



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 12:43 PM UTC

PDB ID : 1LBX / pdb_00001lbx
Title : Crystal Structure of a ternary complex of dual activity FBPase/IMPase (AF2372) from *Archaeoglobus fulgidus* with Calcium ions and D-myo-Inositol-1-Phosphate
Authors : Stieglitz, K.A.; Johnson, K.A.; Yang, H.; Roberts, M.F.; Seaton, B.A.; Head, J.F.; Stec, B.
Deposited on : 2002-04-04
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](#) ①) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtrriage (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

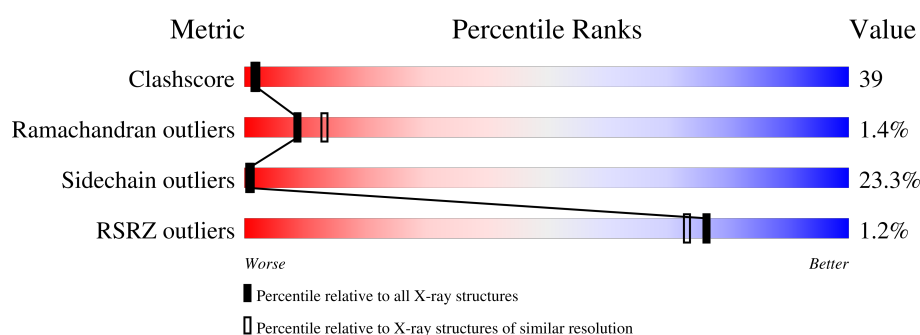
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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))
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (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	252	41% 44% 14%
1	B	252	33% 49% 17%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4059 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.

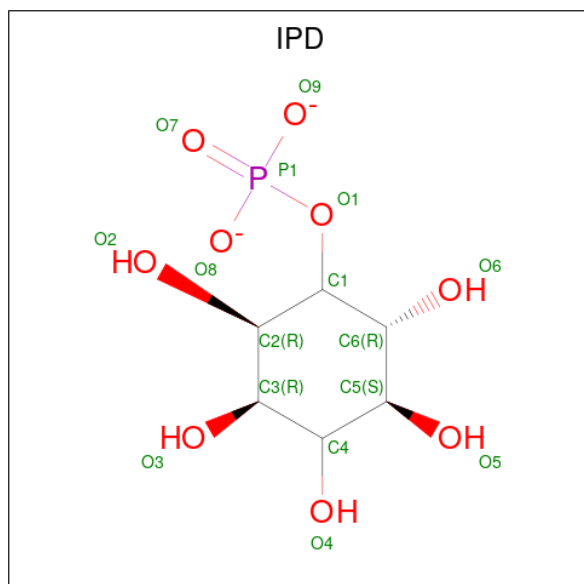
- Molecule 1 is a protein called fructose 1,6-bisphosphatase/inositol monophosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	252	Total	C	N	O	S	0	0	0
			1966	1243	333	380	10			
1	B	252	Total	C	N	O	S	0	0	0
			1966	1243	333	380	10			

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Ca	0	0
			2	2		
2	B	2	Total	Ca	0	0
			2	2		

- Molecule 3 is D-MYO-INOSITOL-1-PHOSPHATE (CCD ID: IPD) (formula: C₆H₁₁O₉P).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	P	0	0
			16	6	9	1		
3	B	1	Total	C	O	P	0	0
			16	6	9	1		

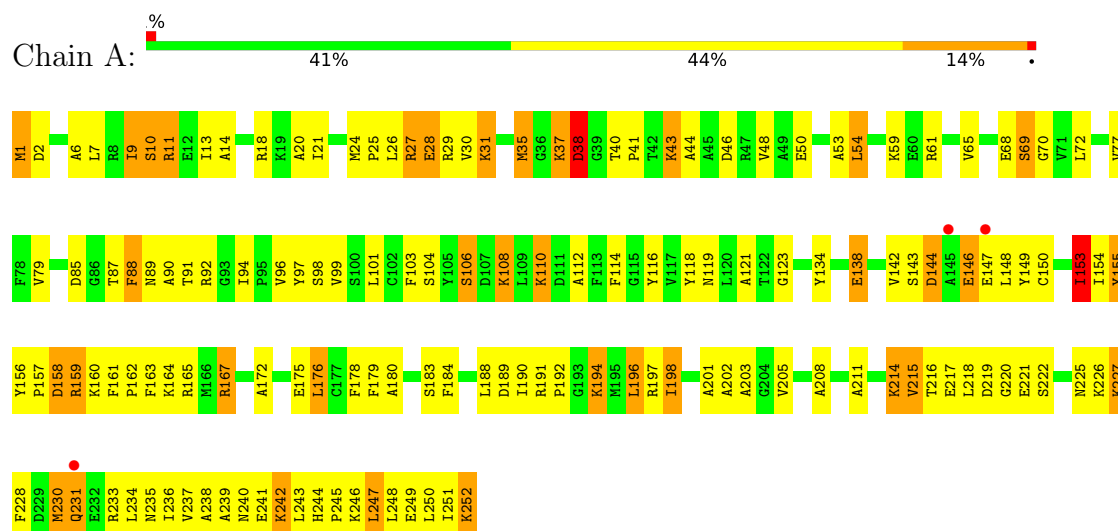
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	50	Total	O	0	0
			50	50		
4	B	41	Total	O	0	0
			41	41		

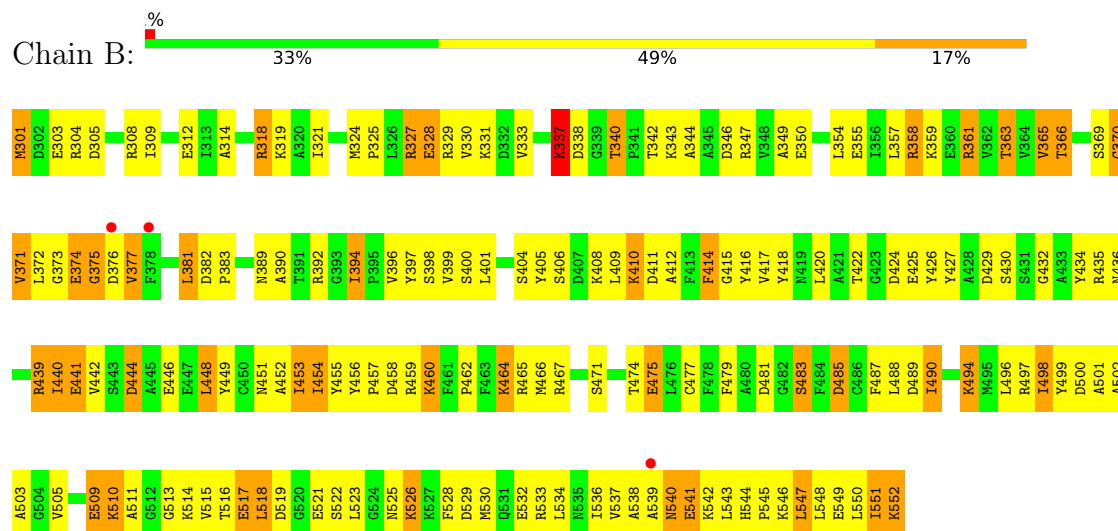
3 Residue-property plots

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: fructose 1,6-bisphosphatase/inositol monophosphatase



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4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	53.02Å 54.58Å 83.06Å 90.00° 104.95° 90.00°	Depositor
Resolution (Å)	20.00 – 2.40 20.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	96.7 (20.00-2.40) 86.1 (20.00-2.40)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 2.39Å)	Xtriage
Refinement program	SHELXL-97	Depositor
R, R_{free}	0.183 , 0.288 0.214 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	39.1	Xtriage
Anisotropy	0.505	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 107.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	4059	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.37% 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: CA, IPD

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	0.36	0/1999	1.28	11/2688 (0.4%)
1	B	0.35	0/1999	1.19	7/2688 (0.3%)
All	All	0.35	0/3998	1.23	18/5376 (0.3%)

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	180	ALA	CA-C-N	9.38	133.20	120.44
1	A	180	ALA	C-N-CA	9.38	133.20	120.44
1	A	167	ARG	CA-C-N	7.78	133.12	123.17
1	A	167	ARG	C-N-CA	7.78	133.12	123.17
1	B	414	PHE	CA-C-N	7.74	126.91	121.65
1	B	414	PHE	C-N-CA	7.74	126.91	121.65
1	A	144	ASP	CA-C-N	-7.23	112.79	122.99
1	A	144	ASP	C-N-CA	-7.23	112.79	122.99
1	A	155	TYR	CA-C-N	6.74	133.84	121.70
1	A	155	TYR	C-N-CA	6.74	133.84	121.70
1	B	398	SER	N-CA-C	5.68	118.05	109.41
1	A	88	PHE	CA-CB-CG	5.38	119.18	113.80
1	B	357	LEU	CA-C-N	5.37	127.48	120.28
1	B	357	LEU	C-N-CA	5.37	127.48	120.28
1	B	408	LYS	CA-C-N	5.24	127.56	120.38
1	B	408	LYS	C-N-CA	5.24	127.56	120.38
1	A	153	ILE	CA-C-N	-5.11	115.34	122.75
1	A	153	ILE	C-N-CA	-5.11	115.34	122.75

There are no chirality outliers.

There are no planarity outliers.

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	1966	0	1949	155	0
1	B	1966	0	1946	153	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	16	0	11	0	0
3	B	16	0	11	0	0
4	A	50	0	0	4	0
4	B	41	0	0	2	0
All	All	4059	0	3917	303	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 39.

All (303) 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:A:70:GLY:CA	1:A:230:MET:HE1	1.77	1.14
1:A:70:GLY:HA2	1:A:230:MET:HE1	1.15	1.12
1:A:70:GLY:HA2	1:A:230:MET:CE	1.86	1.04
1:A:28:GLU:HA	1:A:31:LYS:HE2	1.47	0.96
1:B:355:GLU:HA	1:B:358:ARG:HH11	1.33	0.92
1:B:448:LEU:HD11	1:B:550:LEU:HD22	1.50	0.92
1:A:226:LYS:HD2	1:A:234:LEU:HD21	1.53	0.87
1:A:92:ARG:HH11	1:B:483:SER:HA	1.42	0.85
1:A:217:GLU:HB3	1:A:221:GLU:HG2	1.62	0.81
1:B:545:PRO:HA	1:B:548:LEU:HD12	1.63	0.81
1:A:37:LYS:O	1:A:230:MET:HE3	1.81	0.81
1:B:337:LYS:HE2	1:B:370:GLY:HA3	1.64	0.79
1:B:526:LYS:HA	1:B:532:GLU:OE2	1.83	0.78
1:B:338:ASP:OD1	1:B:340:THR:HG23	1.83	0.77
1:A:244:HIS:HA	1:A:247:LEU:HD12	1.67	0.76
1:A:9:ILE:O	1:A:13:ILE:HG13	1.83	0.76
1:A:217:GLU:OE1	1:A:235:ASN:HB2	1.86	0.76
1:A:87:THR:O	1:A:91:THR:HG23	1.87	0.75
1:A:249:GLU:HA	1:A:252:LYS:HD3	1.70	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:28:GLU:O	1:A:31:LYS:HB2	1.87	0.73
1:B:446:GLU:OE2	1:B:542:LYS:HD2	1.89	0.73
1:B:318:ARG:HG3	1:B:418:TYR:HE2	1.54	0.73
1:B:414:PHE:HD2	1:B:429:ASP:HB3	1.52	0.72
1:B:505:VAL:HG11	1:B:523:LEU:HD12	1.71	0.72
1:A:37:LYS:HB2	1:A:68:GLU:O	1.88	0.72
1:A:243:LEU:HG	1:A:247:LEU:HD11	1.71	0.70
1:A:25:PRO:O	1:A:29:ARG:HG3	1.91	0.70
1:A:249:GLU:O	1:A:252:LYS:HB2	1.91	0.70
1:A:240:ASN:ND2	1:A:243:LEU:H	1.90	0.70
1:B:338:ASP:HB2	1:B:497:ARG:NH1	2.07	0.69
1:B:371:VAL:O	1:B:372:LEU:HG	1.92	0.69
1:B:481:ASP:OD2	1:B:483:SER:HB3	1.93	0.69
1:A:227:LYS:HD2	4:A:1002:HOH:O	1.93	0.68
1:B:503:ALA:HB3	4:B:1018:HOH:O	1.93	0.68
1:A:13:ILE:HG23	1:A:53:ALA:HA	1.74	0.68
1:A:148:LEU:HB3	1:A:162:PRO:HG2	1.75	0.67
1:A:198:ILE:HD12	1:A:202:ALA:HB2	1.77	0.67
1:A:215:VAL:HG13	1:A:238:ALA:HB2	1.76	0.67
1:A:40:THR:HB	4:A:1090:HOH:O	1.95	0.66
1:B:525:ASN:HB2	1:B:526:LYS:NZ	2.11	0.65
1:A:26:LEU:O	1:A:29:ARG:HB2	1.97	0.65
1:B:354:LEU:O	1:B:358:ARG:HB3	1.97	0.65
1:A:159:ARG:HH21	1:A:251:ILE:HA	1.61	0.65
1:B:544:HIS:ND1	1:B:548:LEU:HD11	2.10	0.64
1:B:488:LEU:HD21	1:B:537:VAL:HG13	1.80	0.64
1:A:25:PRO:HG2	1:A:28:GLU:HG3	1.78	0.64
1:A:148:LEU:HD21	1:A:246:LYS:HB3	1.79	0.64
1:B:488:LEU:HD11	1:B:547:LEU:HD21	1.80	0.63
1:A:161:PHE:CD2	1:A:250:LEU:HD21	2.34	0.63
1:A:99:VAL:HG12	1:A:118:TYR:HB3	1.80	0.62
1:A:194:LYS:HG2	1:A:235:ASN:HD21	1.64	0.62
1:B:552:LYS:O	1:B:552:LYS:HG3	2.00	0.62
1:B:451:ASN:ND2	1:B:465:ARG:HH11	1.98	0.61
1:A:149:TYR:CE1	1:A:164:LYS:HD2	2.35	0.61
1:A:196:LEU:HD23	1:A:236:ILE:HD12	1.82	0.61
1:B:496:LEU:O	1:B:534:LEU:HD23	2.01	0.61
1:A:196:LEU:O	1:A:233:ARG:HA	2.01	0.60
1:B:551:ILE:O	1:B:551:ILE:HG13	2.01	0.60
1:A:69:SER:HB2	1:A:72:LEU:HD11	1.83	0.59
1:B:389:ASN:HB3	1:B:394:ILE:HB	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:18:ARG:NH2	1:A:123:GLY:HA3	2.17	0.59
1:B:414:PHE:CD2	1:B:429:ASP:HB3	2.36	0.59
1:B:426:TYR:CE1	1:B:477:CYS:HB3	2.37	0.59
1:B:324:MET:HE2	1:B:328:GLU:O	2.01	0.59
1:B:471:SER:O	1:B:475:GLU:HG3	2.03	0.58
1:B:327:ARG:NH1	1:B:327:ARG:HA	2.18	0.58
1:B:448:LEU:CD1	1:B:550:LEU:HD22	2.31	0.58
1:B:488:LEU:HD11	1:B:547:LEU:CD2	2.34	0.58
1:A:142:VAL:HG12	1:A:143:SER:H	1.69	0.58
1:A:201:ALA:O	1:A:205:VAL:HG23	2.04	0.57
1:B:381:LEU:HD12	1:B:400:SER:O	2.04	0.57
1:B:404:SER:HA	1:B:412:ALA:HA	1.87	0.57
1:B:314:ALA:O	1:B:318:ARG:HB2	2.04	0.57
1:A:148:LEU:HD13	1:A:250:LEU:HD12	1.86	0.57
1:B:330:VAL:O	1:B:343:LYS:HD3	2.04	0.57
1:B:488:LEU:HD23	1:B:537:VAL:HA	1.86	0.57
1:A:28:GLU:OE2	1:A:31:LYS:HE3	2.04	0.57
1:A:165:ARG:HD3	1:A:167:ARG:NH2	2.20	0.57
1:A:208:ALA:O	1:A:211:ALA:HB3	2.05	0.57
1:B:453:ILE:HD12	1:B:475:GLU:HB3	1.85	0.57
1:A:198:ILE:CD1	1:A:202:ALA:HB2	2.35	0.56
1:B:544:HIS:CE1	1:B:548:LEU:HD11	2.39	0.56
1:A:249:GLU:HA	1:A:252:LYS:HB2	1.87	0.56
1:A:14:ALA:O	1:A:18:ARG:HB2	2.06	0.56
1:A:194:LYS:HG2	1:A:235:ASN:ND2	2.21	0.56
1:B:327:ARG:HH12	1:B:330:VAL:HG11	1.70	0.56
1:B:514:LYS:HB2	1:B:541:GLU:OE2	2.05	0.56
1:B:327:ARG:HH12	1:B:330:VAL:CG1	2.19	0.55
1:B:505:VAL:HG12	1:B:509:GLU:OE1	2.05	0.55
1:A:85:ASP:O	1:A:97:TYR:HA	2.07	0.55
1:A:104:SER:HB2	1:A:112:ALA:HA	1.89	0.55
1:B:337:LYS:HB2	1:B:369:SER:HA	1.89	0.55
1:B:540:ASN:HB2	4:B:1042:HOH:O	2.05	0.55
1:B:417:VAL:O	1:B:426:TYR:HB2	2.07	0.55
1:B:515:VAL:HG22	1:B:538:ALA:CB	2.36	0.55
1:A:249:GLU:HA	1:A:252:LYS:CD	2.35	0.54
1:B:458:ASP:OD2	1:B:459:ARG:HG2	2.07	0.54
1:A:89:ASN:HB3	1:A:94:ILE:O	2.07	0.54
1:A:108:LYS:NZ	4:A:1002:HOH:O	2.40	0.54
1:B:545:PRO:CA	1:B:548:LEU:HD12	2.36	0.54
1:B:358:ARG:HG2	1:B:359:LYS:N	2.22	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:532:GLU:OE1	1:B:532:GLU:HA	2.08	0.54
1:B:490:ILE:HG22	1:B:518:LEU:CD1	2.38	0.54
1:B:327:ARG:HH11	1:B:331:LYS:NZ	2.06	0.54
1:B:490:ILE:HG22	1:B:518:LEU:HD11	1.90	0.54
1:A:244:HIS:CE1	1:A:248:LEU:HD11	2.44	0.53
1:B:415:GLY:O	1:B:427:TYR:HA	2.08	0.53
1:B:355:GLU:HA	1:B:358:ARG:HD2	1.90	0.53
1:A:158:ASP:OD2	1:A:159:ARG:HD3	2.08	0.53
1:A:20:ALA:HB1	1:A:48:VAL:CG1	2.39	0.53
1:A:35:MET:HE3	1:A:41:PRO:HG3	1.89	0.53
1:B:448:LEU:HD13	1:B:462:PRO:CG	2.39	0.53
1:A:1:MET:CE	1:A:77:VAL:HG11	2.39	0.53
1:A:106:SER:OG	1:A:108:LYS:HB2	2.09	0.53
1:A:226:LYS:HD2	1:A:234:LEU:CD2	2.32	0.53
1:A:243:LEU:HG	1:A:247:LEU:CD1	2.39	0.53
1:A:25:PRO:HG2	1:A:28:GLU:CG	2.38	0.52
1:A:43:LYS:O	1:A:46:ASP:HB2	2.09	0.52
1:B:327:ARG:HA	1:B:327:ARG:CZ	2.38	0.52
1:B:452:ALA:O	1:B:466:MET:HA	2.09	0.52
1:B:501:ALA:O	1:B:505:VAL:HG23	2.09	0.52
1:A:92:ARG:HH11	1:B:483:SER:CA	2.17	0.52
1:B:363:THR:HG23	1:B:373:GLY:C	2.34	0.52
1:B:449:TYR:CZ	1:B:464:LYS:HD2	2.45	0.52
1:A:20:ALA:HB1	1:A:48:VAL:HG12	1.92	0.52
1:A:6:ALA:O	1:A:10:SER:HB2	2.09	0.51
1:B:453:ILE:HG21	1:B:475:GLU:OE1	2.10	0.51
1:B:343:LYS:O	1:B:346:ASP:HB2	2.10	0.51
1:B:355:GLU:HG3	1:B:358:ARG:NH1	2.26	0.51
1:B:349:ALA:HB1	1:B:383:PRO:HB2	1.92	0.51
1:A:18:ARG:HD2	1:A:118:TYR:CE2	2.45	0.51
1:A:240:ASN:HD21	1:A:243:LEU:H	1.56	0.51
1:B:392:ARG:HG2	1:B:392:ARG:HH11	1.76	0.51
1:A:99:VAL:CG1	1:A:118:TYR:HB3	2.41	0.51
1:A:172:ALA:O	1:A:176:LEU:HD12	2.11	0.50
1:B:479:PHE:CE1	1:B:539:ALA:HA	2.47	0.50
1:A:179:PHE:HE1	1:A:208:ALA:HB1	1.77	0.50
1:B:361:ARG:O	1:B:377:VAL:HG23	2.10	0.50
1:A:90:ALA:HA	1:A:97:TYR:CE2	2.46	0.50
1:B:517:GLU:HB2	1:B:521:GLU:O	2.11	0.50
1:A:65:VAL:HG21	1:A:228:PHE:HB3	1.94	0.50
1:B:451:ASN:O	1:B:485:ASP:OD2	2.30	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:496:LEU:HB3	1:B:534:LEU:O	2.12	0.50
1:A:69:SER:CB	1:A:72:LEU:HD11	2.41	0.50
1:A:134:TYR:HA	1:A:138:GLU:O	2.12	0.49
1:A:165:ARG:HG3	1:A:165:ARG:HH11	1.77	0.49
1:B:418:TYR:CD2	1:B:420:LEU:HD23	2.47	0.49
1:B:525:ASN:HB2	1:B:526:LYS:HZ2	1.76	0.49
1:A:79:VAL:HG22	1:A:103:PHE:CD2	2.46	0.49
1:B:350:GLU:OE1	1:B:366:THR:OG1	2.29	0.49
1:A:252:LYS:NZ	1:A:252:LYS:HB3	2.28	0.49
1:B:349:ALA:CB	1:B:383:PRO:HB2	2.43	0.49
1:B:426:TYR:CD1	1:B:477:CYS:HB3	2.47	0.49
1:B:303:GLU:OE1	1:B:430:SER:OG	2.30	0.49
1:A:88:PHE:O	1:A:92:ARG:HG3	2.13	0.49
1:B:526:LYS:HD3	1:B:532:GLU:OE2	2.12	0.49
1:B:501:ALA:HB1	1:B:505:VAL:HG23	1.95	0.48
1:B:381:LEU:HG	1:B:382:ASP:N	2.27	0.48
1:A:183:SER:HA	1:B:392:ARG:HD2	1.94	0.48
1:B:365:VAL:CG1	1:B:528:PHE:HB3	2.43	0.48
1:B:305:ASP:O	1:B:309:ILE:HD12	2.13	0.48
1:B:498:ILE:O	1:B:502:ALA:HB2	2.13	0.48
1:A:189:ASP:CG	1:A:191:ARG:HH21	2.22	0.48
1:A:110:LYS:NZ	1:A:110:LYS:HB3	2.24	0.48
1:A:70:GLY:HA2	1:A:230:MET:SD	2.54	0.48
1:A:114:PHE:CE1	1:A:116:TYR:HB2	2.49	0.48
1:A:217:GLU:HG3	1:A:218:LEU:N	2.29	0.48
1:A:249:GLU:C	1:A:252:LYS:HB2	2.38	0.48
1:A:142:VAL:HG23	1:A:211:ALA:O	2.14	0.47
1:A:148:LEU:HD13	1:A:250:LEU:CD1	2.44	0.47
1:A:167:ARG:HG3	1:A:184:PHE:HZ	1.79	0.47
1:A:196:LEU:CD2	1:A:236:ILE:HD12	2.44	0.47
1:A:251:ILE:O	1:A:252:LYS:OXT	2.33	0.47
1:B:448:LEU:HD13	1:B:462:PRO:HG2	1.96	0.47
1:A:153:ILE:HA	1:A:167:ARG:O	2.15	0.47
1:A:21:ILE:O	1:A:24:MET:HB3	2.14	0.47
1:A:240:ASN:HD22	1:A:242:LYS:N	2.12	0.47
1:B:400:SER:OG	1:B:503:ALA:HB3	2.14	0.47
1:B:434:TYR:HA	1:B:440:ILE:HG23	1.96	0.47
1:B:441:GLU:HA	1:B:511:ALA:O	2.14	0.47
1:A:167:ARG:HG3	1:A:184:PHE:CZ	2.50	0.47
1:B:474:THR:O	1:B:477:CYS:HB2	2.14	0.47
1:B:523:LEU:O	1:B:526:LYS:HG2	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:333:VAL:HG22	1:B:342:THR:O	2.15	0.47
1:B:435:ARG:O	1:B:436:ASN:HB2	2.15	0.47
1:A:179:PHE:CE2	1:A:239:ALA:HA	2.50	0.47
1:B:501:ALA:CB	1:B:536:ILE:HD11	2.45	0.46
1:B:497:ARG:HD3	1:B:499:TYR:OH	2.16	0.46
1:A:27:ARG:O	1:A:30:VAL:HG12	2.15	0.46
1:A:178:PHE:CE1	1:B:394:ILE:HD13	2.51	0.46
1:A:155:TYR:HA	1:A:156:TYR:CD2	2.50	0.46
1:A:240:ASN:ND2	1:A:242:LYS:HB2	2.31	0.46
1:B:432:GLY:HA2	1:B:510:LYS:HE3	1.96	0.46
1:A:244:HIS:N	1:A:245:PRO:HD2	2.31	0.46
1:A:165:ARG:HG3	1:A:165:ARG:NH1	2.31	0.46
1:A:7:LEU:O	1:A:11:ARG:HB2	2.15	0.46
1:A:37:LYS:HD3	1:A:37:LYS:HA	1.52	0.46
1:B:338:ASP:OD2	1:B:499:TYR:OH	2.33	0.46
1:A:10:SER:OG	1:A:101:LEU:HD22	2.17	0.45
1:A:70:GLY:HA3	1:A:230:MET:HE1	1.85	0.45
1:B:324:MET:HA	1:B:325:PRO:HD3	1.74	0.45
1:B:416:TYR:HA	1:B:426:TYR:O	2.16	0.45
1:B:442:VAL:HG11	1:B:513:GLY:HA3	1.98	0.45
1:B:325:PRO:O	1:B:329:ARG:HG3	2.16	0.45
1:B:425:GLU:O	1:B:435:ARG:HA	2.16	0.45
1:A:24:MET:HE2	1:A:29:ARG:HA	1.99	0.45
1:A:99:VAL:HG22	1:A:101:LEU:CD1	2.46	0.45
1:A:150:CYS:HG	1:A:163:PHE:HD2	1.64	0.45
1:A:191:ARG:NH2	1:A:196:LEU:HD13	2.32	0.45
1:B:497:ARG:O	1:B:500:ASP:HB2	2.15	0.45
1:B:501:ALA:HB1	1:B:505:VAL:CG2	2.46	0.45
1:A:155:TYR:OH	1:A:175:GLU:OE1	2.29	0.45
1:A:249:GLU:CA	1:A:252:LYS:HB2	2.47	0.45
1:B:418:TYR:CE2	1:B:420:LEU:HD23	2.52	0.45
1:A:99:VAL:O	1:A:99:VAL:HG13	2.16	0.45
1:B:396:VAL:O	1:B:396:VAL:HG12	2.17	0.45
1:B:444:ASP:OD1	1:B:444:ASP:N	2.49	0.45
1:A:110:LYS:HB3	1:A:110:LYS:HE2	1.64	0.45
1:A:144:ASP:OD1	1:A:144:ASP:N	2.50	0.45
1:A:233:ARG:O	1:A:234:LEU:HD23	2.16	0.45
1:A:248:LEU:O	1:A:252:LYS:N	2.50	0.44
1:B:454:ILE:O	1:B:457:PRO:HD3	2.17	0.44
1:B:439:ARG:HG3	1:B:439:ARG:HH11	1.81	0.44
1:A:1:MET:HE2	1:A:77:VAL:HG11	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:29:ARG:NH2	1:A:90:ALA:O	2.50	0.44
1:B:390:ALA:HB2	1:B:397:TYR:CG	2.52	0.44
1:A:18:ARG:NH1	1:A:118:TYR:OH	2.50	0.44
1:A:98:SER:HB3	1:A:118:TYR:O	2.18	0.44
1:A:241:GLU:O	1:A:245:PRO:HD2	2.18	0.44
1:A:37:LYS:O	1:A:38:ASP:HB3	2.17	0.44
1:A:197:ARG:NH1	1:A:233:ARG:HH21	2.15	0.44
1:A:203:ALA:HB3	4:A:1044:HOH:O	2.16	0.44
1:B:327:ARG:O	1:B:331:LYS:HD3	2.17	0.44
1:B:496:LEU:O	1:B:534:LEU:N	2.50	0.43
1:B:544:HIS:N	1:B:545:PRO:HD2	2.32	0.43
1:A:50:GLU:HG2	1:A:54:LEU:HG	2.00	0.43
1:A:118:TYR:CZ	1:A:123:GLY:HA2	2.54	0.43
1:B:337:LYS:HB3	1:B:370:GLY:H	1.82	0.43
1:A:245:PRO:HA	1:A:248:LEU:HD12	1.99	0.43
1:B:381:LEU:HD13	1:B:401:LEU:CD2	2.48	0.43
1:A:243:LEU:HD12	1:A:246:LYS:HB2	1.99	0.43
1:A:18:ARG:HD2	1:A:118:TYR:HE2	1.83	0.43
1:A:216:THR:OG1	1:A:220:GLY:HA2	2.18	0.43
1:A:162:PRO:CD	1:A:250:LEU:HD11	2.49	0.43
1:B:318:ARG:HA	1:B:420:LEU:HD22	2.01	0.43
1:B:539:ALA:HB1	1:B:543:LEU:HB3	2.01	0.43
1:B:337:LYS:CE	1:B:370:GLY:HA3	2.44	0.43
1:B:399:VAL:HG22	1:B:420:LEU:HD11	2.00	0.43
1:A:146:GLU:HA	1:A:243:LEU:HB2	2.01	0.43
1:A:158:ASP:OD2	1:A:158:ASP:N	2.50	0.43
1:A:198:ILE:HD12	1:A:198:ILE:O	2.18	0.43
1:B:451:ASN:N	1:B:485:ASP:OD2	2.52	0.42
1:B:526:LYS:HA	1:B:526:LYS:HD3	1.64	0.42
1:A:191:ARG:HA	1:A:192:PRO:HD3	1.83	0.42
1:B:533:ARG:O	1:B:534:LEU:HB3	2.18	0.42
1:A:110:LYS:O	1:A:110:LYS:HG2	2.18	0.42
1:A:161:PHE:CE2	1:A:250:LEU:HD21	2.53	0.42
1:B:361:ARG:HD3	1:B:361:ARG:HA	1.33	0.42
1:B:376:ASP:O	1:B:405:TYR:O	2.36	0.42
1:B:410:LYS:HG2	1:B:411:ASP:CG	2.44	0.42
1:A:26:LEU:HD23	1:A:29:ARG:NE	2.35	0.42
1:A:243:LEU:HG	1:A:243:LEU:O	2.19	0.42
1:B:374:GLU:O	1:B:375:GLY:O	2.36	0.42
1:A:146:GLU:HB2	1:A:246:LYS:NZ	2.34	0.42
1:A:214:LYS:O	1:A:238:ALA:HA	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:318:ARG:HG3	1:B:418:TYR:CE2	2.44	0.42
1:A:215:VAL:CG1	1:A:236:ILE:HG23	2.49	0.42
1:B:422:THR:OG1	1:B:424:ASP:OD2	2.36	0.42
1:B:516:THR:OG1	1:B:517:GLU:N	2.50	0.42
1:A:110:LYS:NZ	1:A:225:ASN:OD1	2.52	0.41
1:A:179:PHE:HE2	1:A:239:ALA:HA	1.84	0.41
1:B:318:ARG:HD2	1:B:418:TYR:OH	2.19	0.41
1:B:365:VAL:HG11	1:B:528:PHE:HB3	2.01	0.41
1:B:487:PHE:HB3	1:B:538:ALA:HB3	2.01	0.41
1:A:231:GLN:O	1:A:231:GLN:OE1	2.38	0.41
1:B:338:ASP:CG	1:B:340:THR:HG23	2.45	0.41
1:B:525:ASN:HB2	1:B:526:LYS:HZ3	1.86	0.41
1:A:94:ILE:O	1:A:96:VAL:N	2.50	0.41
1:A:44:ALA:O	1:A:48:VAL:HG23	2.21	0.41
1:A:108:LYS:NZ	1:A:227:LYS:HD2	2.36	0.41
1:B:406:SER:OG	1:B:411:ASP:OD2	2.30	0.41
1:B:489:ASP:OD2	1:B:496:LEU:HD13	2.21	0.41
1:B:498:ILE:O	1:B:498:ILE:HD12	2.21	0.41
1:A:194:LYS:HB3	1:A:194:LYS:HE3	1.90	0.41
1:A:237:VAL:HG12	1:A:244:HIS:CD2	2.56	0.41
1:B:305:ASP:C	1:B:309:ILE:HD12	2.45	0.41
1:B:448:LEU:HD13	1:B:462:PRO:HG3	2.03	0.41
1:A:146:GLU:OE2	1:A:146:GLU:N	2.49	0.40
1:A:155:TYR:HA	1:A:156:TYR:HD2	1.84	0.40
1:B:314:ALA:HB1	1:B:418:TYR:CG	2.56	0.40
1:B:381:LEU:HD12	1:B:401:LEU:HG	2.03	0.40
1:A:119:ASN:HD22	1:A:121:ALA:H	1.67	0.40
1:A:179:PHE:CE1	1:A:208:ALA:HB1	2.56	0.40
1:B:301:MET:HB3	1:B:301:MET:HE3	1.68	0.40
1:B:392:ARG:HG2	1:B:392:ARG:NH1	2.35	0.40
1:B:547:LEU:O	1:B:551:ILE:HG23	2.22	0.40
1:B:455:TYR:HA	1:B:456:TYR:HA	1.93	0.40
1:B:459:ARG:HB2	1:B:460:LYS:H	1.77	0.40
1:A:157:PRO:HB2	1:B:457:PRO:O	2.20	0.40
1:B:324:MET:HE1	1:B:344:ALA:HB1	2.04	0.40
1:B:327:ARG:NH1	1:B:331:LYS:NZ	2.70	0.40
1:B:453:ILE:HA	1:B:467:ARG:O	2.22	0.40
1:B:494:LYS:O	1:B:533:ARG:HB3	2.21	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	250/252 (99%)	220 (88%)	28 (11%)	2 (1%)	16	25
1	B	250/252 (99%)	220 (88%)	25 (10%)	5 (2%)	6	7
All	All	500/504 (99%)	440 (88%)	53 (11%)	7 (1%)	9	13

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	38	ASP
1	B	522	SER
1	A	194	LYS
1	B	375	GLY
1	B	540	ASN
1	B	337	LYS
1	B	370	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	204/204 (100%)	162 (79%)	42 (21%)	1	1
1	B	204/204 (100%)	151 (74%)	53 (26%)	0	0
All	All	408/408 (100%)	313 (77%)	95 (23%)	1	1

All (95) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	2	ASP
1	A	9	ILE
1	A	10	SER
1	A	11	ARG
1	A	27	ARG
1	A	28	GLU
1	A	31	LYS
1	A	35	MET
1	A	37	LYS
1	A	38	ASP
1	A	43	LYS
1	A	54	LEU
1	A	59	LYS
1	A	61	ARG
1	A	69	SER
1	A	106	SER
1	A	108	LYS
1	A	110	LYS
1	A	138	GLU
1	A	146	GLU
1	A	147	GLU
1	A	153	ILE
1	A	154	ILE
1	A	158	ASP
1	A	159	ARG
1	A	160	LYS
1	A	176	LEU
1	A	188	LEU
1	A	190	ILE
1	A	196	LEU
1	A	198	ILE
1	A	214	LYS
1	A	215	VAL
1	A	219	ASP
1	A	222	SER
1	A	227	LYS
1	A	230	MET
1	A	231	GLN
1	A	242	LYS
1	A	247	LEU
1	A	252	LYS
1	B	301	MET

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Mol	Chain	Res	Type
1	B	304	ARG
1	B	308	ARG
1	B	312	GLU
1	B	318	ARG
1	B	319	LYS
1	B	321	ILE
1	B	327	ARG
1	B	328	GLU
1	B	337	LYS
1	B	340	THR
1	B	347	ARG
1	B	358	ARG
1	B	361	ARG
1	B	363	THR
1	B	365	VAL
1	B	366	THR
1	B	371	VAL
1	B	374	GLU
1	B	377	VAL
1	B	381	LEU
1	B	394	ILE
1	B	409	LEU
1	B	410	LYS
1	B	439	ARG
1	B	440	ILE
1	B	441	GLU
1	B	444	ASP
1	B	448	LEU
1	B	453	ILE
1	B	454	ILE
1	B	460	LYS
1	B	464	LYS
1	B	475	GLU
1	B	483	SER
1	B	485	ASP
1	B	490	ILE
1	B	494	LYS
1	B	498	ILE
1	B	509	GLU
1	B	510	LYS
1	B	517	GLU
1	B	518	LEU

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Mol	Chain	Res	Type
1	B	519	ASP
1	B	526	LYS
1	B	529	ASP
1	B	530	MET
1	B	541	GLU
1	B	546	LYS
1	B	547	LEU
1	B	549	GLU
1	B	551	ILE
1	B	552	LYS

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	119	ASN
1	A	231	GLN
1	A	235	ASN
1	A	240	ASN
1	B	451	ASN

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 6 ligands modelled in this entry, 4 are monoatomic - leaving 2 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	IPD	B	595	2	16,16,16	1.19	3 (18%)	25,25,25	0.82	1 (4%)
3	IPD	A	295	2	16,16,16	1.12	2 (12%)	25,25,25	0.63	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	IPD	B	595	2	-	1/5/29/29	0/1/1/1
3	IPD	A	295	2	-	0/5/29/29	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	595	IPD	C2-C1	2.30	1.58	1.52
3	A	295	IPD	C2-C1	2.25	1.58	1.52
3	B	595	IPD	C6-C1	2.07	1.57	1.52
3	B	595	IPD	C3-C2	2.05	1.57	1.52
3	A	295	IPD	C6-C1	2.02	1.57	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	595	IPD	O1-P1-O7	2.38	117.82	109.33

There are no chirality outliers.

All (1) torsion outliers are listed below:

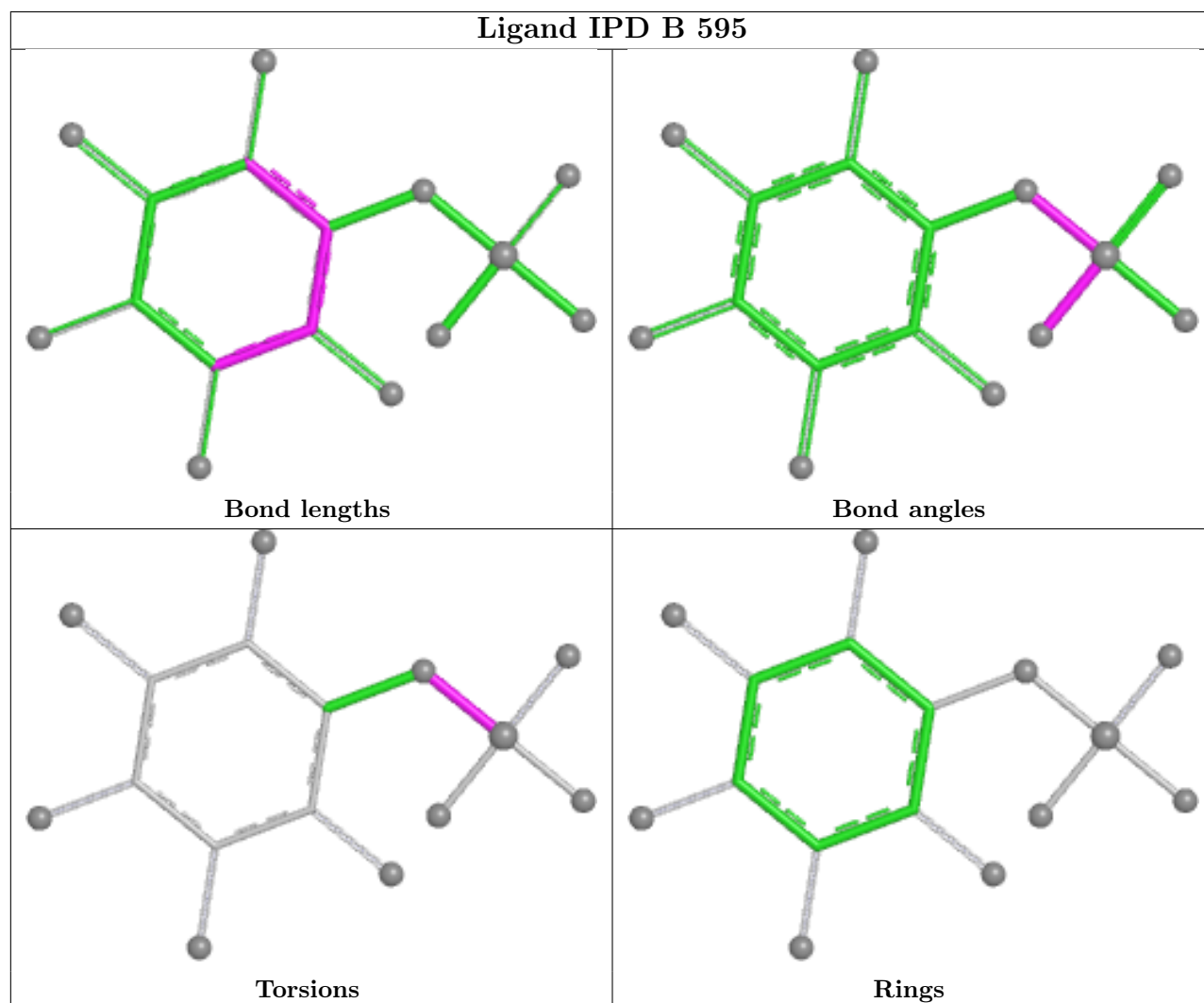
Mol	Chain	Res	Type	Atoms
3	B	595	IPD	C1-O1-P1-O7

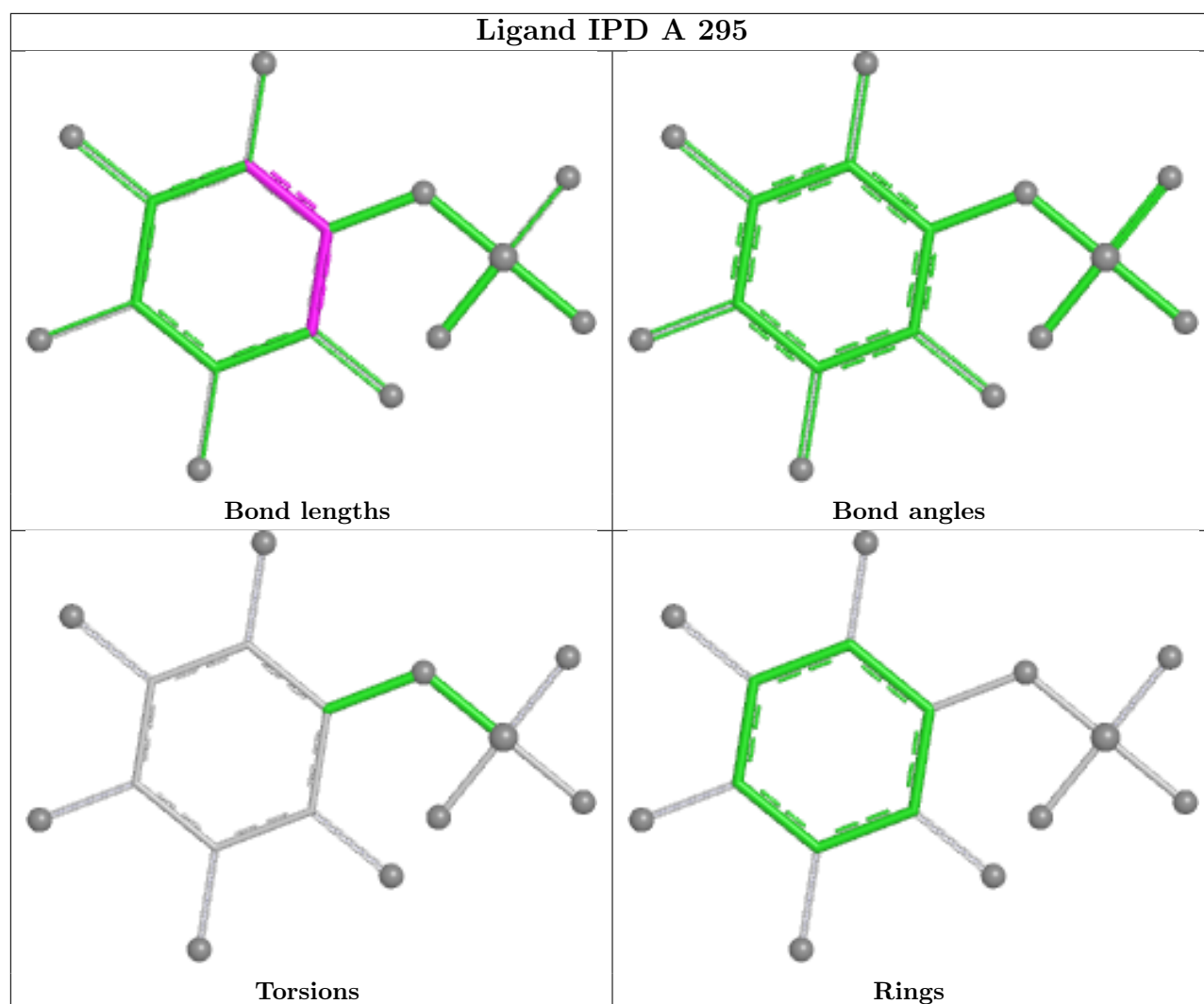
There are no ring outliers.

No monomer is involved in short contacts.

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	252/252 (100%)	0.14	3 (1%) 76 73	24, 46, 76, 106	0
1	B	252/252 (100%)	0.32	3 (1%) 76 73	27, 55, 86, 118	0
All	All	504/504 (100%)	0.23	6 (1%) 76 73	24, 50, 84, 118	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	145	ALA	3.2
1	B	539	ALA	2.7
1	B	376	ASP	2.7
1	B	378	PHE	2.6
1	A	147	GLU	2.3
1	A	231	GLN	2.1

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](#)

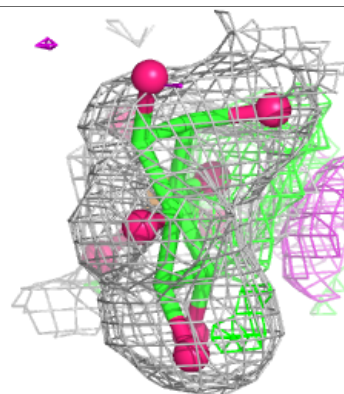
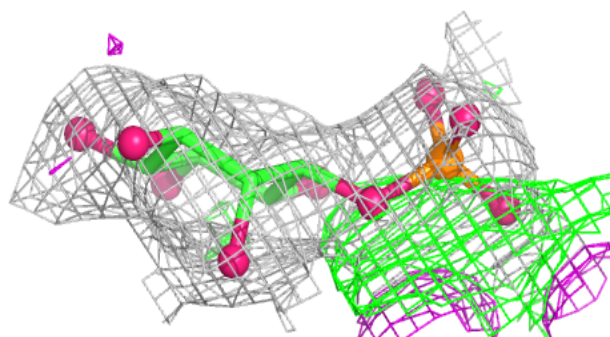
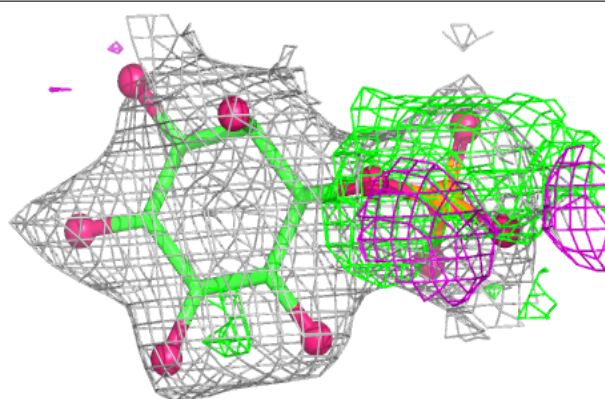
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists 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
2	CA	B	591	1/1	0.47	0.37	10,10,10,10	0
3	IPD	B	595	16/16	0.79	0.15	19,31,55,55	16
3	IPD	A	295	16/16	0.84	0.20	19,37,45,50	16
2	CA	A	291	1/1	0.85	0.33	9,9,9,9	0
2	CA	B	590	1/1	0.86	0.35	6,6,6,6	0
2	CA	A	290	1/1	0.88	0.38	11,11,11,11	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.

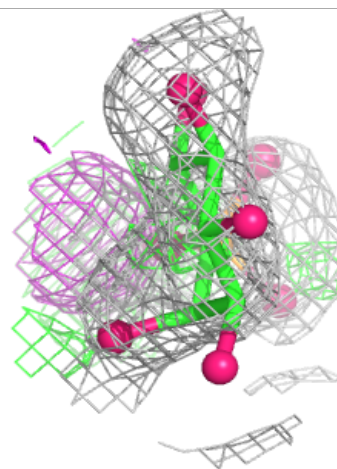
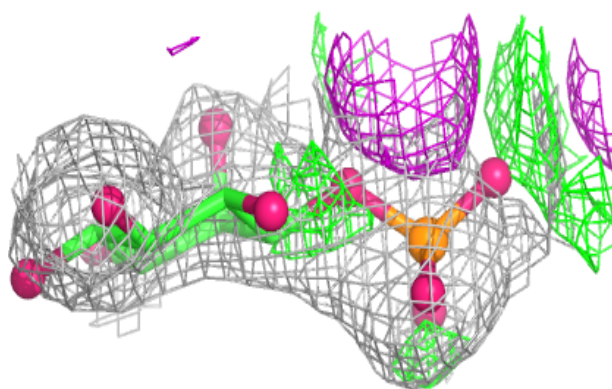
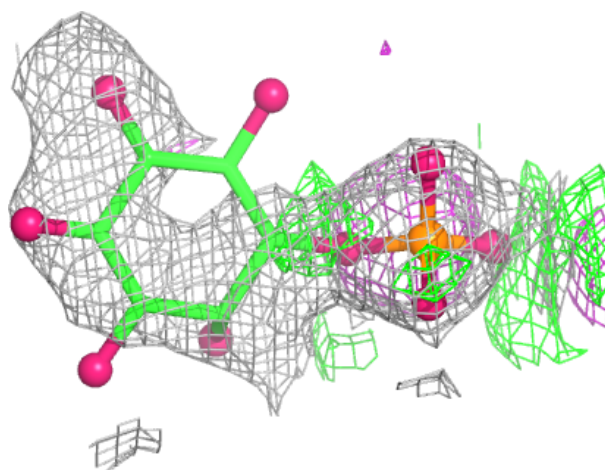
Electron density around IPD B 595:

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 IPD A 295:

$2mF_o-DF_c$ (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.