



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 04:16 AM UTC

PDB ID : 2IO8 / pdb_00002io8
Title : E. coli Bifunctional glutathionylspermidine synthetase/amidase Incomplex with Mg²⁺ and ADP
Authors : Pai, C.H.; Chiang, B.Y.; Ko, T.P.; Chou, C.C.; Chong, C.M.; Yen, F.J.; Coward, J.K.; Wang, A.H.-J.; Lin, C.H.
Deposited on : 2006-10-10
Resolution : 2.10 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

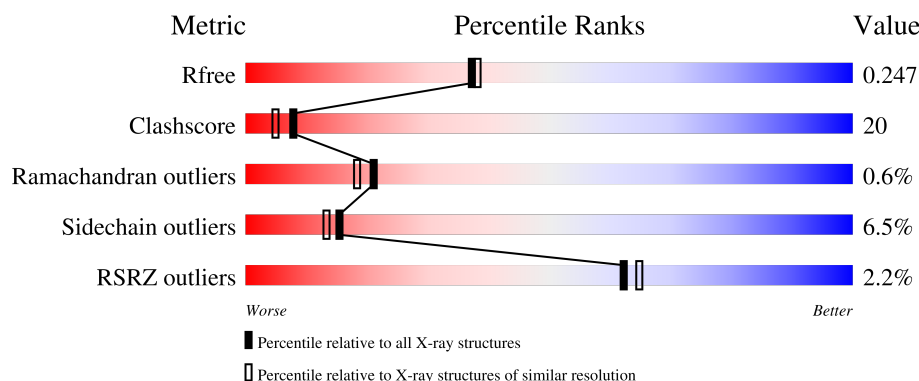
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

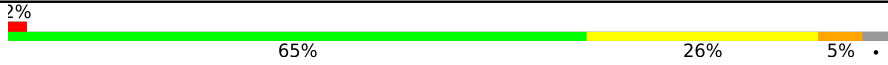
The reported resolution of this entry is 2.10 Å.

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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	619	
1	B	619	

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 10536 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.

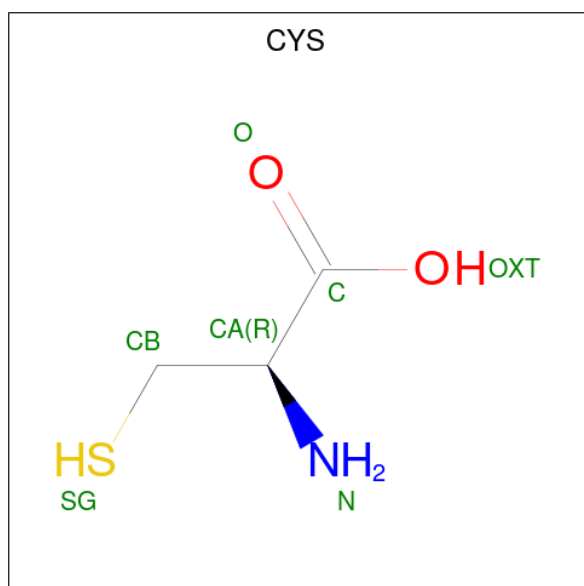
- Molecule 1 is a protein called Bifunctional glutathionylspermidine synthetase/amidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	598	Total	C	N	O	S	0	0	0
			4807	3080	822	886	19			
1	B	593	Total	C	N	O	S	0	0	0
			4767	3056	817	875	19			

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

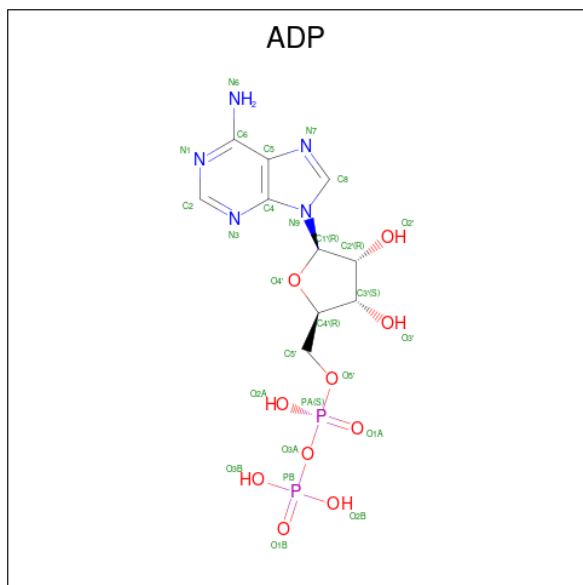
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Mg	0	0
			2	2		
2	B	2	Total	Mg	0	0
			2	2		

- Molecule 3 is CYSTEINE (CCD ID: CYS) (formula: C₃H₇NO₂S).



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

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

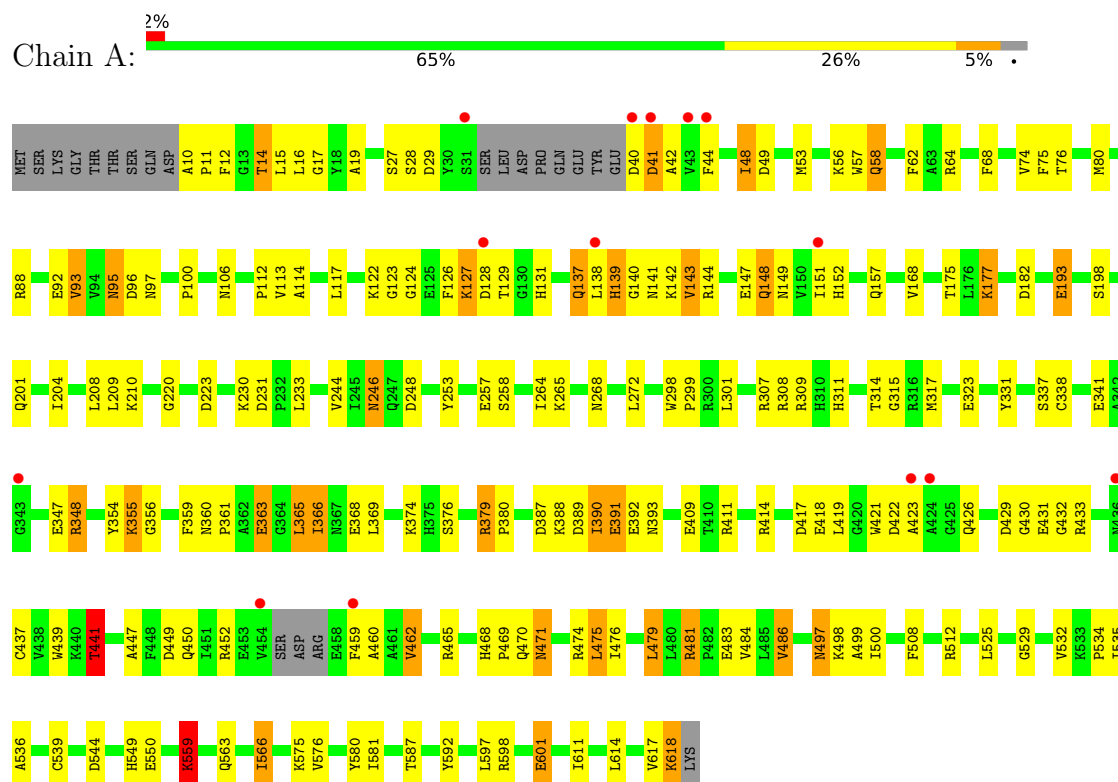
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	458	Total	O	0	0
			458	458		
5	B	432	Total	O	0	0
			432	432		

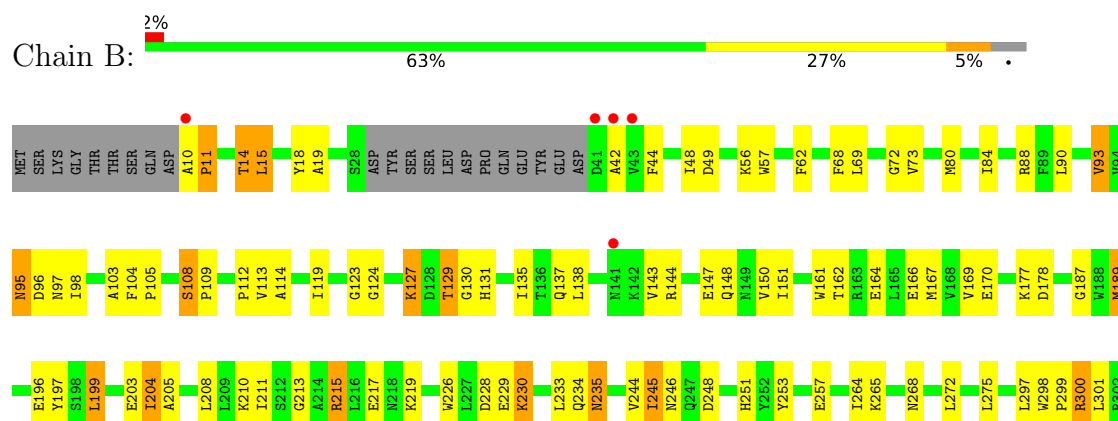
3 Residue-property plots

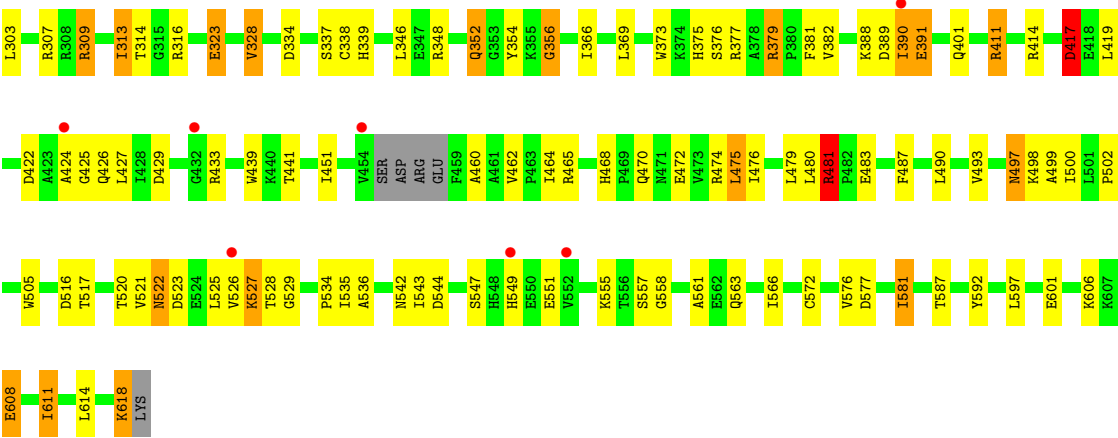
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Bifunctional glutathionylspermidine synthetase/amidase



• Molecule 1: Bifunctional glutathionylspermidine synthetase/amidase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	60.20Å 75.61Å 84.44Å 70.17° 73.92° 77.77°	Depositor
Resolution (Å)	30.00 – 2.10 30.00 – 2.10	Depositor EDS
% Data completeness (in resolution range)	(Not available) (30.00-2.10) 92.6 (30.00-2.10)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.43 (at 2.08Å)	Xtriage
Refinement program	CNS, XTALVIEW	Depositor
R, R_{free}	0.173 , 0.236 0.188 , 0.247	Depositor DCC
R_{free} test set	7567 reflections (9.96%)	wwPDB-VP
Wilson B-factor (Å ²)	27.8	Xtriage
Anisotropy	0.413	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 60.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	10536	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.93% 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: ADP, MG

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	0.65	1/4930 (0.0%)	1.06	29/6695 (0.4%)
1	B	0.64	1/4889 (0.0%)	1.05	22/6639 (0.3%)
All	All	0.65	2/9819 (0.0%)	1.06	51/13334 (0.4%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	189	MET	SD-CE	-5.98	1.64	1.79
1	A	317	MET	SD-CE	5.16	1.92	1.79

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	529	GLY	N-CA-C	-9.57	100.75	112.33
1	B	441	THR	N-CA-C	-8.42	103.14	113.50
1	B	529	GLY	N-CA-C	-7.55	103.17	112.68
1	B	93	VAL	N-CA-C	7.53	121.56	111.17
1	B	328	VAL	CB-CA-C	-7.27	100.73	110.98
1	A	148	GLN	N-CA-C	7.09	122.48	113.55
1	A	481	ARG	N-CA-C	-6.96	100.88	109.65
1	B	130	GLY	N-CA-C	-6.95	99.63	112.62
1	A	441	THR	N-CA-C	-6.87	105.05	113.50
1	A	93	VAL	N-CA-C	6.77	116.92	110.42
1	B	481	ARG	N-CA-C	-6.73	99.46	109.42
1	A	486	VAL	N-CA-C	6.67	119.30	108.97
1	A	48	ILE	N-CA-C	-6.63	95.56	109.34
1	A	508	PHE	CA-C-N	6.42	126.79	119.93
1	A	508	PHE	C-N-CA	6.42	126.79	119.93
1	B	587	THR	N-CA-C	-6.28	99.96	109.95
1	B	230	LYS	N-CA-C	-6.25	104.71	112.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	539	CYS	N-CA-C	6.24	120.14	111.90
1	B	129	THR	N-CA-C	6.12	119.22	111.69
1	A	439	TRP	N-CA-C	-6.10	98.57	108.52
1	A	19	ALA	N-CA-C	-6.09	103.12	110.13
1	B	417	ASP	N-CA-C	6.02	118.64	111.71
1	B	439	TRP	N-CA-C	-5.99	99.44	109.07
1	B	109	PRO	N-CA-C	-5.95	106.42	113.86
1	A	479	LEU	N-CA-C	5.95	118.55	111.71
1	B	611	ILE	N-CA-C	-5.83	100.02	108.87
1	A	363	GLU	N-CA-C	5.81	118.39	111.71
1	A	139	HIS	N-CA-C	5.78	118.28	110.88
1	B	581	ILE	N-CA-C	5.74	116.14	108.11
1	A	566	ILE	N-CA-C	-5.57	100.30	108.99
1	A	601	GLU	N-CA-C	-5.48	106.10	112.89
1	A	137	GLN	N-CA-C	5.43	116.65	108.46
1	B	19	ALA	N-CA-C	-5.42	103.89	110.13
1	B	108	SER	N-CA-C	5.40	118.12	110.24
1	A	417	ASP	N-CA-C	5.35	117.11	111.28
1	A	462	VAL	CA-C-N	5.33	126.50	119.84
1	A	462	VAL	C-N-CA	5.33	126.50	119.84
1	B	313	ILE	N-CA-C	5.30	116.38	111.45
1	A	198	SER	N-CA-C	5.28	117.50	110.53
1	A	376	SER	N-CA-C	-5.26	103.09	110.35
1	B	113	VAL	N-CA-C	5.25	115.78	110.05
1	B	376	SER	N-CA-C	-5.25	103.76	110.53
1	A	409	GLU	N-CA-C	-5.23	101.76	110.17
1	A	559	LYS	N-CA-C	5.22	119.63	113.16
1	A	365	LEU	N-CA-C	5.20	117.34	111.11
1	B	572	CYS	N-CA-C	5.19	117.96	110.28
1	A	106	ASN	N-CA-C	-5.13	102.46	110.10
1	B	245	ILE	N-CA-C	-5.07	107.86	112.12
1	A	117	LEU	N-CA-C	-5.07	102.98	110.48
1	A	193	GLU	N-CA-C	-5.07	107.15	113.38
1	B	356	GLY	N-CA-C	5.01	120.14	111.98

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	4807	0	4679	175	0
1	B	4767	0	4653	206	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	7	0	4	3	0
3	B	7	0	4	2	0
4	A	27	0	12	0	0
4	B	27	0	12	0	0
5	A	458	0	0	23	0
5	B	432	0	0	26	0
All	All	10536	0	9364	376	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 20.

All (376) 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:15:LEU:HD12	1:B:424:ALA:HB1	1.15	1.13
1:B:84:ILE:HG22	1:B:189:MET:HE1	1.18	1.12
1:A:355:LYS:HE3	1:A:355:LYS:H	1.16	1.07
1:A:587:THR:HB	5:A:3518:HOH:O	1.63	0.98
1:B:497:ASN:HD22	1:B:499:ALA:H	1.09	0.98
1:B:309:ARG:HG3	1:B:309:ARG:HH11	1.30	0.97
1:A:64:ARG:HG3	1:A:74:VAL:HG23	1.48	0.95
1:A:323:GLU:HG3	5:A:3400:HOH:O	1.64	0.95
1:A:618:LYS:H	1:A:618:LYS:HD3	1.32	0.93
1:B:205:ALA:HB3	5:B:3799:HOH:O	1.69	0.91
1:B:84:ILE:CG2	1:B:189:MET:HE1	2.00	0.91
1:B:208:LEU:HG	5:B:3799:HOH:O	1.72	0.90
1:A:497:ASN:HD22	1:A:499:ALA:H	1.09	0.89
1:B:309:ARG:O	1:B:309:ARG:HD3	1.72	0.89
1:B:523:ASP:O	1:B:526:VAL:HG12	1.73	0.86
1:B:534:PRO:HB2	1:B:563:GLN:HE21	1.41	0.86
1:A:177:LYS:HB3	1:A:177:LYS:NZ	1.89	0.86
1:A:618:LYS:HD3	1:A:618:LYS:N	1.90	0.86
1:A:497:ASN:ND2	1:A:499:ALA:H	1.76	0.84
1:A:536:ALA:H	1:A:563:GLN:NE2	1.77	0.82
1:A:348:ARG:HG2	1:A:348:ARG:HH11	1.46	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:422:ASP:OD2	1:B:426:GLN:HB2	1.80	0.81
1:B:497:ASN:ND2	1:B:499:ALA:H	1.80	0.80
1:B:309:ARG:HD3	1:B:309:ARG:C	2.07	0.79
1:A:177:LYS:HB3	1:A:177:LYS:HZ3	1.47	0.78
1:A:331:TYR:OH	1:A:587:THR:HG21	1.84	0.78
1:A:268:ASN:HD21	1:A:592:TYR:H	1.32	0.77
1:B:268:ASN:HD21	1:B:592:TYR:H	1.32	0.77
1:A:246:ASN:C	1:A:246:ASN:HD22	1.92	0.77
1:A:308:ARG:HE	1:A:311:HIS:HD2	1.33	0.76
1:A:157:GLN:CD	1:A:157:GLN:H	1.94	0.75
1:A:15:LEU:CD1	1:B:424:ALA:HB1	2.08	0.75
1:B:544:ASP:OD1	1:B:555:LYS:HG3	1.87	0.74
1:A:338:CYS:SG	3:A:5003:CYS:SG	2.55	0.74
1:A:601:GLU:HG2	5:A:3618:HOH:O	1.89	0.73
1:A:11:PRO:O	1:A:14:THR:HG22	1.87	0.73
1:B:103:ALA:HB3	1:B:199:LEU:HD11	1.69	0.73
1:B:390:ILE:HD13	1:B:391:GLU:H	1.53	0.73
1:A:355:LYS:H	1:A:355:LYS:CE	1.97	0.73
1:B:534:PRO:HB2	1:B:563:GLN:NE2	2.03	0.73
1:B:481:ARG:NE	5:B:3782:HOH:O	2.22	0.72
1:A:418:GLU:HB3	5:A:3137:HOH:O	1.88	0.72
1:A:374:LYS:O	1:A:374:LYS:HD3	1.90	0.72
1:B:462:VAL:HG12	1:B:464:ILE:HG23	1.72	0.71
1:B:103:ALA:HB3	1:B:199:LEU:CD1	2.20	0.71
1:A:307:ARG:HD3	1:B:49:ASP:OD1	1.90	0.71
1:B:210:LYS:HZ1	1:B:323:GLU:H	1.35	0.71
1:A:355:LYS:HE3	1:A:355:LYS:N	2.00	0.70
1:B:96:ASP:OD2	1:B:309:ARG:NH1	2.22	0.70
1:B:137:GLN:HG3	1:B:144:ARG:HB2	1.73	0.70
1:B:601:GLU:CD	1:B:601:GLU:H	1.99	0.70
1:B:10:ALA:HB1	1:B:14:THR:HG21	1.73	0.70
1:A:265:LYS:HE2	5:A:3160:HOH:O	1.91	0.69
1:A:210:LYS:HB2	5:A:3524:HOH:O	1.92	0.69
1:A:392:GLU:OE1	1:A:441:THR:HG21	1.93	0.69
1:A:429:ASP:OD1	1:A:433:ARG:HG2	1.93	0.69
1:A:204:ILE:HD11	1:A:208:LEU:HD13	1.74	0.68
1:B:338:CYS:SG	3:B:5004:CYS:SG	2.62	0.68
1:A:231:ASP:HB2	5:A:3785:HOH:O	1.93	0.67
1:A:611:ILE:HD11	3:A:5003:CYS:SG	2.35	0.67
1:B:15:LEU:HD11	1:B:18:TYR:OH	1.95	0.67
1:B:316:ARG:NH2	5:B:3909:HOH:O	2.29	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:40:ASP:C	1:A:42:ALA:H	2.04	0.66
1:A:53:MET:O	1:A:64:ARG:HD2	1.95	0.66
1:A:618:LYS:H	1:A:618:LYS:CD	2.01	0.66
1:B:309:ARG:HH11	1:B:309:ARG:CG	2.03	0.65
1:B:465:ARG:HG3	1:B:474:ARG:NH2	2.11	0.65
1:B:337:SER:O	1:B:338:CYS:HB2	1.96	0.65
1:B:253:TYR:CZ	1:B:581:ILE:HD11	2.32	0.65
1:A:28:SER:H	1:A:152:HIS:CD2	2.14	0.64
1:A:550:GLU:O	1:A:550:GLU:HG2	1.97	0.64
1:A:450:GLN:OE1	1:A:476:ILE:HG12	1.97	0.64
1:A:28:SER:H	1:A:152:HIS:HD2	1.43	0.64
1:B:103:ALA:CB	1:B:199:LEU:HD11	2.27	0.64
1:B:481:ARG:CZ	5:B:3782:HOH:O	2.45	0.64
1:A:587:THR:HG23	5:A:3169:HOH:O	1.99	0.63
1:B:390:ILE:HD13	1:B:391:GLU:HG2	1.80	0.63
1:A:361:PRO:HG3	1:A:614:LEU:HD23	1.80	0.63
1:A:149:ASN:N	5:A:3440:HOH:O	2.11	0.63
1:A:597:LEU:HD11	1:A:614:LEU:HD13	1.81	0.62
1:A:80:MET:CE	1:A:129:THR:HG22	2.30	0.62
1:A:374:LYS:HD3	1:A:374:LYS:C	2.25	0.62
1:A:137:GLN:OE1	1:A:144:ARG:HD2	1.99	0.62
1:B:354:TYR:CZ	1:B:356:GLY:HA3	2.34	0.62
1:A:10:ALA:N	5:A:3077:HOH:O	2.32	0.62
1:B:618:LYS:HB2	1:B:618:LYS:NZ	2.14	0.62
1:A:204:ILE:HG21	1:A:209:LEU:HD21	1.82	0.62
1:A:618:LYS:HB2	5:A:3492:HOH:O	1.99	0.62
1:A:390:ILE:HD13	1:A:390:ILE:H	1.64	0.62
1:A:76:THR:HG22	1:A:272:LEU:HD11	1.82	0.61
1:B:229:GLU:O	1:B:235:ASN:ND2	2.33	0.61
1:A:11:PRO:O	1:A:14:THR:CG2	2.48	0.61
1:A:131:HIS:HE1	1:A:147:GLU:OE2	1.84	0.61
1:B:151:ILE:HD12	1:B:151:ILE:N	2.15	0.61
1:A:390:ILE:HD13	1:A:390:ILE:N	2.15	0.61
1:A:426:GLN:HA	1:A:481:ARG:HH22	1.66	0.61
1:A:348:ARG:HG2	1:A:348:ARG:NH1	2.13	0.61
1:A:15:LEU:C	1:A:15:LEU:HD13	2.26	0.60
1:B:429:ASP:OD2	1:B:433:ARG:HG2	2.01	0.60
1:A:148:GLN:O	5:A:3180:HOH:O	2.16	0.60
1:B:300:ARG:NH2	5:B:3300:HOH:O	2.33	0.60
1:B:11:PRO:HD2	1:B:14:THR:HG21	1.83	0.60
1:A:123:GLY:N	1:A:127:LYS:O	2.34	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:423:ALA:HB3	5:A:3647:HOH:O	2.00	0.60
1:A:465:ARG:HD2	5:A:3435:HOH:O	2.01	0.60
1:B:210:LYS:NZ	1:B:323:GLU:H	1.99	0.60
1:A:139:HIS:O	1:A:141:ASN:N	2.33	0.59
1:B:42:ALA:HB1	1:B:375:HIS:HE1	1.67	0.59
1:A:475:LEU:HD22	1:A:479:LEU:HG	1.83	0.59
1:A:41:ASP:O	1:A:44:PHE:HB2	2.03	0.59
1:A:534:PRO:HB2	1:A:563:GLN:NE2	2.17	0.59
1:A:12:PHE:HB2	1:A:29:ASP:O	2.02	0.59
1:A:390:ILE:H	1:A:390:ILE:CD1	2.16	0.59
1:A:308:ARG:HE	1:A:311:HIS:CD2	2.19	0.58
1:A:139:HIS:HB2	1:A:142:LYS:HG2	1.86	0.58
1:B:391:GLU:HG2	5:B:3645:HOH:O	2.03	0.58
1:B:547:SER:OG	1:B:551:GLU:HG2	2.03	0.58
1:B:303:LEU:HD13	1:B:307:ARG:NH2	2.18	0.58
1:B:536:ALA:H	1:B:563:GLN:NE2	2.00	0.58
1:A:80:MET:HE1	1:A:129:THR:HG22	1.86	0.58
1:B:80:MET:HE3	1:B:129:THR:HA	1.86	0.58
1:A:355:LYS:HD2	1:A:355:LYS:C	2.29	0.57
1:B:215:ARG:NH2	1:B:248:ASP:OD1	2.35	0.57
1:B:265:LYS:HE2	5:B:3419:HOH:O	2.04	0.57
1:B:44:PHE:O	1:B:56:LYS:HG3	2.05	0.57
1:A:337:SER:O	1:A:338:CYS:HB2	2.04	0.57
1:B:390:ILE:HD13	1:B:391:GLU:N	2.16	0.57
1:B:48:ILE:HD13	1:B:69:LEU:HD21	1.85	0.57
1:A:534:PRO:HB2	1:A:563:GLN:HE21	1.70	0.57
1:B:137:GLN:CG	1:B:144:ARG:HB2	2.34	0.57
1:A:483:GLU:CD	1:A:483:GLU:H	2.13	0.56
1:A:512:ARG:HB2	5:A:3004:HOH:O	2.04	0.56
1:B:520:THR:HG22	1:B:521:VAL:N	2.20	0.56
1:A:112:PRO:O	1:A:138:LEU:HD11	2.05	0.56
1:B:68:PHE:HE1	1:B:93:VAL:HG21	1.70	0.56
1:A:483:GLU:HG2	5:A:3338:HOH:O	2.05	0.56
1:A:15:LEU:HD13	1:A:17:GLY:N	2.19	0.56
1:A:389:ASP:HB3	1:A:391:GLU:HG2	1.86	0.56
1:A:559:LYS:CD	1:A:559:LYS:H	2.17	0.56
1:A:575:LYS:HE2	1:A:580:TYR:CZ	2.41	0.56
1:B:390:ILE:HD13	5:B:3645:HOH:O	2.06	0.56
1:B:131:HIS:HE1	1:B:147:GLU:OE1	1.89	0.56
1:B:215:ARG:HH11	1:B:215:ARG:HG3	1.70	0.56
1:B:251:HIS:HE1	1:B:577:ASP:OD2	1.89	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:113:VAL:HG22	1:A:114:ALA:N	2.21	0.56
1:A:128:ASP:HB2	5:A:3844:HOH:O	2.06	0.56
1:A:122:LYS:HB2	1:A:128:ASP:HA	1.88	0.55
1:A:576:VAL:HB	1:A:581:ILE:CD1	2.36	0.55
1:B:72:GLY:O	1:B:93:VAL:HG22	2.06	0.55
1:B:210:LYS:HE2	1:B:210:LYS:HA	1.88	0.55
1:B:119:ILE:HD11	1:B:189:MET:HE2	1.87	0.55
1:B:204:ILE:HD13	1:B:205:ALA:N	2.21	0.55
1:B:234:GLN:OE1	1:B:348:ARG:HG3	2.07	0.55
1:A:48:ILE:O	1:A:49:ASP:HB2	2.06	0.55
1:A:58:GLN:HG2	5:A:3410:HOH:O	2.07	0.55
1:B:411:ARG:HG2	1:B:411:ARG:HH11	1.70	0.55
1:B:498:LYS:HB2	1:B:535:ILE:HA	1.88	0.55
1:B:95:ASN:ND2	1:B:97:ASN:H	2.05	0.54
1:B:226:TRP:HB2	1:B:352:GLN:HG2	1.89	0.54
1:B:245:ILE:HG13	1:B:246:ASN:N	2.21	0.54
1:B:48:ILE:O	1:B:49:ASP:HB2	2.06	0.54
1:B:210:LYS:CE	1:B:323:GLU:H	2.20	0.54
1:B:427:LEU:HD12	1:B:481:ARG:HD2	1.89	0.54
1:B:451:ILE:HG13	1:B:476:ILE:HD12	1.88	0.54
1:B:210:LYS:HE3	1:B:323:GLU:H	1.71	0.54
1:B:337:SER:O	1:B:338:CYS:CB	2.56	0.54
1:B:272:LEU:HD21	5:B:3496:HOH:O	2.08	0.53
1:A:433:ARG:HG2	1:A:433:ARG:HH11	1.72	0.53
1:B:309:ARG:HG3	1:B:309:ARG:NH1	2.10	0.53
1:B:601:GLU:CD	1:B:601:GLU:N	2.67	0.53
1:B:68:PHE:CE1	1:B:93:VAL:HG21	2.43	0.53
1:B:611:ILE:HD11	3:B:5004:CYS:SG	2.49	0.53
1:B:96:ASP:OD1	1:B:309:ARG:NH2	2.33	0.53
1:A:421:TRP:HA	1:A:426:GLN:O	2.09	0.52
1:B:576:VAL:HB	1:B:581:ILE:HD12	1.90	0.52
1:A:462:VAL:HG23	5:B:3034:HOH:O	2.10	0.52
1:B:210:LYS:O	5:B:3733:HOH:O	2.19	0.52
1:B:379:ARG:HB3	5:B:3325:HOH:O	2.10	0.52
1:B:618:LYS:NZ	1:B:618:LYS:CB	2.72	0.52
1:A:74:VAL:HG22	1:A:75:PHE:N	2.25	0.52
1:B:522:ASN:ND2	1:B:525:LEU:H	2.08	0.52
1:B:547:SER:C	1:B:549:HIS:H	2.18	0.52
1:A:220:GLY:HA2	1:A:223:ASP:OD2	2.10	0.51
1:A:380:PRO:HG2	5:A:3765:HOH:O	2.09	0.51
1:B:10:ALA:N	5:B:3481:HOH:O	2.42	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:311:HIS:CD2	5:A:3585:HOH:O	2.63	0.51
1:A:392:GLU:OE1	1:A:441:THR:CG2	2.58	0.51
1:B:475:LEU:HD22	1:B:479:LEU:HG	1.91	0.51
1:B:618:LYS:HB2	1:B:618:LYS:HZ3	1.75	0.51
1:B:275:LEU:HD13	1:B:309:ARG:HH21	1.76	0.51
1:B:618:LYS:CB	1:B:618:LYS:HZ3	2.24	0.51
1:A:114:ALA:HB1	1:B:460:ALA:HB2	1.92	0.51
1:A:598:ARG:NH2	3:A:5003:CYS:O	2.43	0.51
1:B:468:HIS:CE1	1:B:470:GLN:HB2	2.46	0.51
1:B:498:LYS:HB3	1:B:566:ILE:HG12	1.93	0.51
1:B:309:ARG:C	1:B:309:ARG:CD	2.81	0.50
1:A:559:LYS:H	1:A:559:LYS:HD2	1.75	0.50
1:B:462:VAL:HB	5:B:3300:HOH:O	2.10	0.50
1:A:76:THR:HG22	1:A:272:LEU:CD1	2.41	0.50
1:A:341:GLU:HG2	1:A:611:ILE:HG13	1.91	0.50
1:B:95:ASN:C	1:B:95:ASN:HD22	2.19	0.50
1:B:505:TRP:CD2	1:B:516:ASP:HA	2.47	0.50
1:A:460:ALA:HB2	1:B:114:ALA:HB1	1.94	0.50
1:B:10:ALA:HB1	1:B:14:THR:CG2	2.40	0.50
1:B:210:LYS:HA	1:B:210:LYS:CE	2.42	0.49
1:A:452:ARG:NE	5:A:3457:HOH:O	2.14	0.49
1:B:366:ILE:HD13	5:B:3228:HOH:O	2.12	0.49
1:A:15:LEU:HD13	1:A:17:GLY:H	1.77	0.49
1:A:469:PRO:HB2	1:A:470:GLN:OE1	2.12	0.49
1:B:137:GLN:CD	1:B:144:ARG:HD2	2.37	0.49
1:B:313:ILE:HD13	1:B:373:TRP:CZ2	2.47	0.49
1:A:498:LYS:HB2	1:A:535:ILE:HA	1.94	0.49
1:B:417:ASP:HB2	5:B:3197:HOH:O	2.13	0.49
1:B:544:ASP:OD1	1:B:555:LYS:HE2	2.11	0.49
1:A:40:ASP:C	1:A:42:ALA:N	2.70	0.49
1:B:97:ASN:ND2	1:B:98:ILE:H	2.10	0.49
1:A:138:LEU:HD12	1:A:143:VAL:HG22	1.94	0.49
1:B:196:GLU:O	1:B:197:TYR:HB2	2.12	0.49
1:A:359:PHE:HB2	1:A:363:GLU:OE2	2.13	0.48
1:B:481:ARG:HG2	1:B:481:ARG:HH11	1.77	0.48
1:A:483:GLU:CD	1:A:483:GLU:N	2.71	0.48
1:A:536:ALA:N	1:A:563:GLN:NE2	2.54	0.48
1:B:150:VAL:HB	1:B:151:ILE:HD12	1.95	0.48
1:A:532:VAL:HB	1:A:544:ASP:HB2	1.95	0.48
1:B:425:GLY:O	1:B:481:ARG:NH2	2.46	0.48
1:A:96:ASP:CG	1:A:309:ARG:HH21	2.22	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:390:ILE:N	1:A:390:ILE:CD1	2.77	0.48
1:B:204:ILE:HD13	1:B:205:ALA:H	1.77	0.48
1:B:465:ARG:NH2	1:B:472:GLU:HG2	2.28	0.48
1:B:211:ILE:HG13	5:B:3732:HOH:O	2.14	0.47
1:A:393:ASN:OD1	1:A:414:ARG:NH1	2.47	0.47
1:A:28:SER:N	1:A:152:HIS:HD2	2.08	0.47
1:A:422:ASP:OD2	1:A:426:GLN:HG3	2.14	0.47
1:B:11:PRO:CD	1:B:14:THR:HG21	2.45	0.47
1:B:210:LYS:HE3	1:B:323:GLU:N	2.29	0.47
1:A:10:ALA:HB1	1:A:14:THR:HG21	1.95	0.47
1:A:257:GLU:OE2	1:A:618:LYS:HB3	2.15	0.47
1:A:421:TRP:H	1:A:471:ASN:HD21	1.63	0.47
1:A:430:GLY:C	1:A:432:GLY:H	2.23	0.47
1:B:119:ILE:CG1	1:B:189:MET:HE2	2.44	0.47
1:B:348:ARG:NH1	1:B:352:GLN:OE1	2.47	0.47
1:A:168:VAL:CG2	1:A:175:THR:HB	2.45	0.47
1:A:497:ASN:HD22	1:A:497:ASN:C	2.23	0.47
1:B:257:GLU:HG3	5:B:3231:HOH:O	2.15	0.47
1:B:151:ILE:CD1	1:B:162:THR:HB	2.44	0.47
1:B:465:ARG:HH22	1:B:472:GLU:HG2	1.79	0.47
1:A:95:ASN:C	1:A:95:ASN:HD22	2.21	0.47
1:B:112:PRO:HB2	1:B:135:ILE:HD13	1.96	0.47
1:B:497:ASN:HD21	1:B:535:ILE:HB	1.80	0.47
1:B:138:LEU:HD11	1:B:167:MET:HE1	1.97	0.46
1:B:497:ASN:ND2	1:B:535:ILE:HB	2.30	0.46
1:A:598:ARG:HD3	1:A:611:ILE:CD1	2.46	0.46
1:B:313:ILE:HD12	1:B:487:PHE:CD2	2.50	0.46
1:B:366:ILE:HG13	5:B:3226:HOH:O	2.14	0.46
1:A:618:LYS:CB	5:A:3492:HOH:O	2.62	0.46
1:A:230:LYS:HD3	1:A:230:LYS:HA	1.64	0.46
1:B:314:THR:OG1	1:B:339:HIS:HE1	1.99	0.46
1:B:536:ALA:C	1:B:563:GLN:HE22	2.24	0.46
1:A:16:LEU:HD21	1:A:27:SER:HB2	1.98	0.46
1:B:62:PHE:HB2	1:B:148:GLN:HB2	1.98	0.46
1:B:144:ARG:HG2	1:B:164:GLU:HG2	1.98	0.46
1:A:62:PHE:HB2	1:A:148:GLN:HB2	1.97	0.45
1:A:68:PHE:HE1	1:A:93:VAL:HG11	1.81	0.45
1:B:103:ALA:HB3	1:B:199:LEU:HD12	1.96	0.45
1:A:15:LEU:HD13	1:A:16:LEU:N	2.30	0.45
1:A:418:GLU:HG3	1:A:430:GLY:N	2.32	0.45
1:B:309:ARG:NH1	1:B:309:ARG:CG	2.69	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:347:GLU:OE1	1:A:360:ASN:HB3	2.17	0.45
1:A:497:ASN:HD21	1:A:535:ILE:HB	1.81	0.45
1:B:348:ARG:NH1	1:B:352:GLN:CD	2.74	0.45
1:A:549:HIS:O	1:A:550:GLU:HB3	2.16	0.45
1:A:208:LEU:HD22	1:A:258:SER:OG	2.16	0.45
1:A:361:PRO:CG	1:A:614:LEU:HD23	2.47	0.45
1:B:124:GLY:O	1:B:127:LYS:HG3	2.16	0.45
1:B:161:TRP:CZ3	1:B:164:GLU:HG3	2.51	0.45
1:B:177:LYS:HD3	1:B:178:ASP:N	2.31	0.45
1:B:303:LEU:HD13	1:B:307:ARG:HH21	1.79	0.45
1:B:297:LEU:HD11	1:B:451:ILE:HD12	1.97	0.45
1:A:56:LYS:HA	1:A:57:TRP:HA	1.78	0.45
1:B:264:ILE:HG12	1:B:592:TYR:CD2	2.52	0.45
1:B:268:ASN:ND2	1:B:592:TYR:H	2.05	0.45
1:A:88:ARG:HG3	1:A:201:GLN:HB2	1.99	0.45
1:A:126:PHE:O	1:A:127:LYS:C	2.60	0.44
1:A:233:LEU:HD12	1:A:233:LEU:HA	1.78	0.44
1:A:387:ASP:OD1	1:A:388:LYS:N	2.49	0.44
1:B:465:ARG:NH2	1:B:472:GLU:O	2.35	0.44
1:A:337:SER:O	1:A:338:CYS:CB	2.66	0.44
1:B:346:LEU:HA	1:B:346:LEU:HD23	1.69	0.44
1:A:151:ILE:O	1:A:151:ILE:HD12	2.17	0.44
1:A:361:PRO:HG3	1:A:614:LEU:CD2	2.48	0.44
1:A:354:TYR:CZ	1:A:356:GLY:HA3	2.53	0.44
1:B:388:LYS:HG3	1:B:414:ARG:NH2	2.33	0.44
1:B:42:ALA:HB1	1:B:375:HIS:CE1	2.50	0.44
1:B:313:ILE:HD13	1:B:373:TRP:CH2	2.53	0.44
1:B:80:MET:HE1	1:B:129:THR:HG22	1.99	0.44
1:B:204:ILE:CD1	1:B:208:LEU:HB2	2.48	0.44
1:B:217:GLU:O	1:B:217:GLU:HG3	2.18	0.44
1:A:112:PRO:O	1:A:138:LEU:CD1	2.65	0.44
1:B:88:ARG:NH2	1:B:199:LEU:CD1	2.81	0.44
1:B:95:ASN:HD22	1:B:97:ASN:H	1.65	0.44
1:B:265:LYS:CE	5:B:3419:HOH:O	2.64	0.44
1:B:166:GLU:HG3	1:B:167:MET:N	2.32	0.43
1:A:298:TRP:HB2	1:A:299:PRO:HD3	2.00	0.43
1:B:213:GLY:HA3	1:B:577:ASP:OD2	2.18	0.43
1:B:426:GLN:HG2	5:B:3367:HOH:O	2.18	0.43
1:A:95:ASN:ND2	1:A:97:ASN:H	2.16	0.43
1:B:204:ILE:HD11	1:B:208:LEU:HD12	2.01	0.43
1:A:314:THR:HA	1:A:587:THR:O	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:151:ILE:HD13	1:B:162:THR:HB	2.00	0.43
1:B:215:ARG:HH11	1:B:215:ARG:CG	2.32	0.43
1:B:426:GLN:HA	1:B:481:ARG:HH21	1.82	0.43
1:B:497:ASN:HD22	1:B:497:ASN:C	2.26	0.43
1:B:557:SER:OG	1:B:558:GLY:N	2.52	0.43
1:A:379:ARG:HB2	1:A:437:CYS:HB2	2.00	0.43
1:B:275:LEU:HD13	1:B:309:ARG:NH2	2.33	0.43
1:A:76:THR:CG2	1:A:272:LEU:CD1	2.96	0.43
1:A:497:ASN:ND2	1:A:535:ILE:HB	2.34	0.43
1:B:104:PHE:O	1:B:187:GLY:HA3	2.18	0.43
1:B:480:LEU:N	1:B:480:LEU:HD22	2.34	0.43
1:B:490:LEU:O	1:B:493:VAL:HG22	2.19	0.43
1:B:151:ILE:HD12	1:B:151:ILE:H	1.82	0.43
1:A:137:GLN:OE1	1:A:144:ARG:NH1	2.43	0.43
1:B:334:ASP:C	1:B:334:ASP:OD1	2.62	0.43
1:A:92:GLU:HB3	1:A:95:ASN:HD21	1.84	0.42
1:A:253:TYR:CZ	1:A:581:ILE:HD11	2.54	0.42
1:B:381:PHE:CZ	1:B:411:ARG:HB2	2.54	0.42
1:A:366:ILE:HB	5:A:3753:HOH:O	2.20	0.42
1:A:597:LEU:CD1	1:A:614:LEU:HD13	2.48	0.42
1:B:217:GLU:OE1	1:B:219:LYS:HG3	2.19	0.42
1:B:348:ARG:NH1	1:B:352:GLN:NE2	2.68	0.42
1:B:228:ASP:OD2	1:B:230:LYS:HG2	2.19	0.42
1:A:315:GLY:N	1:A:587:THR:HG22	2.34	0.42
1:A:64:ARG:CG	1:A:74:VAL:HG23	2.33	0.42
1:A:177:LYS:NZ	1:A:177:LYS:CB	2.71	0.42
1:B:56:LYS:HA	1:B:57:TRP:HA	1.76	0.42
1:B:95:ASN:ND2	1:B:97:ASN:HB2	2.35	0.42
1:B:203:GLU:HG3	5:B:3570:HOH:O	2.18	0.42
1:B:265:LYS:CE	5:B:3418:HOH:O	2.67	0.42
1:B:465:ARG:HG3	1:B:474:ARG:HH21	1.81	0.42
1:B:499:ALA:O	1:B:502:PRO:HD2	2.20	0.42
1:A:137:GLN:HG2	1:A:144:ARG:HB2	2.00	0.42
1:A:124:GLY:HA3	1:A:182:ASP:O	2.20	0.42
1:B:119:ILE:CD1	1:B:189:MET:HE2	2.50	0.42
1:A:113:VAL:CG2	1:A:114:ALA:N	2.83	0.41
1:B:219:LYS:HE2	1:B:219:LYS:HB3	1.89	0.41
1:A:481:ARG:HB3	1:A:484:VAL:HG23	2.02	0.41
1:B:411:ARG:HH11	1:B:411:ARG:CG	2.33	0.41
1:B:597:LEU:HD11	1:B:614:LEU:HD13	2.01	0.41
1:B:48:ILE:HG21	1:B:68:PHE:HE2	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:127:LYS:HD2	1:B:127:LYS:N	2.35	0.41
1:A:139:HIS:HB2	1:A:142:LYS:CG	2.50	0.41
1:B:543:ILE:O	1:B:555:LYS:HA	2.21	0.41
1:B:96:ASP:CG	1:B:309:ARG:HH22	2.22	0.41
1:B:73:VAL:HG21	1:B:90:LEU:HD13	2.02	0.41
1:B:272:LEU:CD2	5:B:3496:HOH:O	2.65	0.41
1:B:429:ASP:OD1	1:B:429:ASP:C	2.63	0.41
1:B:481:ARG:CZ	1:B:483:GLU:OE1	2.68	0.41
1:A:465:ARG:HD3	1:A:474:ARG:NH2	2.36	0.41
1:B:251:HIS:HD2	5:B:3718:HOH:O	2.04	0.41
1:B:527:LYS:HD2	1:B:528:THR:HG23	2.03	0.41
1:A:100:PRO:HG3	1:A:193:GLU:HG2	2.02	0.41
1:A:468:HIS:CG	1:A:469:PRO:HD2	2.55	0.41
1:B:401:GLN:OE1	1:B:401:GLN:HA	2.21	0.41
1:B:169:VAL:C	1:B:170:GLU:HG2	2.47	0.40
1:B:265:LYS:HA	1:B:265:LYS:HD3	1.81	0.40
1:B:298:TRP:HB2	1:B:299:PRO:HD3	2.01	0.40
1:B:608:GLU:CD	1:B:608:GLU:H	2.29	0.40
1:A:76:THR:CG2	1:A:272:LEU:HD12	2.51	0.40
1:A:264:ILE:HG12	1:A:592:TYR:CD2	2.56	0.40
1:A:447:ALA:HB1	1:A:476:ILE:CG2	2.51	0.40
1:B:215:ARG:CG	1:B:215:ARG:NH1	2.84	0.40
1:A:500:ILE:O	1:A:500:ILE:HG13	2.22	0.40
1:A:246:ASN:HD21	1:A:248:ASP:C	2.30	0.40
1:B:105:PRO:O	1:B:108:SER:HB2	2.22	0.40
1:B:123:GLY:N	1:B:127:LYS:O	2.55	0.40
1:B:542:ASN:ND2	1:B:561:ALA:HB2	2.37	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	592/619 (96%)	564 (95%)	24 (4%)	4 (1%)	18	15
1	B	587/619 (95%)	559 (95%)	25 (4%)	3 (0%)	24	22
All	All	1179/1238 (95%)	1123 (95%)	49 (4%)	7 (1%)	21	18

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	127	LYS
1	B	127	LYS
1	B	323	GLU
1	A	41	ASP
1	A	140	GLY
1	A	431	GLU
1	B	11	PRO

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	508/530 (96%)	477 (94%)	31 (6%)	17	15
1	B	504/530 (95%)	469 (93%)	35 (7%)	14	12
All	All	1012/1060 (96%)	946 (94%)	66 (6%)	15	13

All (66) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	THR
1	A	58	GLN
1	A	95	ASN
1	A	143	VAL
1	A	177	LYS
1	A	244	VAL
1	A	246	ASN
1	A	301	LEU
1	A	348	ARG

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Mol	Chain	Res	Type
1	A	355	LYS
1	A	365	LEU
1	A	366	ILE
1	A	368	GLU
1	A	369	LEU
1	A	379	ARG
1	A	390	ILE
1	A	391	GLU
1	A	411	ARG
1	A	419	LEU
1	A	441	THR
1	A	449	ASP
1	A	459	PHE
1	A	471	ASN
1	A	475	LEU
1	A	486	VAL
1	A	497	ASN
1	A	525	LEU
1	A	559	LYS
1	A	566	ILE
1	A	617	VAL
1	A	618	LYS
1	B	14	THR
1	B	15	LEU
1	B	95	ASN
1	B	143	VAL
1	B	199	LEU
1	B	204	ILE
1	B	215	ARG
1	B	233	LEU
1	B	235	ASN
1	B	244	VAL
1	B	300	ARG
1	B	301	LEU
1	B	309	ARG
1	B	328	VAL
1	B	352	GLN
1	B	369	LEU
1	B	377	ARG
1	B	379	ARG
1	B	382	VAL
1	B	389	ASP

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Mol	Chain	Res	Type
1	B	390	ILE
1	B	391	GLU
1	B	411	ARG
1	B	417	ASP
1	B	419	LEU
1	B	475	LEU
1	B	481	ARG
1	B	497	ASN
1	B	500	ILE
1	B	517	THR
1	B	522	ASN
1	B	527	LYS
1	B	606	LYS
1	B	608	GLU
1	B	618	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (50) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	70	ASN
1	A	95	ASN
1	A	139	HIS
1	A	141	ASN
1	A	149	ASN
1	A	152	HIS
1	A	201	GLN
1	A	241	ASN
1	A	246	ASN
1	A	261	GLN
1	A	268	ASN
1	A	276	HIS
1	A	311	HIS
1	A	339	HIS
1	A	352	GLN
1	A	375	HIS
1	A	386	GLN
1	A	405	GLN
1	A	471	ASN
1	A	497	ASN
1	A	563	GLN
1	A	565	ASN
1	A	591	ASN

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Mol	Chain	Res	Type
1	B	55	HIS
1	B	70	ASN
1	B	95	ASN
1	B	97	ASN
1	B	102	GLN
1	B	131	HIS
1	B	141	ASN
1	B	152	HIS
1	B	171	ASN
1	B	201	GLN
1	B	235	ASN
1	B	251	HIS
1	B	261	GLN
1	B	268	ASN
1	B	286	ASN
1	B	306	GLN
1	B	339	HIS
1	B	367	ASN
1	B	375	HIS
1	B	397	GLN
1	B	405	GLN
1	B	470	GLN
1	B	497	ASN
1	B	522	ASN
1	B	563	GLN
1	B	565	ASN
1	B	582	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
4	ADP	A	5001	2	28,29,29	1.27	3 (10%)	43,45,45	1.10	3 (6%)
3	CYS	B	5004	-	5,6,6	0.75	0	3,7,7	1.17	1 (33%)
4	ADP	B	5002	2	28,29,29	1.15	3 (10%)	43,45,45	1.09	3 (6%)
3	CYS	A	5003	-	5,6,6	2.12	2 (40%)	3,7,7	3.63	2 (66%)

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	ADP	A	5001	2	-	2/16/32/32	0/3/3/3
3	CYS	B	5004	-	-	3/6/6/6	-
4	ADP	B	5002	2	-	2/16/32/32	0/3/3/3
3	CYS	A	5003	-	-	0/6/6/6	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	5001	ADP	C2-N1	3.70	1.40	1.33
4	B	5002	ADP	C2-N1	3.03	1.39	1.33
3	A	5003	CYS	CB-CA	2.95	1.56	1.53
3	A	5003	CYS	CB-SG	2.91	1.87	1.81
4	A	5001	ADP	C5-N7	-2.30	1.34	1.39
4	B	5002	ADP	C5-N7	-2.08	1.35	1.39
4	B	5002	ADP	C6-N6	-2.07	1.28	1.34
4	A	5001	ADP	C5-C6	2.01	1.46	1.41

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	5003	CYS	CA-CB-SG	5.87	126.93	114.40
4	B	5002	ADP	N3-C2-N1	-3.37	123.48	128.58
4	A	5001	ADP	N3-C2-N1	-3.36	123.49	128.58
4	A	5001	ADP	C2-N1-C6	2.93	123.54	118.73
4	B	5002	ADP	C2-N1-C6	2.83	123.38	118.73
3	A	5003	CYS	CB-CA-C	2.28	112.16	109.89
4	B	5002	ADP	O2A-PA-O3A	2.19	113.20	107.27
4	A	5001	ADP	O2A-PA-O3A	2.02	112.75	107.27
3	B	5004	CYS	CA-CB-SG	2.02	118.70	114.40

There are no chirality outliers.

All (7) torsion outliers are listed below:

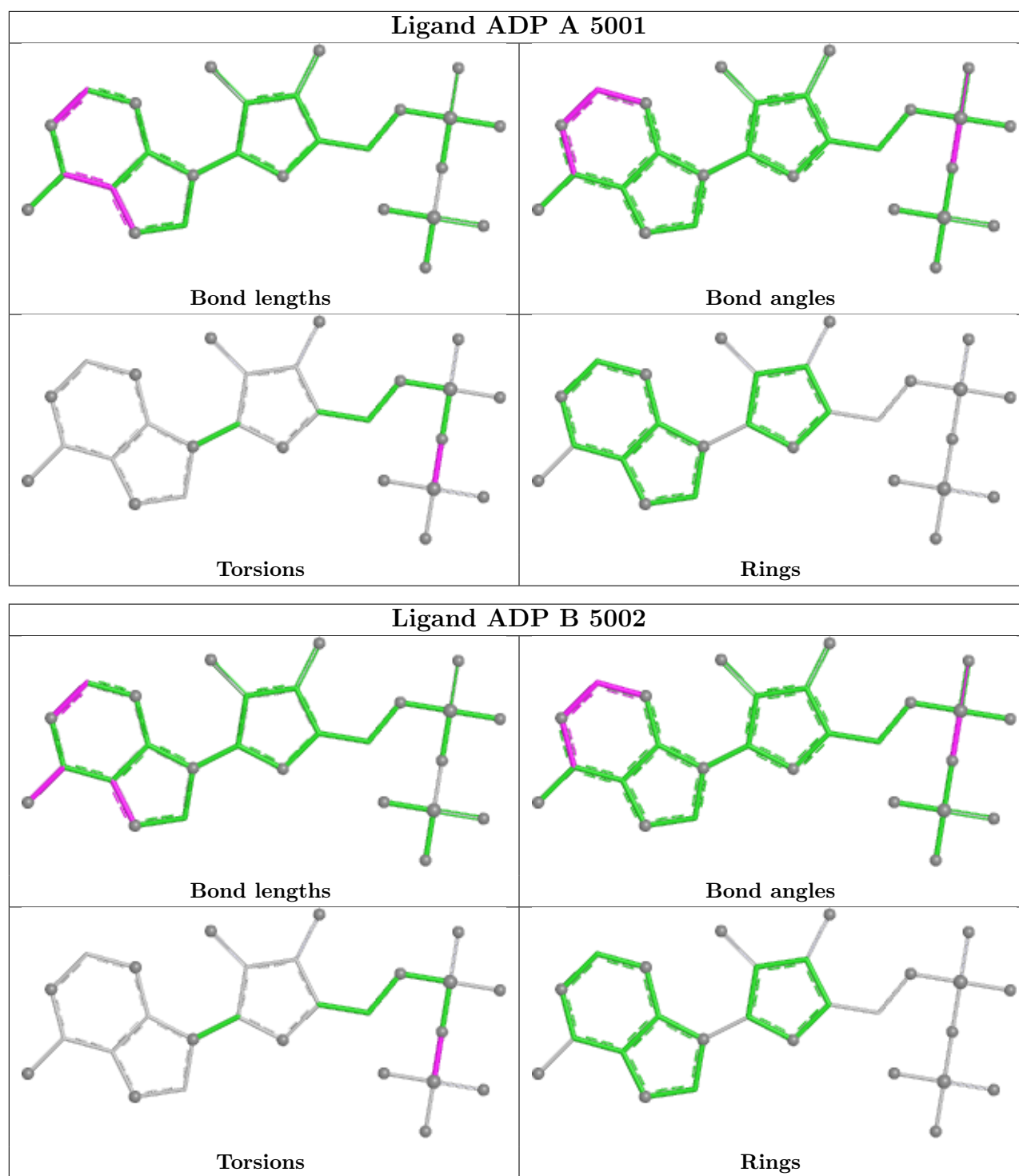
Mol	Chain	Res	Type	Atoms
4	A	5001	ADP	PA-O3A-PB-O3B
4	B	5002	ADP	PA-O3A-PB-O3B
3	B	5004	CYS	OXT-C-CA-N
3	B	5004	CYS	O-C-CA-N
3	B	5004	CYS	N-CA-CB-SG
4	A	5001	ADP	PA-O3A-PB-O2B
4	B	5002	ADP	PA-O3A-PB-O2B

There are no ring outliers.

2 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	5004	CYS	2	0
3	A	5003	CYS	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	598/619 (96%)	0.15	14 (2%) 61 64	14, 28, 48, 72	0
1	B	593/619 (95%)	0.17	12 (2%) 65 67	15, 28, 47, 64	0
All	All	1191/1238 (96%)	0.16	26 (2%) 62 65	14, 28, 47, 72	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	31	SER	4.2
1	A	40	ASP	3.8
1	B	41	ASP	3.6
1	A	454	VAL	3.3
1	B	141	ASN	3.2
1	B	424	ALA	3.1
1	B	10	ALA	3.0
1	B	390	ILE	2.8
1	B	42	ALA	2.8
1	B	454	VAL	2.7
1	A	41	ASP	2.7
1	A	424	ALA	2.6
1	A	128	ASP	2.6
1	B	43	VAL	2.4
1	B	549	HIS	2.4
1	A	43	VAL	2.4
1	B	552	VAL	2.3
1	A	44	PHE	2.3
1	A	151	ILE	2.2
1	A	436	ASN	2.2
1	A	423	ALA	2.2
1	B	432	GLY	2.1
1	A	459	PHE	2.1
1	B	526	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	138	LEU	2.0
1	A	343	GLY	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

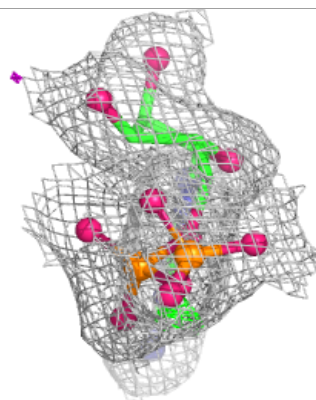
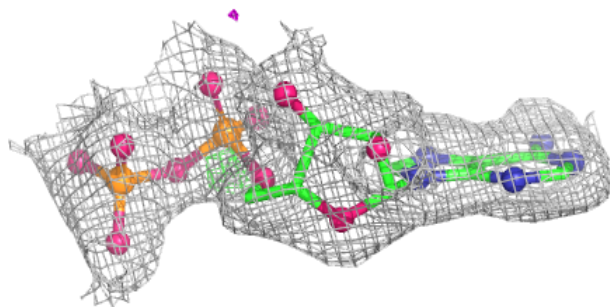
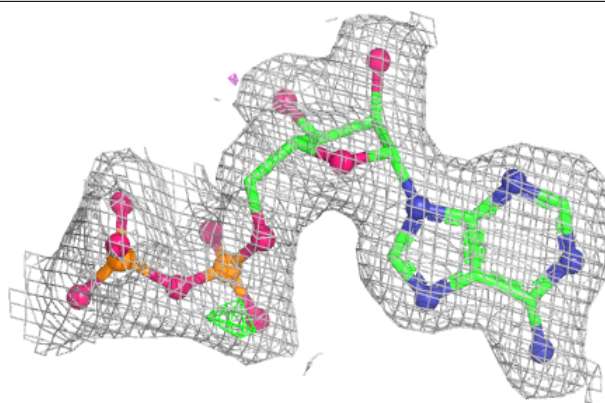
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	CYS	A	5003	7/7	0.83	0.12	44,45,46,47	0
3	CYS	B	5004	7/7	0.88	0.13	44,45,45,45	0
2	MG	B	7004	1/1	0.97	0.03	20,20,20,20	0
2	MG	B	7003	1/1	0.98	0.03	17,17,17,17	0
4	ADP	A	5001	27/27	0.98	0.05	10,18,21,22	0
2	MG	A	7002	1/1	0.99	0.02	16,16,16,16	0
2	MG	A	7001	1/1	0.99	0.03	16,16,16,16	0
4	ADP	B	5002	27/27	0.99	0.04	14,20,23,24	0

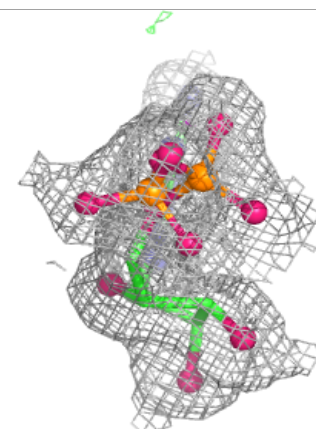
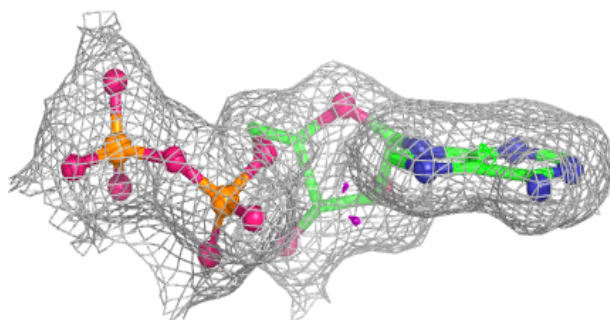
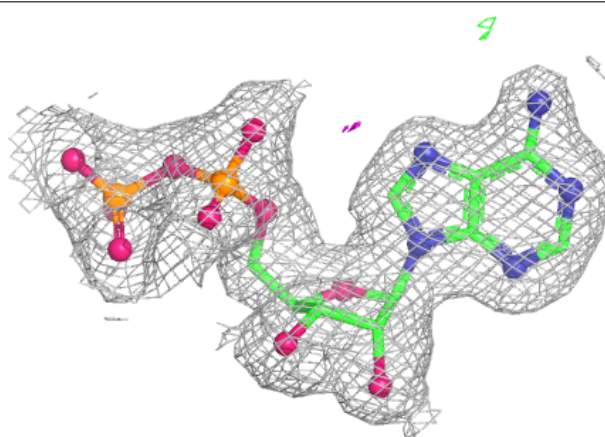
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ADP A 5001:

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

**Electron density around ADP B 5002:**

$2mF_o-DF_c$ (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.