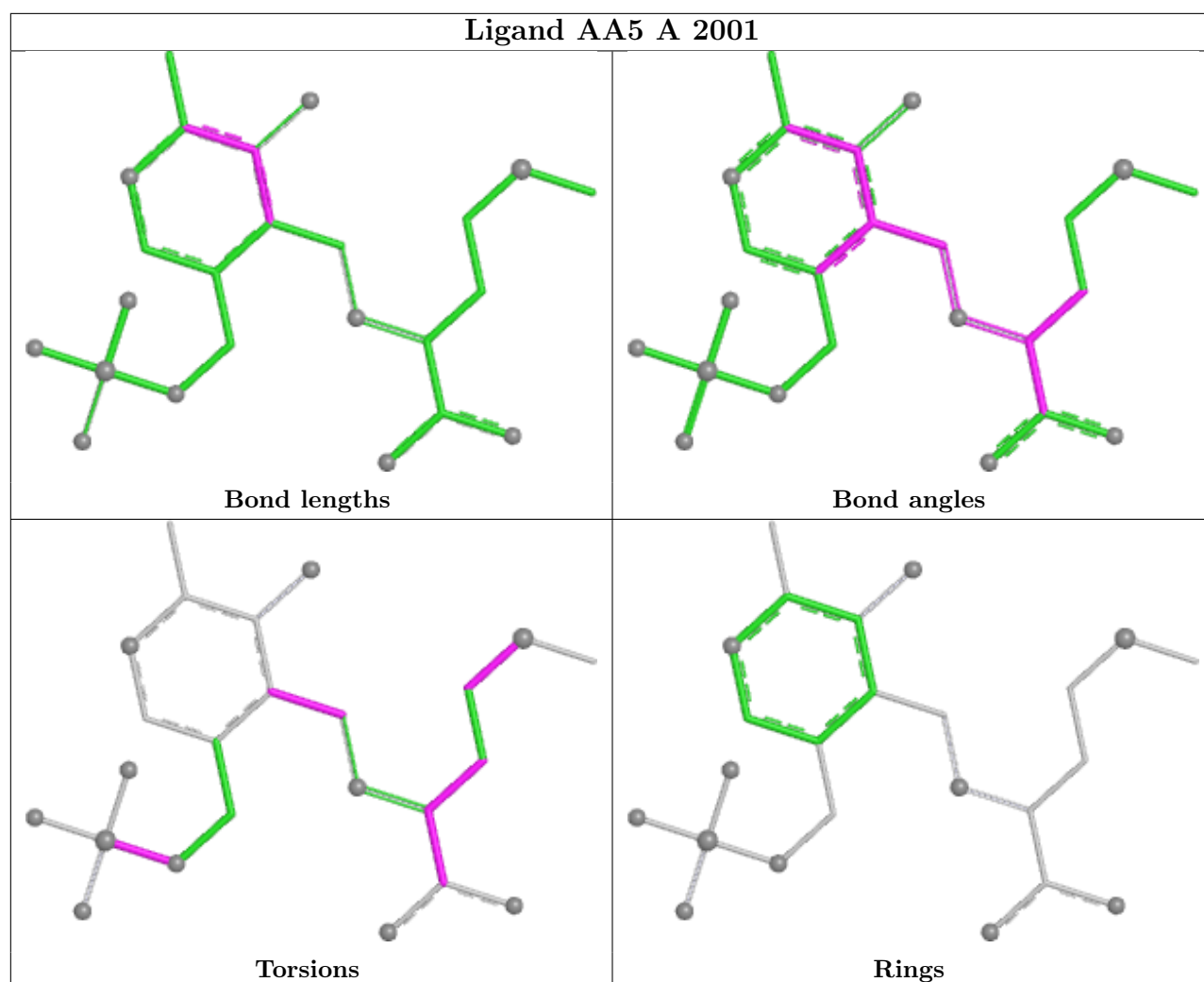
There are no ring outliers.

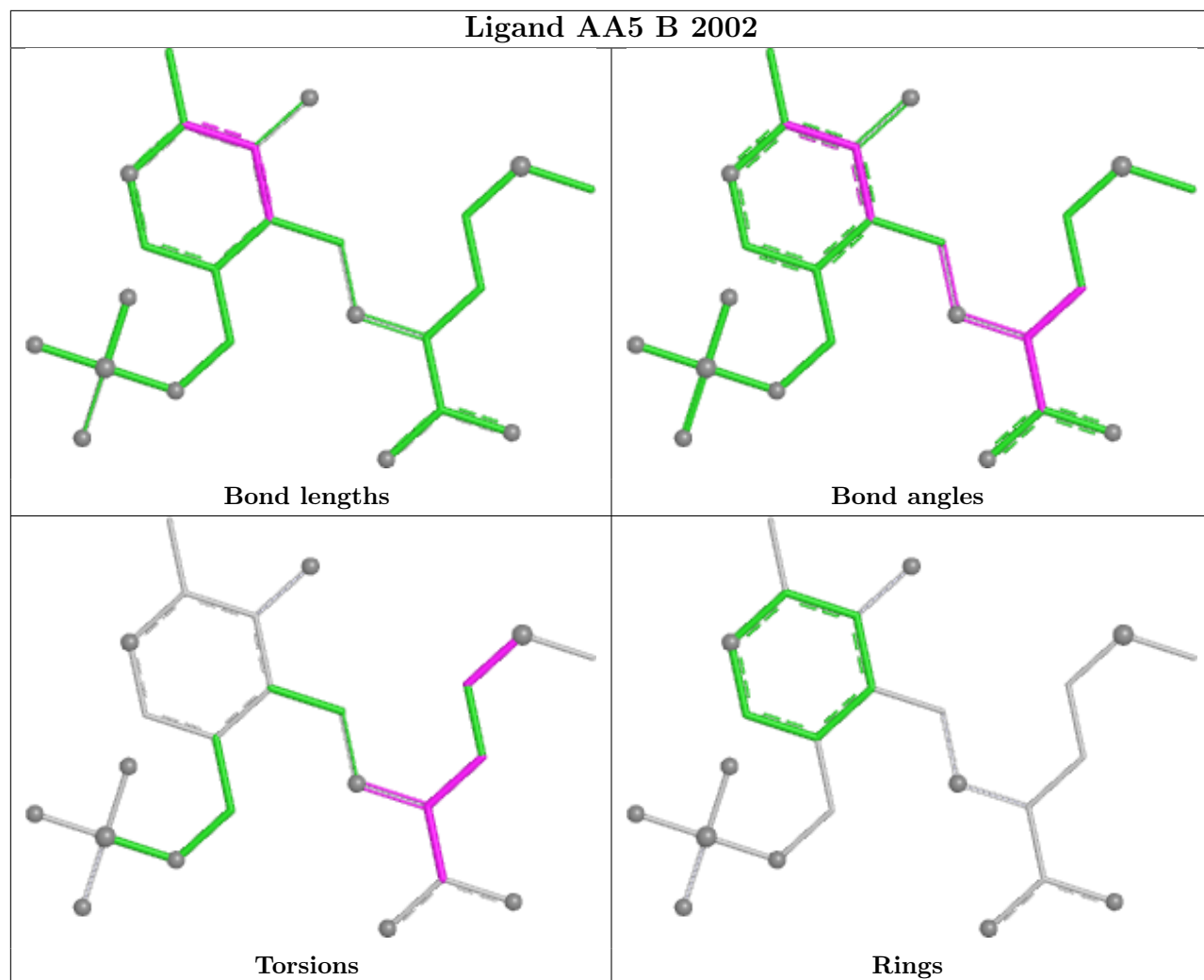
5 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	C	2003	MET	4	0
5	A	2009	GOL	1	0
3	D	2004	AA5	1	0
3	A	2001	AA5	5	0
3	B	2002	AA5	1	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	387/389 (99%)	0.20	9 (2%) 61 55	11, 20, 43, 62	2 (0%)
1	B	386/389 (99%)	0.33	14 (3%) 46 40	17, 31, 53, 66	2 (0%)
1	D	384/389 (98%)	0.39	11 (2%) 53 48	18, 32, 56, 66	0
2	C	386/389 (99%)	0.21	9 (2%) 61 55	11, 20, 41, 57	2 (0%)
All	All	1543/1556 (99%)	0.28	43 (2%) 55 49	11, 24, 51, 66	6 (0%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	548	GLY	3.7
1	D	1853	GLU	3.6
2	C	1350	ALA	3.6
1	D	1888	LEU	3.5
1	B	850	ALA	3.3
1	B	852	PRO	3.2
2	C	1355	ILE	3.2
1	B	888	LEU	3.2
1	A	45	MET	3.1
1	B	545	MET	3.1
1	D	1849	ALA	2.9
1	B	854	ASN	2.9
1	D	1850	ALA	2.8
1	B	503	ALA	2.8
2	C	1351	VAL	2.6
2	C	1045	MET	2.5
2	C	1066	GLU	2.5
1	A	351	VAL	2.5
1	D	1505	ASP	2.5
2	C	1264	GLU	2.4
1	A	50	GLY	2.4

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Mol	Chain	Res	Type	RSRZ
1	D	1829	LEU	2.3
1	A	3	ALA	2.3
1	D	1571	ILE	2.3
1	A	350	ALA	2.2
1	B	795	ILE	2.2
1	A	389	TRP	2.2
2	C	1389	TRP	2.2
1	A	47	LYS	2.2
1	D	1792	GLY	2.2
1	B	547	LYS	2.2
1	A	355	ILE	2.1
1	B	788	GLU	2.1
1	D	1795	ILE	2.1
2	C	1360	GLY	2.1
1	B	853	GLU	2.1
1	B	855	ILE	2.1
2	C	1358	LYS	2.0
1	B	851	VAL	2.0
1	D	1854	ASN	2.0
1	A	106	THR	2.0
1	D	1855	ILE	2.0
1	B	608	TYR	2.0

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($\text{\AA}^2$)	Q<0.9
2	LLP	C	1205	24/25	0.95	0.10	15,16,17,18	6

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,

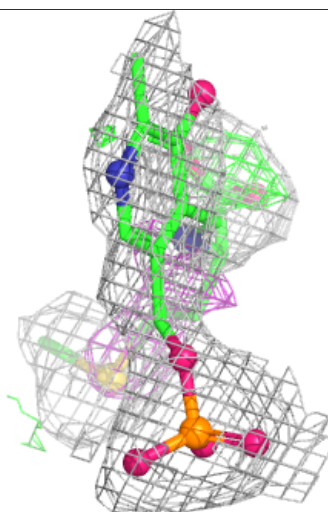
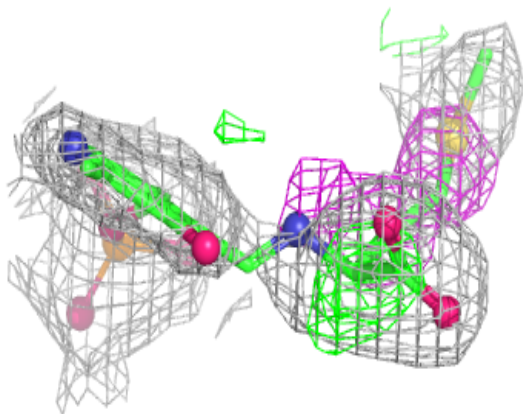
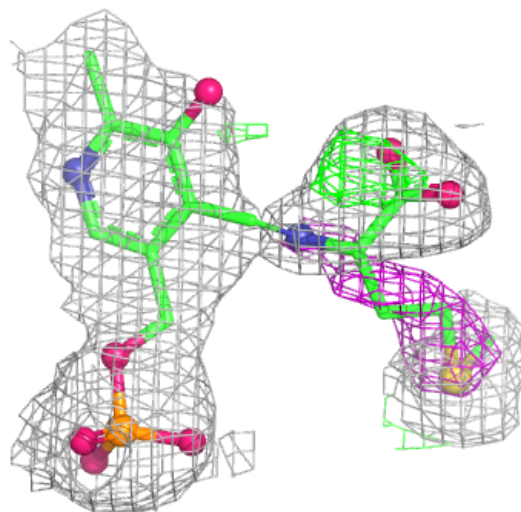
median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	SO4	D	2008	5/5	0.78	0.13	65,65,65,65	0
6	MET	C	2003	9/9	0.81	0.21	36,36,38,38	0
3	AA5	D	2004	24/24	0.83	0.19	36,40,41,42	0
4	SO4	C	2007	5/5	0.84	0.16	59,59,60,60	0
4	SO4	A	2005	5/5	0.85	0.13	63,63,64,64	0
5	GOL	C	2010	6/6	0.85	0.14	46,46,46,46	0
3	AA5	B	2002	24/24	0.85	0.17	32,36,38,40	0
4	SO4	B	2006	5/5	0.87	0.11	68,68,68,68	0
5	GOL	A	2009	6/6	0.87	0.12	36,36,37,37	0
3	AA5	A	2001	24/24	0.88	0.14	20,25,27,29	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.

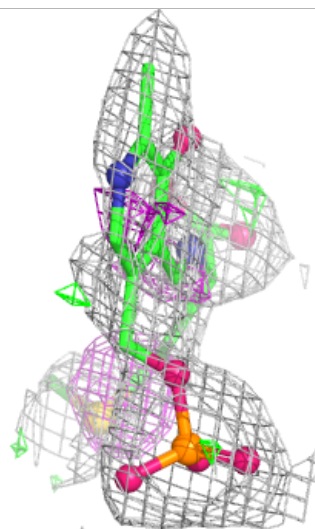
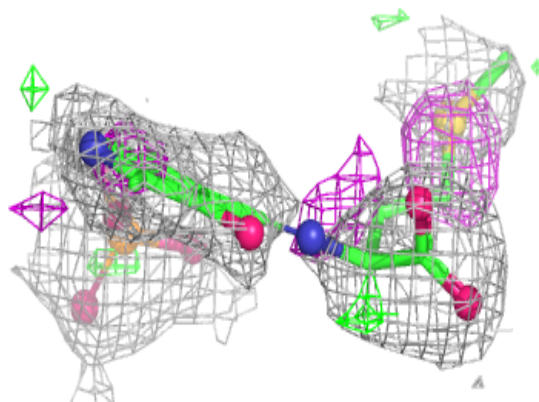
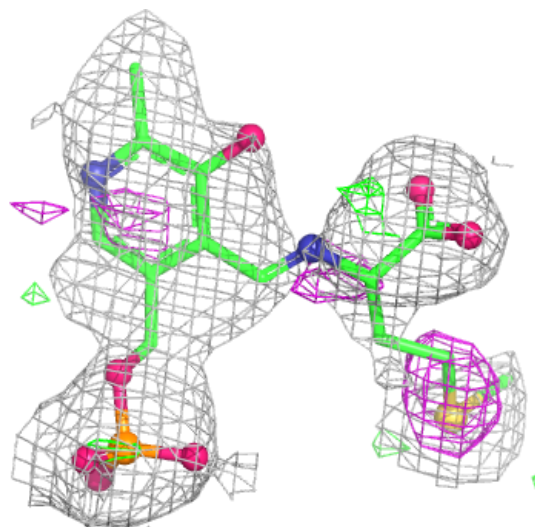
Electron density around AA5 D 2004:

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



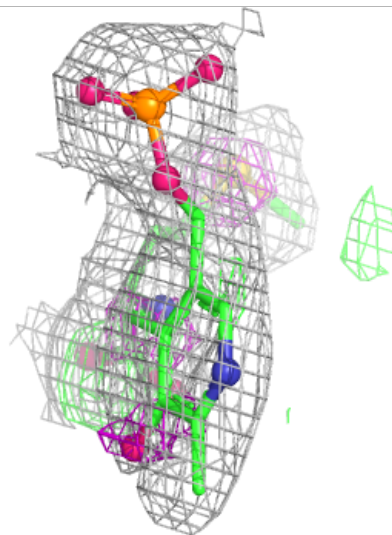
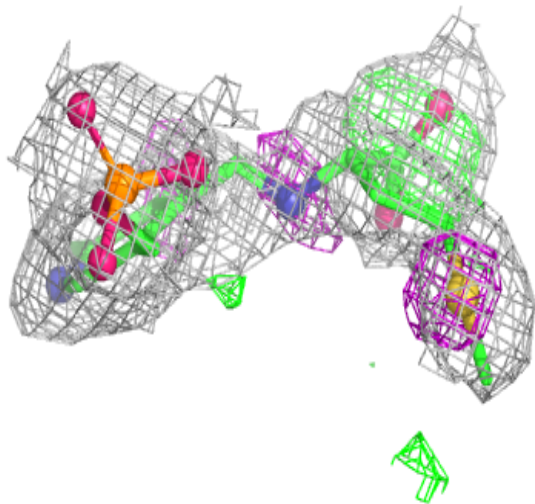
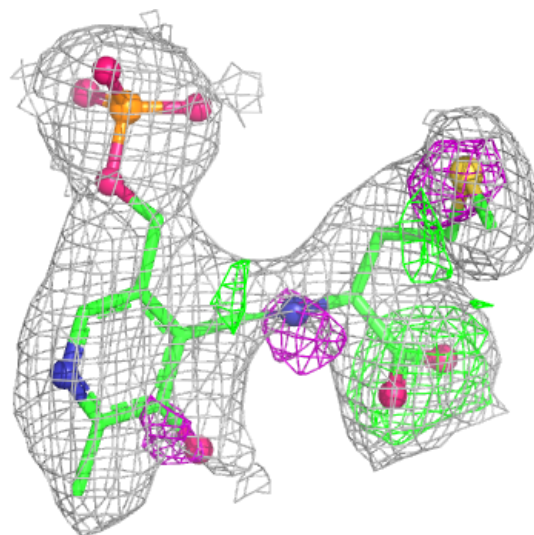
Electron density around AA5 B 2002:

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



Electron density around AA5 A 2001:

$2mF_o-DF_c$ (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.