



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 04:12 AM EDT

PDB ID : 1G51
Title : ASPARTYL TRNA SYNTHETASE FROM THERMUS THERMOPHILUS
AT 2.4 Å RESOLUTION
Authors : Poterzsmán, A.; Delarue, M.; Thierry, J.C.; Moras, D.
Deposited on : 2000-10-30
Resolution : 2.40 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.36.2
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) : 2.36.2

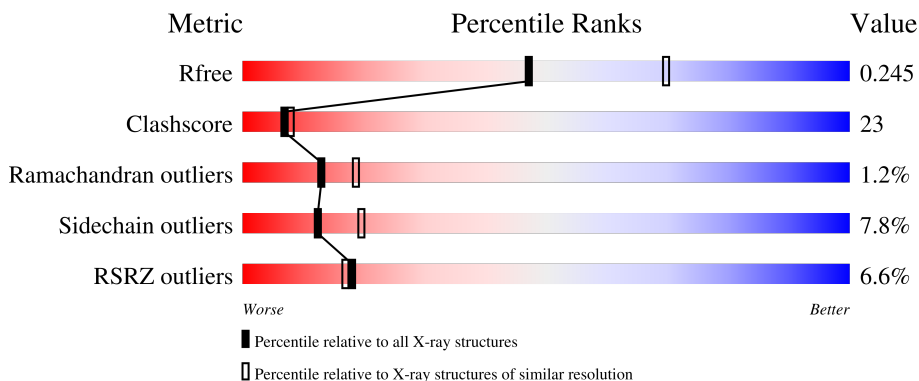
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	580	 10% 59% 36% .
1	B	580	 3% 66% 29% . .

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 10100 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 ASPARTYL-TRNA SYNTHETASE.

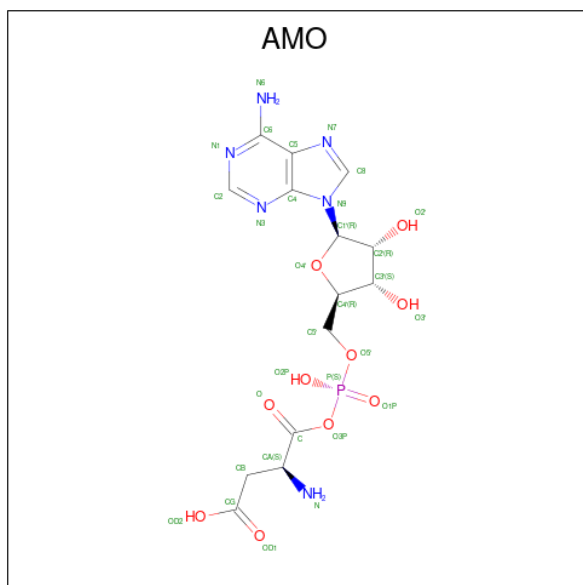
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	580	Total 4668	C 2980	N 840	O 837	S 11	0	0	0
1	B	580	Total 4668	C 2980	N 840	O 837	S 11	0	0	0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



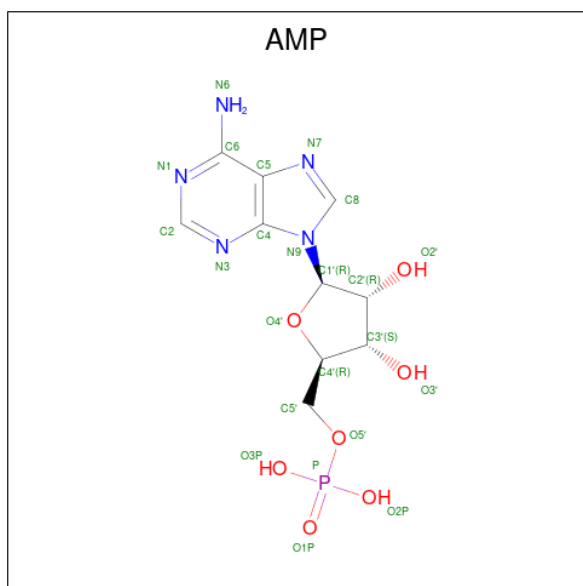
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
2	A	1	Total 5	O 4	S 1	0	0
2	B	1	Total 5	O 4	S 1	0	0

- Molecule 3 is ASPARTYL-ADENOSINE-5'-MONOPHOSPHATE (three-letter code: AMO) (formula: C₁₄H₁₉N₆O₁₀P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			
3	A	1	Total	31	14	6	10	1	0	0
3	B	1	Total	31	14	6	10	1	0	0

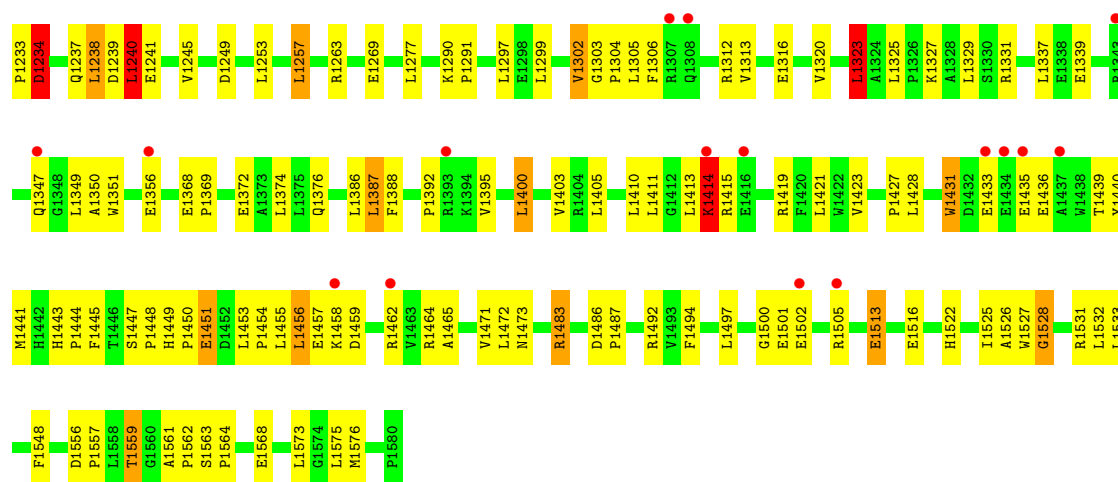
- Molecule 4 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: $C_{10}H_{14}N_5O_7P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			
4	B	1	Total	23	10	5	7	1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	288	Total 288	O 288	0	0
5	B	381	Total 381	O 381	0	0



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	60.13Å 155.50Å 171.15Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	14.00 – 2.40 14.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	91.3 (14.00-2.40) 91.4 (14.00-2.40)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.84 (at 2.39Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.194 , 0.251 0.187 , 0.245	Depositor DCC
R_{free} test set	4620 reflections (7.64%)	wwPDB-VP
Wilson B-factor (Å ²)	30.1	Xtrriage
Anisotropy	0.507	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 58.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	10100	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% 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: SO4, AMO, AMP

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	0.62	0/4780	0.84	7/6467 (0.1%)
1	B	0.65	0/4780	0.91	14/6467 (0.2%)
All	All	0.63	0/9560	0.88	21/12934 (0.2%)

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	240	LEU	CA-CB-CG	8.87	135.71	115.30
1	B	1240	LEU	CA-CB-CG	8.74	135.40	115.30
1	A	2	ARG	NE-CZ-NH1	7.63	124.11	120.30
1	B	1212	LEU	C-N-CA	-6.83	104.62	121.70
1	A	212	LEU	N-CA-C	-6.36	93.82	111.00
1	B	1046	VAL	CB-CA-C	-6.29	99.45	111.40
1	B	1212	LEU	N-CA-C	-5.96	94.91	111.00
1	B	1234	ASP	CB-CG-OD2	5.79	123.51	118.30
1	A	218	ILE	N-CA-C	-5.75	95.46	111.00
1	B	1323	LEU	CA-CB-CG	5.70	128.40	115.30
1	B	1238	LEU	N-CA-C	-5.67	95.69	111.00
1	B	1218	ILE	N-CA-C	-5.66	95.72	111.00
1	A	156	ASP	CB-CG-OD1	5.62	123.36	118.30
1	A	528	GLY	N-CA-C	-5.49	99.39	113.10
1	B	1356	GLU	N-CA-C	-5.41	96.40	111.00
1	B	1003	ARG	NE-CZ-NH2	-5.29	117.66	120.30
1	A	41	ASP	CB-CG-OD2	-5.17	113.64	118.30
1	B	1207	LEU	CA-CB-CG	5.16	127.16	115.30
1	B	1182	PHE	N-CA-C	-5.15	97.09	111.00
1	B	1528	GLY	N-CA-C	-5.12	100.31	113.10
1	B	1028	ARG	NE-CZ-NH2	-5.07	117.76	120.30

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	4668	0	4679	276	0
1	B	4668	0	4676	181	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
3	A	31	0	17	5	0
3	B	31	0	17	3	0
4	B	23	0	12	0	0
5	A	288	0	0	21	0
5	B	381	0	0	25	0
All	All	10100	0	9401	435	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 23.

All (435) 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:B:1431:TRP:CH2	1:B:1436:GLU:HA	1.92	1.04
1:A:301:GLU:OE2	1:A:319:SER:HB2	1.59	1.00
1:A:214:ARG:HG2	5:B:2657:HOH:O	1.61	1.00
1:A:394:LYS:HE2	1:A:398:THR:HG21	1.42	1.00
1:A:499:ILE:HG13	1:A:503:GLU:HB3	1.48	0.95
1:A:459:ASP:HB3	1:A:462:ARG:HG2	1.47	0.94
1:A:393:ARG:HD2	1:A:394:LYS:H	1.31	0.93
1:A:303:GLY:HA2	1:A:320:VAL:HG22	1.50	0.92
1:B:1559:THR:HG22	1:B:1561:ALA:H	1.31	0.92
1:A:393:ARG:CD	1:A:394:LYS:H	1.83	0.91
1:A:137:ARG:HH22	1:A:139:ARG:HH12	1.13	0.90
1:B:1011:ARG:H	1:B:1014:HIS:HD2	1.20	0.89
1:A:393:ARG:HD2	1:A:394:LYS:N	1.88	0.88
1:A:389:VAL:CG1	1:A:400:LEU:HB2	2.03	0.88

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:455:LEU:HD23	1:A:462:ARG:HD3	1.55	0.87
1:A:394:LYS:O	1:A:398:THR:HG22	1.75	0.86
1:A:79:PRO:HG2	1:A:80:GLU:OE1	1.76	0.85
1:B:1204:LYS:HE2	1:B:1241:GLU:OE1	1.76	0.85
1:A:213:ASP:N	5:A:2638:HOH:O	2.11	0.84
1:B:1439:THR:HG22	1:B:1440:TYR:H	1.41	0.83
1:A:297:LEU:HB3	1:A:323:LEU:HD12	1.60	0.83
1:A:276:ARG:O	1:A:277:LEU:HD23	1.79	0.83
1:B:1042:ARG:HD3	1:B:1043:GLU:OE1	1.79	0.83
1:B:1327:LYS:HB2	1:B:1411:LEU:HD12	1.60	0.83
1:A:339:GLU:O	1:A:343:ARG:HG2	1.79	0.83
1:B:1241:GLU:OE2	1:B:1483:ARG:HD2	1.78	0.82
1:A:455:LEU:HD12	1:A:455:LEU:H	1.43	0.82
1:A:389:VAL:HG11	1:A:400:LEU:HB2	1.59	0.81
1:A:455:LEU:H	1:A:455:LEU:CD1	1.94	0.81
1:B:1040:ARG:HB2	1:B:1045:LEU:HD23	1.62	0.81
1:A:80:GLU:O	1:A:80:GLU:HG2	1.81	0.80
1:B:1323:LEU:HD22	1:B:1387:LEU:HB2	1.64	0.79
1:B:1012:GLU:OE1	1:B:1089:ARG:HD3	1.82	0.79
1:A:137:ARG:HH2	1:A:139:ARG:NH1	1.80	0.78
1:A:329:LEU:HD23	1:A:411:LEU:HD21	1.65	0.77
1:A:323:LEU:HD22	1:A:400:LEU:HD11	1.65	0.77
1:A:578:VAL:HG21	5:B:2481:HOH:O	1.85	0.77
1:B:1439:THR:HG22	1:B:1440:TYR:N	1.99	0.77
1:B:1316:GLU:HG3	5:B:2488:HOH:O	1.85	0.76
1:A:2:ARG:NH2	1:B:1245:VAL:HG12	1.99	0.76
1:A:455:LEU:HD12	1:A:455:LEU:N	2.01	0.76
1:A:408:ALA:HA	1:A:413:LEU:HD12	1.68	0.76
1:A:570:LEU:HD22	1:A:575:LEU:HB2	1.66	0.76
1:B:1327:LYS:HB2	1:B:1411:LEU:CD1	2.15	0.76
1:A:392:PRO:HD2	1:A:395:VAL:HG21	1.67	0.75
1:A:394:LYS:HD3	1:A:395:VAL:N	2.02	0.75
1:A:394:LYS:NZ	1:A:395:VAL:HG12	2.02	0.75
1:A:499:ILE:CG1	1:A:503:GLU:HB3	2.16	0.75
1:A:392:PRO:HB2	1:A:395:VAL:HG22	1.68	0.75
1:B:1431:TRP:CZ3	1:B:1433:GLU:HA	2.21	0.75
1:A:204:LYS:HE3	1:A:241:GLU:OE1	1.87	0.75
1:A:303:GLY:CA	1:A:320:VAL:HG22	2.17	0.74
1:A:330:SER:O	1:A:334:VAL:HG23	1.88	0.74
1:A:409:ASP:OD2	1:A:415:ARG:NH1	2.21	0.74
1:B:1220:ARG:HD2	1:B:1234:ASP:OD2	1.88	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:278:SER:OG	1:A:281:GLU:HG2	1.88	0.73
1:A:311:PHE:HB2	1:A:366:PHE:CE1	2.24	0.73
1:B:1421:LEU:CD2	1:B:1471:VAL:HG22	2.19	0.72
1:A:394:LYS:HZ3	1:A:395:VAL:HG12	1.55	0.72
1:A:139:ARG:NH2	1:A:544:GLU:OE1	2.22	0.72
1:A:393:ARG:HH12	1:A:395:VAL:HG13	1.55	0.71
1:A:227:LEU:O	1:A:552:LYS:HD2	1.91	0.71
1:A:173:LYS:HB2	1:B:1559:THR:CG2	2.21	0.71
1:B:1431:TRP:CZ2	1:B:1436:GLU:HA	2.26	0.70
1:A:273:PRO:HB2	5:A:2356:HOH:O	1.92	0.69
1:B:1458:LYS:HE2	1:B:1459:ASP:HB2	1.74	0.69
1:A:295:PHE:CE2	1:A:408:ALA:HB2	2.28	0.68
1:A:353:ARG:HG3	1:A:353:ARG:HH11	1.59	0.68
1:B:1201:GLN:O	1:B:1204:LYS:HG2	1.94	0.68
1:B:1439:THR:CG2	1:B:1440:TYR:H	2.06	0.67
1:A:449:HIS:ND1	1:A:450:PRO:HD2	2.09	0.67
1:A:418:PHE:HB3	1:A:472:LEU:HD11	1.77	0.67
1:B:1011:ARG:H	1:B:1014:HIS:CD2	2.10	0.67
1:B:1128:LEU:HB3	1:B:1557:PRO:HG2	1.75	0.67
1:A:320:VAL:HG12	1:A:390:ALA:CB	2.24	0.67
1:A:303:GLY:N	1:A:304:PRO:HD2	2.10	0.67
1:A:349:LEU:HD23	1:A:388:PHE:O	1.95	0.67
1:A:389:VAL:HG12	1:A:400:LEU:HB2	1.75	0.67
1:B:1007:ALA:HB1	1:B:1046:VAL:HG22	1.77	0.67
1:A:381:ARG:HB3	1:A:382:PRO:CD	2.26	0.66
1:A:391:GLY:O	1:A:392:PRO:O	2.13	0.66
1:A:325:LEU:HD11	1:A:329:LEU:HD11	1.77	0.65
1:A:173:LYS:HB2	1:B:1559:THR:HG23	1.78	0.65
1:A:413:LEU:O	1:A:415:ARG:HG3	1.97	0.65
1:A:40:ARG:HB3	1:A:45:LEU:HD23	1.79	0.65
1:A:439:THR:HG22	1:A:440:TYR:H	1.62	0.64
1:A:451:GLU:C	1:A:453:LEU:H	1.99	0.64
1:B:1455:LEU:HD23	1:B:1462:ARG:HD3	1.80	0.64
1:A:353:ARG:HG3	1:A:353:ARG:NH1	2.12	0.64
1:A:494:PHE:O	1:A:499:ILE:HG22	1.96	0.64
1:B:1257:LEU:HD13	1:B:1527:TRP:CH2	2.33	0.64
1:A:299:LEU:HD22	1:A:400:LEU:CD1	2.29	0.63
1:A:330:SER:OG	1:A:333:GLU:HG3	1.98	0.63
1:B:1431:TRP:HZ3	1:B:1433:GLU:HA	1.63	0.63
1:B:1453:LEU:O	1:B:1456:LEU:HB2	1.98	0.63
1:B:1455:LEU:HD12	1:B:1455:LEU:H	1.63	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:427:PRO:HD2	1:A:441:MET:HE3	1.79	0.63
1:A:400:LEU:HA	1:A:403:VAL:HG22	1.80	0.63
1:A:331:ARG:HD2	1:A:334:VAL:HB	1.81	0.63
1:A:51:HIS:HE1	1:A:76:ARG:HH12	1.47	0.63
1:A:393:ARG:CD	1:A:393:ARG:H	2.08	0.62
1:A:340:VAL:HG21	1:A:406:ARG:HG3	1.81	0.62
1:B:1372:GLU:HB2	5:B:2333:HOH:O	1.98	0.62
1:A:451:GLU:O	1:A:453:LEU:N	2.32	0.62
1:A:325:LEU:HG	1:A:387:LEU:HD13	1.81	0.62
1:A:406:ARG:HG3	1:A:406:ARG:HH11	1.65	0.62
1:B:1350:ALA:HB3	1:B:1388:PHE:HB2	1.81	0.62
1:B:1028:ARG:HG3	1:B:1037:LEU:CD2	2.29	0.61
1:B:1323:LEU:C	1:B:1323:LEU:HD23	2.21	0.61
1:A:339:GLU:HA	5:A:2652:HOH:O	1.98	0.61
1:A:442:HIS:HE1	3:A:831:AMO:OD2	1.83	0.61
1:B:1421:LEU:HD21	1:B:1471:VAL:HG22	1.81	0.61
1:B:1436:GLU:HG2	5:B:2664:HOH:O	2.00	0.61
1:B:1154:ILE:HD13	1:B:1238:LEU:HD22	1.83	0.61
1:A:323:LEU:HD22	1:A:400:LEU:CD1	2.30	0.61
1:B:1331:ARG:HD2	5:B:2414:HOH:O	2.01	0.61
1:A:298:GLU:HG3	5:A:2074:HOH:O	2.00	0.60
1:B:1313:VAL:HG13	5:B:2443:HOH:O	2.01	0.60
1:A:77:LEU:HD13	1:A:78:ARG:N	2.17	0.60
1:A:302:VAL:HG23	1:A:320:VAL:HG23	1.83	0.60
1:B:1556:ASP:OD1	1:B:1559:THR:HB	2.01	0.60
1:A:368:GLU:HB2	1:A:369:PRO:HD3	1.84	0.60
1:A:245:VAL:HG12	1:B:1002:ARG:HH12	1.66	0.60
1:A:392:PRO:CB	1:A:393:ARG:CZ	2.79	0.60
1:B:1225:GLU:HG2	5:B:2413:HOH:O	2.01	0.60
1:B:1303:GLY:N	1:B:1304:PRO:HD2	2.16	0.60
1:A:79:PRO:CG	1:A:80:GLU:OE1	2.50	0.60
1:B:1108:PHE:HD2	1:B:1126:LEU:HD13	1.67	0.60
1:B:1299:LEU:HD22	1:B:1400:LEU:HD13	1.84	0.60
1:A:27:ARG:HD3	5:A:2517:HOH:O	2.02	0.60
1:A:325:LEU:HB2	1:A:385:THR:HG22	1.84	0.60
1:B:1048:LEU:HD23	1:B:1092:VAL:HG13	1.84	0.60
1:B:1451:GLU:OE2	1:B:1464:ARG:NH2	2.34	0.59
1:A:40:ARG:CB	1:A:45:LEU:HD23	2.32	0.59
1:A:212:LEU:C	5:A:2638:HOH:O	2.38	0.59
1:A:451:GLU:O	1:A:454:PRO:HD2	2.02	0.59
1:A:327:LYS:HE2	5:A:2398:HOH:O	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1329:LEU:HD23	1:B:1411:LEU:HD21	1.84	0.59
1:A:453:LEU:HB2	1:A:454:PRO:HD3	1.83	0.58
1:A:234:ASP:OD2	5:A:2313:HOH:O	2.17	0.58
1:A:287:GLY:HA3	1:A:397:ALA:O	2.03	0.58
1:B:1029:ARG:HH11	1:B:1031:LEU:HD11	1.68	0.58
1:A:406:ARG:HH11	1:A:406:ARG:CG	2.16	0.58
1:A:499:ILE:HD11	1:A:504:GLN:N	2.19	0.58
1:B:1455:LEU:H	1:B:1455:LEU:CD1	2.16	0.58
1:A:51:HIS:CE1	1:A:76:ARG:HH12	2.20	0.58
1:B:1419:ARG:NE	5:B:2057:HOH:O	2.36	0.58
1:A:292:ASP:OD1	1:A:294:ARG:HD3	2.04	0.57
1:A:8:GLY:O	1:A:11:ARG:NH2	2.37	0.57
1:B:1129:LYS:HD3	1:B:1130:TYR:CE1	2.39	0.57
1:B:1455:LEU:HD12	1:B:1455:LEU:N	2.19	0.57
1:A:334:VAL:O	1:A:338:GLU:HG3	2.04	0.57
1:B:1483:ARG:HG3	1:B:1522:HIS:CD2	2.40	0.57
1:A:180:ARG:HE	1:B:1187:ARG:NH2	2.03	0.57
1:A:40:ARG:HB3	1:A:45:LEU:CD2	2.35	0.57
1:A:439:THR:HG22	1:A:440:TYR:N	2.18	0.57
1:A:185:PRO:HD2	1:B:1183:LEU:O	2.05	0.57
1:A:320:VAL:HG12	1:A:390:ALA:HB2	1.86	0.56
1:B:1257:LEU:HD13	1:B:1527:TRP:CZ2	2.39	0.56
1:A:154:ILE:HD13	1:A:238:LEU:HD22	1.87	0.56
1:B:1451:GLU:O	1:B:1454:PRO:HD2	2.06	0.56
1:A:27:ARG:HD2	1:A:38:ASP:OD2	2.04	0.56
1:A:325:LEU:HD11	1:A:387:LEU:HD21	1.86	0.56
1:A:55:PRO:HG2	1:A:95:SER:O	2.05	0.56
1:A:220:ARG:HD2	1:A:234:ASP:OD1	2.06	0.56
1:B:1337:LEU:HD22	1:B:1403:VAL:HG13	1.88	0.56
1:B:1253:LEU:HD13	1:B:1253:LEU:C	2.26	0.55
1:B:1189:GLU:CG	1:B:1192:LEU:HD22	2.36	0.55
1:B:1234:ASP:OD1	5:B:2642:HOH:O	2.18	0.55
1:A:1:MET:O	1:A:2:ARG:C	2.45	0.55
1:A:248:GLU:OE2	1:A:276:ARG:NH2	2.39	0.55
1:A:309:SER:H	1:A:315:GLN:NE2	2.05	0.55
1:A:443:HIS:HE1	3:A:831:AMO:OD2	1.90	0.55
1:A:452:ASP:HA	1:A:455:LEU:HD13	1.88	0.55
1:B:1040:ARG:NH2	1:B:1066:GLU:OE2	2.40	0.55
1:A:555:LYS:HG2	1:A:562:PRO:HD2	1.88	0.55
1:A:380:ALA:CB	1:A:386:LEU:HD21	2.37	0.55
1:A:392:PRO:HB3	1:A:393:ARG:CZ	2.36	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:89:ARG:HG3	1:A:89:ARG:HH11	1.72	0.54
1:A:276:ARG:HG3	1:A:422:TRP:HB2	1.87	0.54
1:B:1297:LEU:HD13	1:B:1325:LEU:HD23	1.89	0.54
1:A:281:GLU:HA	1:A:284:GLU:HB2	1.90	0.54
1:A:435:GLU:O	1:A:437:ALA:N	2.37	0.54
1:A:76:ARG:NH1	1:A:93:GLU:HG3	2.23	0.54
1:A:80:GLU:OE1	1:A:80:GLU:N	2.41	0.54
1:B:1451:GLU:C	1:B:1453:LEU:H	2.10	0.54
1:B:1458:LYS:HG2	1:B:1459:ASP:N	2.23	0.53
1:A:180:ARG:HD2	1:B:1187:ARG:HE	1.73	0.53
1:A:578:VAL:HG23	5:A:2662:HOH:O	2.07	0.53
1:B:1421:LEU:HD23	1:B:1471:VAL:HG22	1.89	0.53
1:A:393:ARG:NH1	1:A:395:VAL:HG13	2.24	0.53
1:A:255:GLU:HB3	1:A:272:LEU:HD22	1.91	0.53
1:B:1453:LEU:HB2	1:B:1454:PRO:HD3	1.89	0.53
1:A:350:ALA:HB3	1:A:388:PHE:HB2	1.90	0.53
1:A:568:GLU:HG3	5:A:2585:HOH:O	2.08	0.52
1:A:138:ARG:O	1:A:142:GLU:HG3	2.09	0.52
1:B:1040:ARG:HB2	1:B:1045:LEU:CD2	2.37	0.52
1:A:325:LEU:HD12	1:A:385:THR:CG2	2.39	0.52
5:A:2070:HOH:O	1:B:1513:GLU:HG2	2.08	0.52
1:B:1487:PRO:HG3	1:B:1516:GLU:HG2	1.92	0.52
1:A:499:ILE:HD11	1:A:503:GLU:C	2.30	0.52
1:A:505:ARG:HG2	1:A:505:ARG:HH11	1.75	0.52
1:B:1062:ARG:NH2	5:B:2376:HOH:O	2.42	0.52
1:B:1263:ARG:NH1	5:B:2098:HOH:O	2.41	0.52
1:A:325:LEU:CD1	1:A:329:LEU:HD11	2.39	0.52
1:A:455:LEU:HA	1:A:458:LYS:HD3	1.92	0.52
1:B:1211:GLY:C	1:B:1212:LEU:O	2.45	0.52
1:A:322:ALA:HB2	1:A:388:PHE:CD2	2.45	0.52
1:A:180:ARG:HE	1:B:1187:ARG:HH21	1.57	0.51
1:A:578:VAL:HG23	1:A:578:VAL:O	2.09	0.51
1:A:353:ARG:HB2	1:A:360:SER:HB2	1.93	0.51
1:B:1215:TYR:C	1:B:1215:TYR:CD2	2.84	0.51
1:B:1563:SER:HB2	1:B:1564:PRO:HD2	1.92	0.51
1:A:421:LEU:CD2	1:A:471:VAL:HG22	2.40	0.51
1:B:1001:MET:O	1:B:1002:ARG:C	2.48	0.51
1:A:121:GLU:HA	5:A:2485:HOH:O	2.11	0.51
1:A:392:PRO:HB3	1:A:393:ARG:NE	2.25	0.51
1:A:308:GLN:HA	1:A:315:GLN:HE22	1.76	0.50
1:A:359:PHE:HB3	1:A:364:ALA:HB1	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1459:ASP:OD1	1:B:1462:ARG:HD2	2.10	0.50
1:A:299:LEU:N	1:A:299:LEU:HD23	2.25	0.50
1:A:308:GLN:CA	1:A:315:GLN:HE22	2.24	0.50
1:A:340:VAL:CG1	1:A:403:VAL:HG12	2.41	0.50
1:B:1290:LYS:N	1:B:1291:PRO:HD3	2.25	0.50
1:B:1568:GLU:HG3	5:B:2197:HOH:O	2.11	0.50
1:A:451:GLU:O	1:A:454:PRO:CD	2.59	0.50
1:A:451:GLU:OE1	1:A:451:GLU:N	2.44	0.50
1:B:1028:ARG:HG3	1:B:1037:LEU:HD23	1.93	0.50
1:B:1457:GLU:HB2	5:B:2185:HOH:O	2.11	0.50
1:A:288:SER:HA	5:A:2475:HOH:O	2.11	0.50
1:B:1421:LEU:HD21	1:B:1471:VAL:CG2	2.42	0.50
1:A:2:ARG:HA	5:A:2116:HOH:O	2.11	0.50
1:A:459:ASP:HB3	1:A:462:ARG:CG	2.31	0.50
1:B:1302:VAL:HG13	1:B:1306:PHE:HE1	1.77	0.50
1:B:1505:ARG:HG2	1:B:1505:ARG:HH11	1.77	0.49
1:A:400:LEU:HD22	1:A:403:VAL:CG2	2.42	0.49
1:A:409:ASP:CG	1:A:415:ARG:HH12	2.14	0.49
1:B:1443:HIS:HB2	1:B:1444:PRO:HD2	1.92	0.49
1:A:303:GLY:HA2	1:A:320:VAL:CG2	2.32	0.49
1:A:411:LEU:O	1:A:412:GLY:C	2.49	0.49
1:A:49:VAL:HG21	1:A:91:GLU:OE2	2.13	0.49
1:A:394:LYS:HD3	1:A:395:VAL:HG13	1.95	0.49
1:A:429:LEU:HD13	1:A:438:TRP:HB3	1.93	0.49
1:A:505:ARG:HH11	1:A:505:ARG:CG	2.25	0.49
1:A:578:VAL:CG1	1:B:1576:MET:HB3	2.42	0.49
1:A:2:ARG:HH22	1:B:1245:VAL:HG12	1.76	0.49
1:A:320:VAL:HG12	1:A:390:ALA:HB1	1.94	0.49
1:A:392:PRO:HB2	1:A:393:ARG:CZ	2.43	0.49
1:A:421:LEU:HD21	1:A:471:VAL:HG22	1.93	0.49
1:A:237:GLN:HB2	1:A:527:TRP:O	2.13	0.49
1:A:451:GLU:C	1:A:453:LEU:N	2.66	0.49
1:B:1076:ARG:HB3	1:B:1076:ARG:HH11	1.78	0.49
1:B:1457:GLU:OE2	1:B:1492:ARG:HD3	2.13	0.49
1:A:392:PRO:HB2	1:A:395:VAL:CG2	2.41	0.48
1:A:173:LYS:HB2	1:B:1559:THR:HG21	1.91	0.48
1:A:290:LYS:N	1:A:291:PRO:HD3	2.27	0.48
1:B:1428:LEU:HA	1:B:1465:ALA:HB2	1.95	0.48
1:B:1303:GLY:HA2	1:B:1320:VAL:HG23	1.94	0.48
1:A:464:ARG:NH1	5:A:2073:HOH:O	2.46	0.48
1:A:227:LEU:CD1	1:A:233:PRO:HD3	2.43	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:410:LEU:C	1:A:412:GLY:H	2.17	0.48
1:B:1253:LEU:HD13	1:B:1253:LEU:O	2.13	0.48
1:A:89:ARG:HG3	1:A:89:ARG:NH1	2.29	0.48
1:A:317:ALA:HB1	1:A:391:GLY:H	1.79	0.48
1:A:406:ARG:CG	1:A:406:ARG:NH1	2.76	0.48
1:B:1240:LEU:HD22	1:B:1525:ILE:HG22	1.96	0.48
1:A:299:LEU:HD22	1:A:400:LEU:HD12	1.96	0.47
1:A:378:THR:O	1:A:379:GLU:HB2	2.14	0.47
1:A:393:ARG:CD	1:A:393:ARG:N	2.77	0.47
1:A:434:GLU:H	1:A:434:GLU:CD	2.17	0.47
1:A:80:GLU:O	1:A:80:GLU:CG	2.55	0.47
1:A:353:ARG:HH11	1:A:353:ARG:CG	2.22	0.47
1:A:570:LEU:HD11	1:B:1193:PHE:HZ	1.79	0.47
1:B:1133:LEU:O	1:B:1136:ARG:HB2	2.15	0.47
1:B:1029:ARG:NH1	1:B:1031:LEU:HD11	2.29	0.47
1:B:1173:LYS:HA	5:B:2182:HOH:O	2.15	0.47
1:B:1249:ASP:HA	5:B:2467:HOH:O	2.14	0.47
1:A:172:THR:OG1	1:A:173:LYS:N	2.43	0.47
1:A:180:ARG:CD	1:B:1187:ARG:HE	2.26	0.47
1:A:289:ASP:O	1:A:423:VAL:HG21	2.15	0.47
1:A:335:ALA:HA	1:A:338:GLU:OE1	2.15	0.47
1:A:359:PHE:CB	1:A:364:ALA:HB1	2.45	0.47
1:A:394:LYS:HE2	1:A:398:THR:CG2	2.30	0.47
1:A:564:PRO:HD3	1:B:1192:LEU:CD1	2.45	0.47
1:B:1228:ARG:NE	5:B:2474:HOH:O	2.47	0.47
1:B:1372:GLU:O	1:B:1376:GLN:HB2	2.15	0.47
1:A:289:ASP:C	1:A:291:PRO:HD3	2.35	0.47
1:A:393:ARG:HD2	1:A:393:ARG:N	2.29	0.47
1:A:395:VAL:HA	1:A:398:THR:HG23	1.97	0.46
1:A:394:LYS:O	1:A:398:THR:CG2	2.56	0.46
1:B:1531:ARG:NH1	3:B:1831:AMO:H2'2	2.30	0.46
1:A:429:LEU:HD13	1:A:438:TRP:CB	2.46	0.46
1:B:1080:GLU:HA	1:B:1081:PRO:HD2	1.75	0.46
1:A:312:ARG:HA	1:A:315:GLN:HB3	1.97	0.46
1:B:1415:ARG:HG3	5:B:2650:HOH:O	2.15	0.46
1:A:169:PRO:HG3	1:B:1548:PHE:HB2	1.97	0.46
1:B:1108:PHE:CD2	1:B:1126:LEU:HD13	2.50	0.46
1:B:1454:PRO:C	1:B:1456:LEU:H	2.20	0.46
1:A:240:LEU:HD22	1:A:525:ILE:HG22	1.97	0.46
1:A:363:VAL:HG22	1:A:363:VAL:O	2.16	0.46
1:B:1202:LEU:HD21	1:B:1445:PHE:CZ	2.51	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1202:LEU:HB2	5:B:2453:HOH:O	2.16	0.45
1:A:201:GLN:OE1	3:A:831:AMO:N	2.49	0.45
1:B:1076:ARG:HB3	1:B:1076:ARG:NH1	2.31	0.45
1:B:1189:GLU:CD	1:B:1192:LEU:HD22	2.37	0.45
1:B:1327:LYS:HD2	1:B:1411:LEU:HD12	1.98	0.45
1:B:1447:SER:HA	1:B:1448:PRO:HD3	1.84	0.45
1:B:1062:ARG:NH1	5:B:2192:HOH:O	2.46	0.45
1:B:1169:PRO:HG2	1:B:1203:PHE:CZ	2.52	0.45
1:A:215:TYR:CD2	1:A:215:TYR:C	2.88	0.45
1:A:303:GLY:N	1:A:304:PRO:CD	2.79	0.45
1:B:1329:LEU:CD2	1:B:1411:LEU:HD21	2.47	0.45
1:A:428:LEU:HA	1:A:465:ALA:HB2	1.99	0.45
1:B:1392:PRO:HG2	1:B:1395:VAL:CG2	2.47	0.45
1:B:1439:THR:CG2	1:B:1440:TYR:N	2.65	0.45
1:A:1:MET:O	1:A:2:ARG:O	2.34	0.45
1:B:1451:GLU:C	1:B:1451:GLU:OE1	2.55	0.45
1:A:392:PRO:HD2	1:A:395:VAL:CG2	2.40	0.45
1:B:1526:ALA:CB	3:B:1831:AMO:HB2	2.47	0.45
1:A:299:LEU:HD13	1:A:400:LEU:HD12	1.99	0.45
1:A:380:ALA:HB2	1:A:386:LEU:HD21	1.99	0.45
1:B:1500:GLY:O	1:B:1502:GLU:N	2.49	0.45
1:A:325:LEU:CD1	1:A:387:LEU:HD11	2.47	0.45
1:B:1029:ARG:NH2	5:B:2146:HOH:O	2.50	0.45
1:B:1237:GLN:HA	1:B:1527:TRP:O	2.17	0.45
1:A:184:VAL:HG22	1:B:1184:VAL:HG22	1.99	0.44
1:A:340:VAL:HG12	1:A:403:VAL:HG12	1.98	0.44
1:B:1351:TRP:HA	1:B:1386:LEU:O	2.18	0.44
1:A:344:HIS:NE2	1:A:402:ALA:CB	2.80	0.44
1:A:25:VAL:HG21	1:A:63:VAL:HG13	1.99	0.44
1:A:189:GLU:HB3	1:A:192:LEU:HD12	1.99	0.44
1:B:1302:VAL:HG22	1:B:1305:LEU:HD12	1.98	0.44
1:A:213:ASP:HB3	5:B:2657:HOH:O	2.18	0.44
1:A:325:LEU:HD21	1:A:387:LEU:HD22	2.00	0.44
1:B:1528:GLY:HA3	3:B:1831:AMO:H1'	1.99	0.44
1:A:137:ARG:NH2	1:A:139:ARG:NH1	2.59	0.44
1:A:249:ASP:OD1	1:B:1002:ARG:HD3	2.17	0.44
1:B:1368:GLU:HB2	1:B:1369:PRO:HD3	2.00	0.44
1:A:429:LEU:CD2	1:A:497:LEU:HD11	2.47	0.44
1:B:1290:LYS:O	1:B:1290:LYS:HG3	2.18	0.44
1:B:1082:ASN:ND2	1:B:1084:ARG:HH21	2.16	0.44
1:B:1172:THR:OG1	1:B:1173:LYS:N	2.49	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:394:LYS:HZ2	1:A:395:VAL:HG12	1.82	0.43
1:A:427:PRO:HG2	1:A:441:MET:HE2	2.01	0.43
1:A:447:SER:HA	1:A:448:PRO:HD3	1.89	0.43
1:A:452:ASP:OD1	1:A:464:ARG:HG2	2.18	0.43
1:B:1302:VAL:HG13	1:B:1306:PHE:CE1	2.52	0.43
1:A:297:LEU:O	1:A:323:LEU:HD12	2.18	0.43
1:A:393:ARG:HD2	1:A:393:ARG:H	1.79	0.43
1:A:531:ARG:NH1	3:A:831:AMO:H2'2	2.34	0.43
1:A:175:THR:HG22	5:A:2247:HOH:O	2.18	0.43
1:A:427:PRO:CG	1:A:441:MET:HE2	2.48	0.43
1:B:1413:LEU:HD23	1:B:1413:LEU:HA	1.90	0.43
1:A:564:PRO:HD3	1:B:1192:LEU:HD12	2.01	0.43
1:A:570:LEU:HD11	1:B:1193:PHE:CZ	2.53	0.43
1:B:1187:ARG:HG3	1:B:1187:ARG:HH11	1.82	0.43
1:A:107:PRO:HG3	1:A:130:TYR:CD1	2.54	0.43
1:A:220:ARG:NH2	1:B:1167:GLU:HB3	2.34	0.43
1:B:1039:LEU:HG	1:B:1048:LEU:HD11	2.01	0.43
1:A:351:TRP:HA	1:A:386:LEU:O	2.18	0.43
1:B:1187:ARG:HB3	1:B:1573:LEU:HD23	2.00	0.43
1:A:157:PHE:CD2	1:A:257:LEU:HD13	2.54	0.43
1:A:228:ARG:HG2	1:A:228:ARG:HH11	1.84	0.43
1:A:578:VAL:CG2	5:A:2662:HOH:O	2.65	0.43
1:B:1010:LEU:HD23	1:B:1046:VAL:HG11	2.01	0.42
1:B:1227:LEU:CD1	1:B:1233:PRO:HD3	2.49	0.42
1:A:213:ASP:HA	5:A:2087:HOH:O	2.18	0.42
1:A:320:VAL:HG23	1:A:320:VAL:O	2.20	0.42
1:A:325:LEU:HD11	1:A:387:LEU:CD2	2.48	0.42
1:A:570:LEU:HD22	1:A:575:LEU:CB	2.43	0.42
1:B:1129:LYS:HE2	5:B:2344:HOH:O	2.19	0.42
1:B:1449:HIS:CG	1:B:1450:PRO:HD2	2.54	0.42
1:A:112:ALA:HB3	1:A:119:GLU:HG2	2.02	0.42
1:B:1238:LEU:HD21	1:B:1257:LEU:HD11	2.01	0.42
1:A:27:ARG:HG2	1:A:28:ARG:N	2.35	0.42
1:B:1042:ARG:CD	1:B:1043:GLU:OE1	2.60	0.42
1:B:1405:LEU:HA	1:B:1405:LEU:HD23	1.81	0.42
1:A:294:ARG:HD2	1:A:473:ASN:CG	2.40	0.42
1:A:158:LEU:HB3	1:A:163:PHE:HB2	2.02	0.42
1:A:454:PRO:HB2	1:A:455:LEU:HD12	2.00	0.42
1:B:1034:LEU:HD12	1:B:1034:LEU:HA	1.90	0.42
1:B:1216:PHE:HA	1:B:1239:ASP:O	2.20	0.42
1:A:295:PHE:CZ	1:A:408:ALA:HB2	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1175:THR:HG22	5:B:2345:HOH:O	2.19	0.42
1:B:1349:LEU:HD12	1:B:1388:PHE:O	2.20	0.42
1:A:505:ARG:CG	1:A:505:ARG:NH1	2.83	0.42
1:B:1427:PRO:HD2	1:B:1441:MET:CE	2.50	0.42
1:A:434:GLU:OE2	1:A:434:GLU:N	2.52	0.42
1:A:416:GLU:HG3	1:A:417:GLY:N	2.34	0.42
1:A:443:HIS:CE1	3:A:831:AMO:OD2	2.72	0.42
1:A:578:VAL:O	1:A:578:VAL:CG2	2.68	0.42
1:B:1327:LYS:HB2	1:B:1411:LEU:HD11	2.01	0.42
1:A:363:VAL:HG22	1:A:366:PHE:HB2	2.02	0.41
1:B:1312:ARG:O	1:B:1316:GLU:HG2	2.19	0.41
1:A:133:LEU:O	1:A:136:ARG:HB2	2.20	0.41
1:A:137:ARG:HH12	1:A:139:ARG:HH11	1.67	0.41
1:A:494:PHE:O	1:A:499:ILE:CG2	2.66	0.41
1:B:1214:ARG:HA	1:B:1241:GLU:O	2.20	0.41
1:B:1451:GLU:C	1:B:1453:LEU:N	2.73	0.41
1:A:345:LYS:HD2	1:A:394:LYS:NZ	2.36	0.41
1:B:1028:ARG:HG3	1:B:1037:LEU:HD21	2.02	0.41
1:A:39:LEU:HG	1:A:48:LEU:HD11	2.01	0.41
1:A:170:PHE:O	1:A:197:PRO:HD3	2.21	0.41
1:A:227:LEU:HD13	1:A:233:PRO:HD3	2.01	0.41
1:B:1486:ASP:OD2	1:B:1486:ASP:C	2.57	0.41
1:A:343:ARG:HD3	5:A:2292:HOH:O	2.20	0.41
1:A:456:LEU:HD11	1:A:496:LEU:HD22	2.02	0.41
1:A:186:TYR:CG	1:B:1562:PRO:HG3	2.56	0.41
1:A:212:LEU:CA	5:A:2638:HOH:O	2.68	0.41
1:A:333:GLU:OE2	1:A:410:LEU:HB3	2.20	0.41
1:B:1034:LEU:HD11	1:B:1051:HIS:ND1	2.36	0.41
1:B:1185:PRO:HB2	1:B:1573:LEU:HD22	2.03	0.41
1:B:1440:TYR:CD1	1:B:1444:PRO:HD3	2.56	0.41
1:A:306:PHE:CE2	1:A:314:PHE:HD2	2.39	0.41
1:A:331:ARG:CZ	1:A:351:TRP:HZ2	2.33	0.41
1:A:450:PRO:HG2	1:A:451:GLU:OE1	2.20	0.41
1:A:562:PRO:HG3	1:B:1186:TYR:CG	2.56	0.41
1:B:1277:LEU:O	1:B:1423:VAL:HA	2.21	0.41
1:B:1400:LEU:HD23	1:B:1400:LEU:HA	1.92	0.41
1:B:1414:LYS:CD	1:B:1414:LYS:H	2.33	0.41
1:A:494:PHE:CZ	1:A:508:PHE:CD2	3.08	0.41
1:B:1148:HIS:CD2	1:B:1148:HIS:C	2.94	0.41
1:B:1323:LEU:C	1:B:1323:LEU:CD2	2.89	0.41
1:B:1455:LEU:HB3	1:B:1459:ASP:HB3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:25:VAL:HG21	1:A:63:VAL:CG1	2.51	0.40
1:A:339:GLU:HG3	5:A:2292:HOH:O	2.21	0.40
1:A:214:ARG:CD	5:B:2657:HOH:O	2.69	0.40
1:A:349:LEU:HD23	1:A:350:ALA:H	1.86	0.40
1:B:1004:THR:C	1:B:1005:HIS:ND1	2.75	0.40
1:B:1472:LEU:O	1:B:1473:ASN:C	2.59	0.40
1:B:1048:LEU:CD2	1:B:1092:VAL:HG13	2.50	0.40
1:B:1212:LEU:HA	1:B:1212:LEU:HD23	1.87	0.40
1:A:228:ARG:HG2	1:A:228:ARG:NH1	2.35	0.40
1:A:579:ARG:NH1	1:A:579:ARG:HG2	2.35	0.40
1:B:1263:ARG:HD3	1:B:1269:GLU:OE1	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	578/580 (100%)	536 (93%)	33 (6%)	9 (2%)	9	13
1	B	578/580 (100%)	543 (94%)	30 (5%)	5 (1%)	17	25
All	All	1156/1160 (100%)	1079 (93%)	63 (5%)	14 (1%)	13	19

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2	ARG
1	A	392	PRO
1	A	436	GLU
1	A	452	ASP
1	B	1414	LYS
1	A	296	GLY
1	B	1501	GLU

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Mol	Chain	Res	Type
1	A	357	GLY
1	B	1456	LEU
1	B	1002	ARG
1	A	201	GLN
1	B	1229	ALA
1	A	370	VAL
1	A	412	GLY

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	483/483 (100%)	448 (93%)	35 (7%)	14	23
1	B	483/483 (100%)	443 (92%)	40 (8%)	11	17
All	All	966/966 (100%)	891 (92%)	75 (8%)	12	19

All (75) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	LEU
1	A	34	LEU
1	A	39	LEU
1	A	63	VAL
1	A	77	LEU
1	A	123	SER
1	A	124	GLU
1	A	126	LEU
1	A	128	LEU
1	A	139	ARG
1	A	207	LEU
1	A	215	TYR
1	A	228	ARG
1	A	234	ASP
1	A	240	LEU
1	A	276	ARG

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Mol	Chain	Res	Type
1	A	349	LEU
1	A	356	GLU
1	A	393	ARG
1	A	398	THR
1	A	405	LEU
1	A	406	ARG
1	A	421	LEU
1	A	455	LEU
1	A	457	GLU
1	A	462	ARG
1	A	471	VAL
1	A	489	LEU
1	A	494	PHE
1	A	497	LEU
1	A	513	GLU
1	A	520	PRO
1	A	552	LYS
1	A	570	LEU
1	A	579	ARG
1	B	1010	LEU
1	B	1013	THR
1	B	1039	LEU
1	B	1042	ARG
1	B	1046	VAL
1	B	1076	ARG
1	B	1092	VAL
1	B	1104	LYS
1	B	1126	LEU
1	B	1128	LEU
1	B	1165	GLN
1	B	1190	PRO
1	B	1192	LEU
1	B	1196	LEU
1	B	1207	LEU
1	B	1215	TYR
1	B	1228	ARG
1	B	1234	ASP
1	B	1240	LEU
1	B	1257	LEU
1	B	1302	VAL
1	B	1323	LEU
1	B	1339	GLU

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Mol	Chain	Res	Type
1	B	1347	GLN
1	B	1374	LEU
1	B	1387	LEU
1	B	1400	LEU
1	B	1410	LEU
1	B	1414	LYS
1	B	1431	TRP
1	B	1435	GLU
1	B	1451	GLU
1	B	1483	ARG
1	B	1494	PHE
1	B	1497	LEU
1	B	1513	GLU
1	B	1532	LEU
1	B	1533	LEU
1	B	1559	THR
1	B	1575	LEU

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

Mol	Chain	Res	Type
1	A	51	HIS
1	A	315	GLN
1	A	442	HIS
1	A	443	HIS
1	B	1014	HIS
1	B	1047	GLN
1	B	1260	HIS
1	B	1344	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

5 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
2	SO4	A	1901	-	4,4,4	0.44	0	6,6,6	0.11	0
3	AMO	B	1831	-	28,33,33	0.96	1 (3%)	32,49,49	1.01	3 (9%)
4	AMP	B	800	-	21,25,25	0.79	0	23,38,38	1.12	4 (17%)
2	SO4	B	901	-	4,4,4	0.42	0	6,6,6	0.16	0
3	AMO	A	831	-	28,33,33	1.01	1 (3%)	32,49,49	0.85	1 (3%)

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	AMP	B	800	-	-	0/6/26/26	0/3/3/3
3	AMO	B	1831	-	-	1/17/39/39	0/3/3/3
3	AMO	A	831	-	-	1/17/39/39	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	831	AMO	P-O3P	3.63	1.67	1.60
3	B	1831	AMO	P-O3P	2.99	1.66	1.60

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1831	AMO	O3P-P-O1P	-2.73	101.15	109.95
4	B	800	AMP	O3'-C3'-C2'	-2.61	103.45	111.82
3	B	1831	AMO	O3P-P-O5'	2.45	110.36	103.00
3	A	831	AMO	C5-C6-N6	2.44	124.02	120.31
4	B	800	AMP	O3P-P-O1P	2.21	119.43	110.83
3	B	1831	AMO	C5-C6-N6	2.17	123.62	120.31
4	B	800	AMP	C5-C6-N6	2.06	123.45	120.31
4	B	800	AMP	O2P-P-O5'	-2.02	101.41	106.67

There are no chirality outliers.

All (2) torsion outliers are listed below:

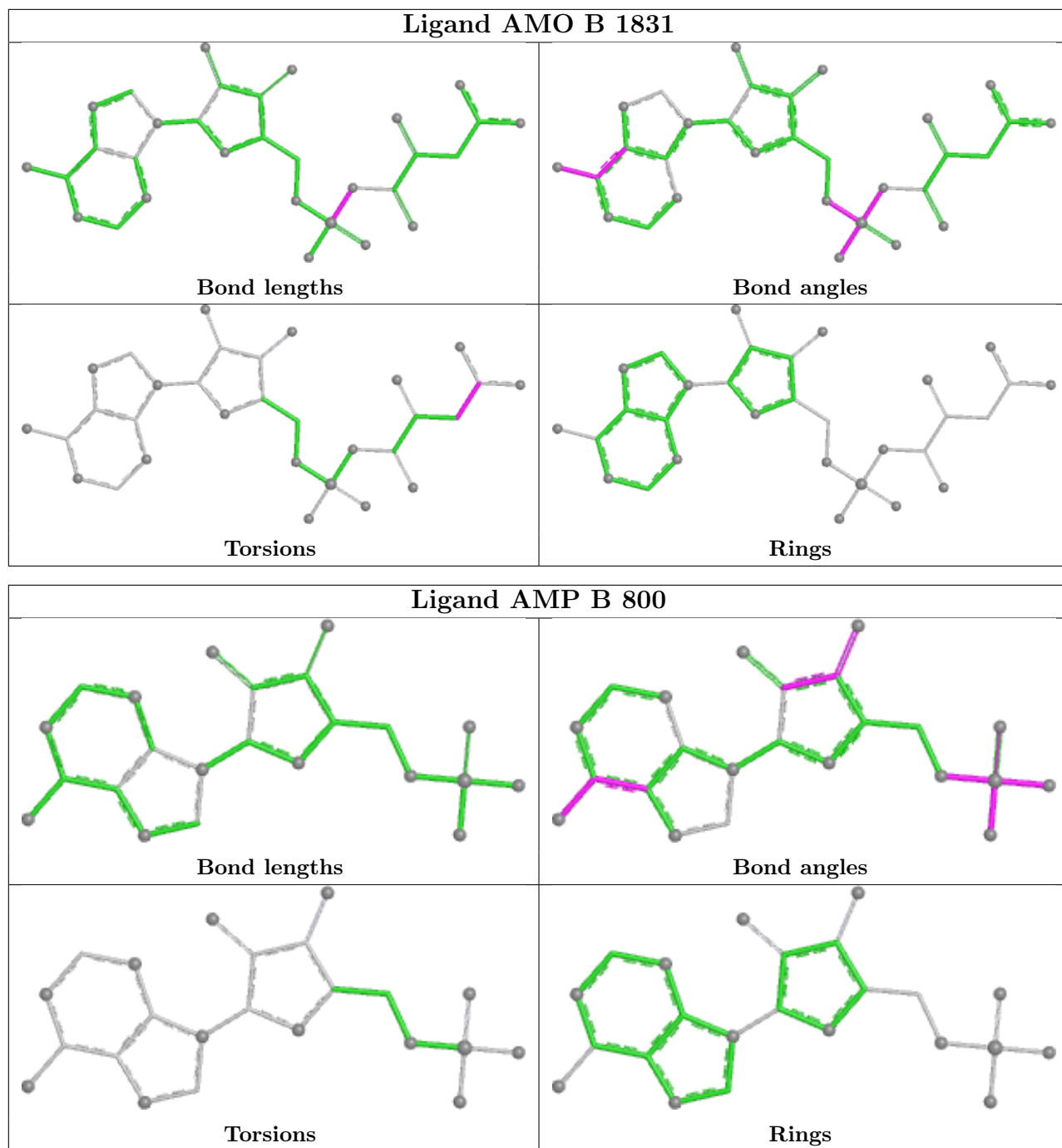
Mol	Chain	Res	Type	Atoms
3	A	831	AMO	C-O3P-P-O1P
3	B	1831	AMO	CA-CB-CG-OD1

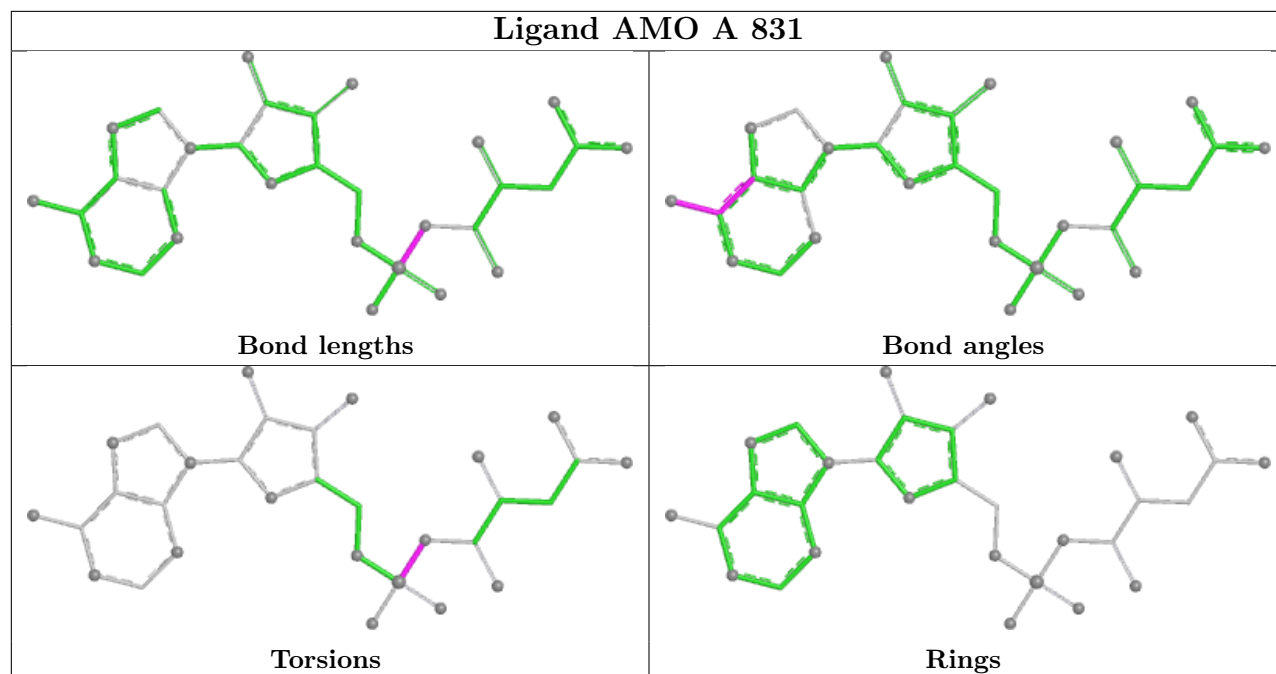
There are no ring outliers.

2 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1831	AMO	3	0
3	A	831	AMO	5	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	580/580 (100%)	0.08	60 (10%) 6 6	14, 39, 86, 102	0
1	B	580/580 (100%)	-0.41	17 (2%) 51 50	13, 31, 64, 93	0
All	All	1160/1160 (100%)	-0.17	77 (6%) 18 17	13, 34, 81, 102	0

All (77) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	304	PRO	5.8
1	B	1434	GLU	5.3
1	A	307	ARG	5.0
1	A	434	GLU	5.0
1	A	365	LYS	5.0
1	A	311	PHE	4.9
1	B	1433	GLU	4.6
1	A	313	VAL	4.5
1	A	369	PRO	4.4
1	A	305	LEU	4.4
1	A	317	ALA	4.2
1	A	580	PRO	4.1
1	B	1502	GLU	4.1
1	A	374	LEU	4.0
1	A	393	ARG	3.9
1	A	309	SER	3.8
1	A	316	GLU	3.7
1	A	376	GLN	3.7
1	A	338	GLU	3.7
1	A	579	ARG	3.6
1	A	436	GLU	3.5
1	A	345	LYS	3.5
1	A	437	ALA	3.4
1	A	343	ARG	3.4

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Mol	Chain	Res	Type	RSRZ
1	A	414	LYS	3.4
1	A	337	LEU	3.3
1	A	381	ARG	3.3
1	A	435	GLU	3.1
1	B	1001	MET	3.1
1	A	502	GLU	3.1
1	B	1307	ARG	3.1
1	A	319	SER	3.0
1	A	347	GLN	3.0
1	A	506	GLU	3.0
1	A	462	ARG	2.9
1	B	1393	ARG	2.9
1	A	364	ALA	2.9
1	A	371	ARG	2.8
1	A	433	GLU	2.8
1	A	346	ALA	2.8
1	B	1505	ARG	2.8
1	A	312	ARG	2.7
1	A	318	GLU	2.7
1	A	314	PHE	2.7
1	A	366	PHE	2.7
1	B	1462	ARG	2.7
1	A	372	GLU	2.7
1	A	80	GLU	2.6
1	A	178	GLY	2.5
1	A	357	GLY	2.5
1	A	363	VAL	2.5
1	A	390	ALA	2.5
1	A	464	ARG	2.4
1	A	121	GLU	2.4
1	B	1435	GLU	2.4
1	A	53	ALA	2.4
1	B	1458	LYS	2.4
1	A	463	VAL	2.4
1	A	382	PRO	2.4
1	A	341	ALA	2.4
1	A	306	PHE	2.3
1	A	310	GLY	2.3
1	A	505	ARG	2.3
1	B	1416	GLU	2.3
1	B	1343	ARG	2.2
1	A	1	MET	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	356	GLU	2.2
1	B	1308	GLN	2.2
1	B	1414	LYS	2.2
1	A	303	GLY	2.2
1	B	1356	GLU	2.2
1	A	342	LYS	2.1
1	A	329	LEU	2.1
1	B	1437	ALA	2.1
1	A	299	LEU	2.1
1	A	488	ARG	2.1
1	B	1347	GLN	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](#)

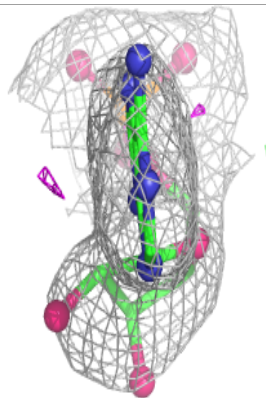
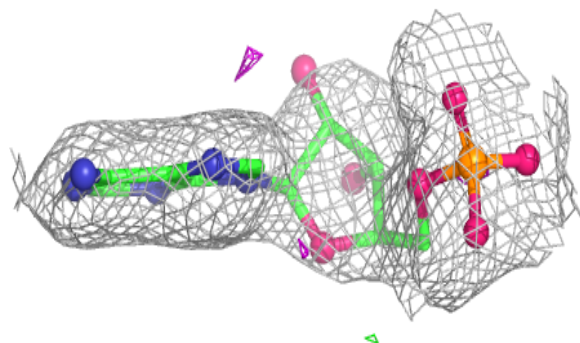
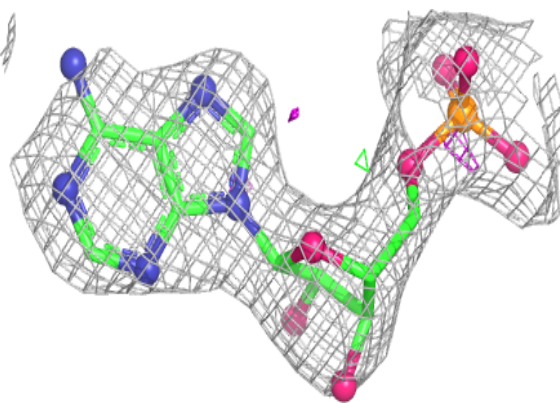
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	AMP	B	800	23/23	0.77	0.25	73,82,96,98	0
2	SO4	A	1901	5/5	0.96	0.10	69,71,71,71	0
3	AMO	A	831	31/31	0.97	0.09	25,28,30,32	0
3	AMO	B	1831	31/31	0.98	0.10	17,26,29,30	0
2	SO4	B	901	5/5	0.98	0.15	68,69,70,70	0

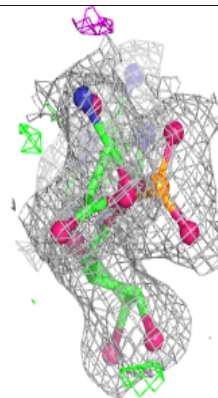
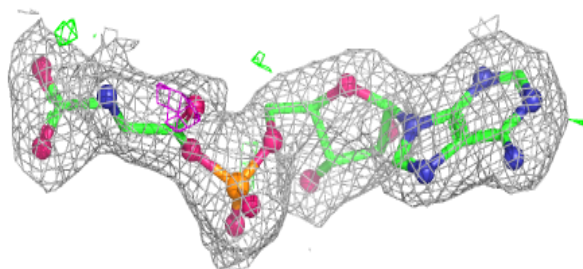
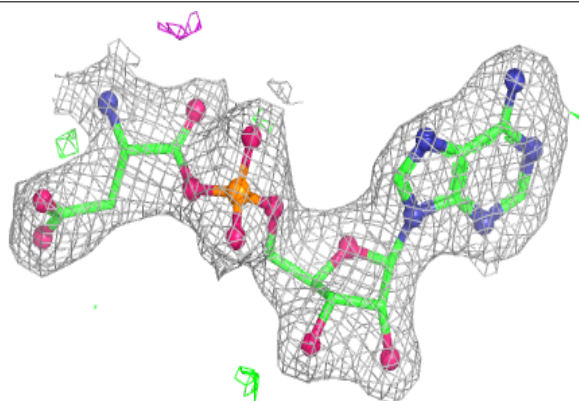
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

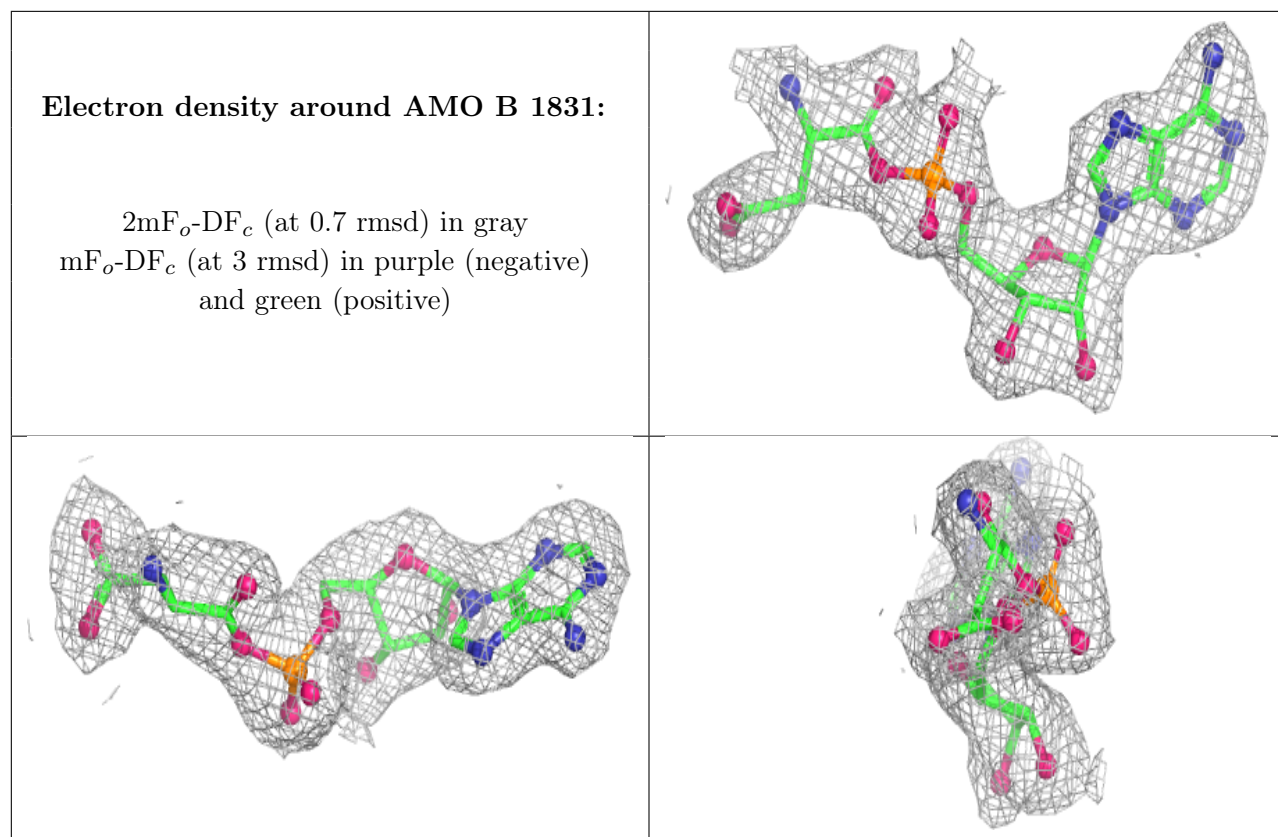
Electron density around AMP B 800:

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

**Electron density around AMO A 831:**

$2mF_o-DF_c$ (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.