



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 01:39 AM UTC

PDB ID : 7VHV / pdb_00007vhv
Title : Crystal structure of S. aureus D-alanine alanyl carrier protein ligase
Authors : Lee, B.J.; Lee, I.-G.; Im, H.G.; Yoon, H.J.
Deposited on : 2021-09-23
Resolution : 2.55 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

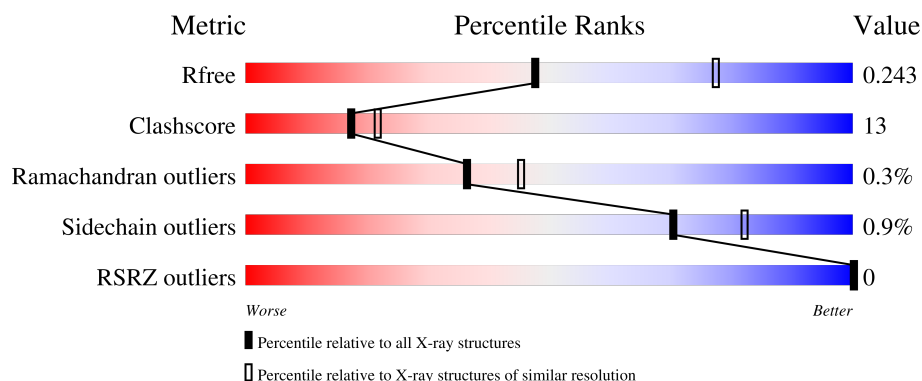
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 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	1091 (2.54-2.54)
Clashscore	190562	1120 (2.54-2.54)
Ramachandran outliers	187476	1106 (2.54-2.54)
Sidechain outliers	187428	1106 (2.54-2.54)
RSRZ outliers	180081	1091 (2.54-2.54)

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	485	 77% 22% .
1	B	485	 79% 21%
1	C	485	 74% 24% ..
1	D	485	 75% 20% ..

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 15795 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 D-alanine–D-alanyl carrier protein ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	D	480	Total	C	N	O	S	0	0	0
			3804	2426	621	737	20			
1	C	480	Total	C	N	O	S	0	0	0
			3804	2426	621	737	20			
1	A	485	Total	C	N	O	S	0	0	0
			3839	2447	626	745	21			
1	B	485	Total	C	N	O	S	0	0	0
			3839	2447	626	745	21			

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	D	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
3	B	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

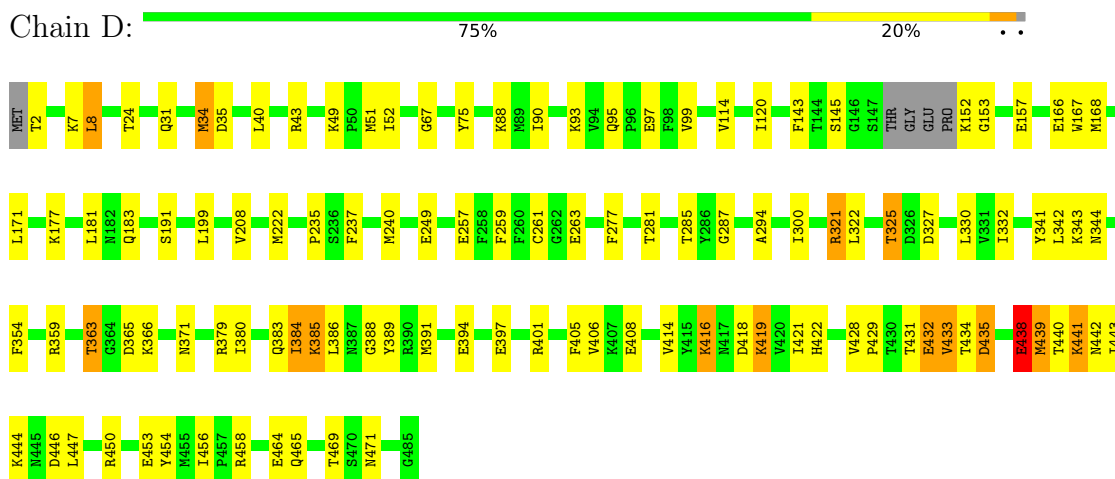
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	79	Total	O	0	0
			79	79		
4	C	89	Total	O	0	0
			89	89		
4	A	101	Total	O	0	0
			101	101		
4	B	112	Total	O	0	0
			112	112		

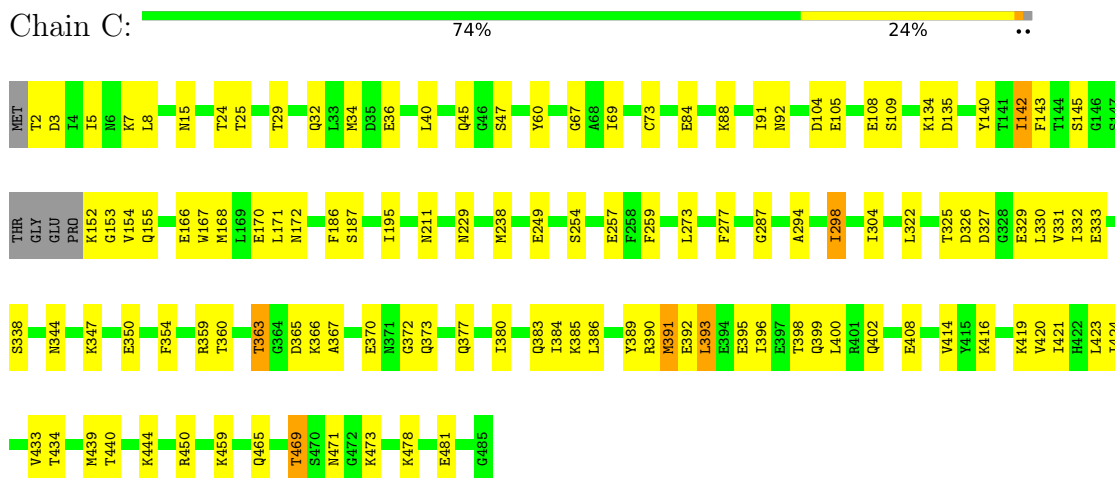
3 Residue-property plots

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.

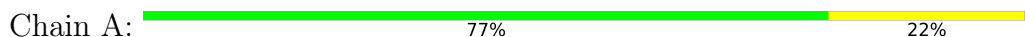
- Molecule 1: D-alanine-D-alanyl carrier protein ligase



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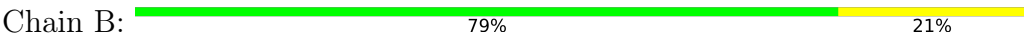


- Molecule 1: D-alanine-D-alanyl carrier protein ligase





● Molecule 1: D-alanine-D-alanyl carrier protein ligase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	89.47Å 88.51Å 130.85Å 90.00° 91.67° 90.00°	Depositor
Resolution (Å)	39.91 – 2.55 39.91 – 2.55	Depositor EDS
% Data completeness (in resolution range)	99.5 (39.91-2.55) 87.8 (39.91-2.55)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.88 (at 2.54Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.189 , 0.240 0.192 , 0.243	Depositor DCC
R_{free} test set	2004 reflections (3.00%)	wwPDB-VP
Wilson B-factor (Å ²)	40.1	Xtriage
Anisotropy	0.487	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 21.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.018 for k,h,-l 0.024 for -k,-h,-l 0.197 for h,-k,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	15795	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.60% 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: MG, ATP

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	0.50	0/3916	0.79	6/5308 (0.1%)
1	B	0.51	1/3916 (0.0%)	0.74	2/5308 (0.0%)
1	C	0.49	0/3879	0.78	6/5256 (0.1%)
1	D	0.62	5/3879 (0.1%)	0.93	17/5256 (0.3%)
All	All	0.53	6/15590 (0.0%)	0.81	31/21128 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	34	MET	SD-CE	-10.35	1.53	1.79
1	D	441	LYS	CE-NZ	-6.32	1.30	1.49
1	D	441	LYS	CG-CD	-6.29	1.33	1.52
1	B	95	GLN	C-O	6.20	1.26	1.23
1	D	419	LYS	CG-CD	6.06	1.70	1.52
1	D	441	LYS	CD-CE	-5.71	1.35	1.52

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	441	LYS	CD-CE-NZ	-11.81	74.11	111.90
1	D	438	GLU	CA-CB-CG	11.41	136.92	114.10
1	D	416	LYS	CD-CE-NZ	9.74	143.07	111.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	416	LYS	CB-CG-CD	9.03	132.07	111.30
1	D	435	ASP	N-CA-C	-9.02	92.25	108.48
1	D	438	GLU	CB-CG-CD	8.92	127.76	112.60
1	D	366	LYS	CG-CD-CE	8.64	131.16	111.30
1	C	391	MET	CB-CG-SD	8.34	137.71	112.70
1	D	8	LEU	CB-CG-CD2	-8.22	86.03	110.70
1	B	24	THR	CB-CA-C	-7.70	106.76	117.23
1	A	478	LYS	CG-CD-CE	7.41	128.34	111.30
1	D	24	THR	CB-CA-C	-6.67	108.87	116.54
1	C	408	GLU	CG-CD-OE2	6.56	133.48	118.40
1	D	384	ILE	CA-C-N	6.17	132.12	122.26
1	D	384	ILE	C-N-CA	6.17	132.12	122.26
1	A	132	GLN	CB-CG-CD	-5.93	102.51	112.60
1	D	464	GLU	CA-C-N	-5.61	112.05	121.75
1	D	464	GLU	C-N-CA	-5.61	112.05	121.75
1	D	384	ILE	O-C-N	5.48	129.10	123.18
1	C	408	GLU	CA-CB-CG	5.38	124.86	114.10
1	A	24	THR	CB-CA-C	-5.22	110.53	116.54
1	D	321	ARG	NE-CZ-NH2	5.20	123.88	119.20
1	C	370	GLU	CA-CB-CG	5.20	124.50	114.10
1	B	217	LYS	N-CA-CB	-5.14	102.56	110.12
1	A	390	ARG	NE-CZ-NH2	5.14	123.82	119.20
1	D	384	ILE	N-CA-C	5.11	115.84	108.48
1	C	393	LEU	CB-CG-CD1	5.11	126.04	110.70
1	C	408	GLU	CG-CD-OE1	-5.11	106.64	118.40
1	D	432	GLU	CA-CB-CG	-5.08	103.95	114.10
1	A	462	TRP	CA-CB-CG	-5.07	103.96	113.60
1	A	49	LYS	CG-CD-CE	5.05	122.92	111.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	438	GLU	Peptide

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	3839	0	3825	90	0
1	B	3839	0	3827	83	1
1	C	3804	0	3791	98	0
1	D	3804	0	3788	116	1
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	31	0	12	0	0
3	B	31	0	12	1	0
3	C	31	0	12	1	0
3	D	31	0	12	2	0
4	A	101	0	0	12	0
4	B	112	0	0	9	3
4	C	89	0	0	9	3
4	D	79	0	0	9	0
All	All	15795	0	15279	384	4

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 13.

All (384) 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:D:93:LYS:O	1:D:343:LYS:NZ	1.65	1.29
1:D:8:LEU:HD23	1:D:34:MET:HE1	1.29	1.08
1:D:8:LEU:CD2	1:D:34:MET:HE1	1.84	1.08
1:C:383:GLN:HE21	1:C:392:GLU:HG3	1.24	1.02
1:B:321:ARG:NH1	4:B:602:HOH:O	1.91	1.01
1:A:383:GLN:HB3	1:A:390:ARG:HH12	1.24	1.00
1:B:363:THR:HG23	1:B:365:ASP:H	1.27	0.99
1:B:325:THR:HG22	1:B:327:ASP:H	1.28	0.95
1:A:436:ASN:HD22	1:A:462:TRP:HZ3	1.13	0.94
1:D:8:LEU:HD12	1:D:199:LEU:HB3	1.48	0.94
1:D:152:LYS:N	4:D:605:HOH:O	2.01	0.93
1:D:8:LEU:CD1	1:D:199:LEU:HB3	1.98	0.92
1:D:166:GLU:OE2	4:D:601:HOH:O	1.87	0.91
1:C:40:LEU:HD23	1:C:67:GLY:HA3	1.52	0.89
1:D:325:THR:HG22	1:D:327:ASP:H	1.34	0.88
1:A:363:THR:HG23	1:A:365:ASP:H	1.39	0.88
1:B:321:ARG:NH2	4:B:607:HOH:O	2.08	0.87
1:D:177:LYS:O	4:D:602:HOH:O	1.91	0.87

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:469:THR:HG22	1:A:471:ASN:H	1.38	0.87
1:B:235:PRO:HD2	1:B:263:GLU:HG3	1.56	0.87
1:D:469:THR:HG22	1:D:471:ASN:H	1.39	0.87
1:A:390:ARG:O	4:A:601:HOH:O	1.91	0.86
1:A:383:GLN:CB	1:A:390:ARG:HH12	1.87	0.86
1:A:383:GLN:HB3	1:A:390:ARG:NH1	1.90	0.85
1:C:15:ASN:OD1	4:C:601:HOH:O	1.94	0.84
1:C:363:THR:HG22	1:C:365:ASP:H	1.41	0.84
1:B:337:VAL:O	1:B:359:ARG:NH1	2.09	0.84
1:C:465:GLN:NE2	4:C:603:HOH:O	2.09	0.83
1:B:86:ARG:HH12	1:B:150:GLU:HG2	1.43	0.83
1:A:303:GLU:OE1	1:A:303:GLU:N	2.13	0.81
1:D:300:ILE:O	4:D:604:HOH:O	1.96	0.81
1:A:325:THR:HG23	1:A:327:ASP:H	1.44	0.80
1:B:417:ASN:O	4:B:603:HOH:O	1.98	0.79
1:C:424:ILE:HD12	1:C:459:LYS:HB2	1.63	0.79
1:D:433:VAL:HG13	1:D:439:MET:HE1	1.65	0.78
1:B:446:ASP:O	1:B:450:ARG:NH1	2.16	0.78
1:A:211:ASN:OD1	1:A:215:LYS:NZ	2.14	0.78
1:A:463:MET:HE3	1:A:466:LEU:HD23	1.66	0.77
1:C:469:THR:HG22	1:C:473:LYS:H	1.49	0.77
1:B:391:MET:HE3	1:B:455:MET:HG3	1.67	0.77
1:D:438:GLU:O	1:D:440:THR:N	2.18	0.77
1:A:345:ASP:OD1	4:A:602:HOH:O	2.01	0.77
1:A:88:LYS:NZ	1:A:108:GLU:O	2.18	0.76
1:A:330:LEU:HB3	1:A:363:THR:HG21	1.66	0.76
1:A:325:THR:HG22	1:A:329:GLU:H	1.51	0.76
1:C:152:LYS:N	4:C:604:HOH:O	2.17	0.76
1:D:385:LYS:CD	1:D:385:LYS:H	1.95	0.75
1:C:469:THR:HG23	1:C:471:ASN:H	1.52	0.75
1:B:469:THR:HG22	1:B:471:ASN:H	1.52	0.74
1:C:187:SER:O	4:C:602:HOH:O	2.05	0.74
1:D:8:LEU:HD23	1:D:34:MET:CE	2.15	0.74
1:A:318:LEU:O	4:A:603:HOH:O	2.05	0.74
1:B:8:LEU:HD23	1:B:34:MET:HE1	1.70	0.73
1:C:8:LEU:HD23	1:C:34:MET:HE1	1.71	0.73
1:B:85:ASP:OD2	4:B:606:HOH:O	2.05	0.73
1:D:379:ARG:NH2	3:D:502:ATP:O2B	2.22	0.73
1:A:57:MET:HE3	1:A:207:LEU:HB3	1.69	0.73
1:A:387:ASN:ND2	1:A:387:ASN:O	2.22	0.73
1:A:446:ASP:OD1	1:A:450:ARG:NH1	2.21	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:432:GLU:HG2	1:D:434:THR:HB	1.71	0.72
1:A:316:GLU:OE1	4:A:605:HOH:O	2.07	0.72
1:D:385:LYS:H	1:D:385:LYS:CE	2.02	0.72
1:A:112:GLY:O	4:A:604:HOH:O	2.06	0.72
1:C:105:GLU:N	1:C:105:GLU:OE1	2.23	0.71
1:B:86:ARG:NH1	1:B:150:GLU:HG2	2.05	0.71
1:D:465:GLN:HG3	4:D:613:HOH:O	1.89	0.71
1:B:264:ILE:HD12	1:B:264:ILE:H	1.56	0.71
1:B:418:ASP:OD1	4:B:608:HOH:O	2.08	0.71
1:B:157:GLU:HG3	1:B:339:LEU:HD21	1.73	0.70
1:C:385:LYS:HA	1:C:389:TYR:O	1.91	0.70
1:C:325:THR:HG23	1:C:327:ASP:H	1.56	0.70
1:D:429:PRO:HG2	1:D:432:GLU:HG3	1.73	0.69
1:D:434:THR:O	1:D:435:ASP:OD1	2.11	0.69
1:D:8:LEU:CD2	1:D:34:MET:CE	2.65	0.68
1:D:429:PRO:CG	1:D:432:GLU:HG3	2.24	0.68
1:C:2:THR:HB	1:C:7:LYS:HE3	1.75	0.68
1:B:61:MET:HE3	1:B:102:THR:OG1	1.94	0.68
1:B:330:LEU:O	1:B:363:THR:HG22	1.94	0.67
1:D:8:LEU:HD21	1:D:34:MET:HE1	1.73	0.67
1:A:463:MET:HE3	1:A:466:LEU:CD2	2.24	0.67
1:A:330:LEU:O	1:A:363:THR:HG22	1.94	0.66
1:B:23:HIS:O	1:B:24:THR:OG1	2.11	0.66
1:B:327:ASP:O	1:B:366:LYS:NZ	2.27	0.66
1:A:469:THR:HG22	1:A:471:ASN:N	2.11	0.66
1:D:416:LYS:HE2	1:D:419:LYS:HE3	1.78	0.65
1:C:322:LEU:HB3	1:C:330:LEU:HD11	1.77	0.65
1:B:330:LEU:HB3	1:B:363:THR:HG21	1.79	0.65
1:D:40:LEU:HD12	1:D:120:ILE:HD11	1.77	0.64
1:D:384:ILE:HA	1:D:385:LYS:HE3	1.78	0.64
1:C:350:GLU:HB3	4:C:612:HOH:O	1.98	0.64
1:D:416:LYS:HE3	1:D:419:LYS:N	2.12	0.63
1:D:440:THR:HG22	1:D:444:LYS:HE3	1.79	0.63
1:C:399:GLN:NE2	1:C:450:ARG:O	2.31	0.63
1:D:394:GLU:OE1	4:D:606:HOH:O	2.15	0.63
1:A:453:GLU:HA	1:A:456:ILE:HD12	1.81	0.63
1:B:143:PHE:HA	1:B:152:LYS:O	1.98	0.63
1:B:86:ARG:HH22	1:B:150:GLU:HG2	1.64	0.62
1:A:85:ASP:O	4:A:609:HOH:O	2.16	0.62
1:B:380:ILE:O	1:B:383:GLN:HG2	1.99	0.61
1:C:238:MET:HE2	1:C:273:LEU:HD13	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:434:THR:C	1:D:435:ASP:OD1	2.44	0.60
1:D:439:MET:HA	1:D:441:LYS:NZ	2.15	0.60
1:C:433:VAL:HG22	1:C:439:MET:HE3	1.84	0.60
1:C:322:LEU:HD22	1:C:332:ILE:HG12	1.82	0.60
1:B:363:THR:HG23	1:B:365:ASP:N	2.09	0.60
1:C:287:GLY:HA3	1:C:294:ALA:HA	1.82	0.60
1:C:24:THR:OG1	1:C:25:THR:N	2.35	0.60
1:C:325:THR:HG22	1:C:329:GLU:H	1.65	0.59
1:A:27:GLU:O	1:A:28:LEU:HD23	2.02	0.59
1:A:447:LEU:HD22	1:A:451:LEU:HD12	1.84	0.59
1:D:435:ASP:HB3	1:D:438:GLU:HB3	1.83	0.59
1:D:435:ASP:CB	1:D:438:GLU:HB3	2.32	0.59
1:D:379:ARG:HH22	3:D:502:ATP:PB	2.25	0.59
1:C:366:LYS:HE3	1:C:377:GLN:HB2	1.85	0.58
1:C:330:LEU:O	1:C:363:THR:HB	2.03	0.58
1:A:287:GLY:HA3	1:A:294:ALA:HA	1.85	0.58
1:C:390:ARG:NH2	1:A:389:TYR:CD2	2.71	0.58
1:A:144:THR:O	1:A:151:PRO:HB3	2.02	0.58
1:A:35:ASP:HA	1:A:127:VAL:HG13	1.85	0.58
1:D:416:LYS:HG3	1:D:419:LYS:HB2	1.87	0.57
1:B:391:MET:HE1	1:B:452:PRO:HD2	1.85	0.57
1:A:140:TYR:CD1	1:A:142:ILE:HG13	2.39	0.57
1:B:61:MET:HE2	1:B:61:MET:HA	1.85	0.57
1:D:52:ILE:HB	1:D:99:VAL:HG12	1.87	0.57
1:D:342:LEU:HG	1:D:343:LYS:HG3	1.87	0.57
1:A:88:LYS:N	4:A:609:HOH:O	2.39	0.56
1:A:160:SER:OG	1:A:335:GLN:O	2.22	0.56
1:D:235:PRO:HD2	1:D:263:GLU:HG3	1.87	0.56
1:A:463:MET:HE1	1:A:479:ILE:HG12	1.87	0.56
1:B:72:GLY:HA2	1:B:133:ILE:HD12	1.88	0.56
1:D:287:GLY:HA3	1:D:294:ALA:HA	1.87	0.56
1:B:86:ARG:NH2	1:B:150:GLU:HG2	2.20	0.56
1:C:385:LYS:HG3	1:C:385:LYS:O	2.04	0.56
1:B:433:VAL:HG22	1:B:439:MET:HE3	1.88	0.56
1:C:8:LEU:HB3	1:C:34:MET:HE1	1.88	0.56
1:D:330:LEU:O	1:D:363:THR:HB	2.05	0.55
1:B:190:LEU:HD13	1:B:261:CYS:HB3	1.86	0.55
1:C:469:THR:HG23	1:C:471:ASN:N	2.19	0.55
1:A:407:LYS:CE	4:A:608:HOH:O	2.51	0.55
1:B:23:HIS:C	1:B:24:THR:HG1	2.13	0.55
1:C:440:THR:HG22	1:C:444:LYS:HE3	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:322:LEU:HD22	1:D:332:ILE:HG12	1.89	0.55
1:A:249:GLU:HB2	1:A:277:PHE:HA	1.89	0.55
1:C:478:LYS:NZ	1:C:481:GLU:OE1	2.33	0.55
1:D:90:ILE:HG12	1:D:143:PHE:CZ	2.43	0.54
1:C:108:GLU:OE2	1:C:109:SER:N	2.40	0.54
1:D:380:ILE:HA	1:D:383:GLN:HG3	1.89	0.54
1:A:364:GLY:HA2	1:A:380:ILE:HD12	1.90	0.54
1:B:287:GLY:HA3	1:B:294:ALA:HA	1.89	0.54
1:A:85:ASP:C	4:A:609:HOH:O	2.50	0.54
1:A:325:THR:HG22	1:A:329:GLU:N	2.23	0.54
1:D:414:VAL:HG21	1:D:422:HIS:NE2	2.22	0.54
1:B:325:THR:HG22	1:B:327:ASP:N	2.11	0.54
1:C:8:LEU:HB3	1:C:34:MET:CE	2.38	0.54
1:A:238:MET:HE3	1:A:260:PHE:HZ	1.73	0.53
1:C:29:THR:OG1	1:C:32:GLN:HG3	2.08	0.53
1:A:390:ARG:HH11	1:A:390:ARG:HG2	1.73	0.53
1:D:40:LEU:HD12	1:D:120:ILE:CD1	2.37	0.53
1:A:325:THR:HG23	1:A:327:ASP:N	2.19	0.53
1:A:56:HIS:NE2	1:A:210:LYS:HG2	2.23	0.53
1:A:115:PHE:CE2	1:A:120:ILE:HD11	2.43	0.53
1:A:167:TRP:CD2	1:A:317:ARG:HD3	2.44	0.52
1:A:436:ASN:ND2	1:A:462:TRP:CZ3	2.63	0.52
1:C:433:VAL:HG22	1:C:439:MET:HG3	1.91	0.52
1:B:180:TRP:CD1	1:B:198:CYS:HG	2.26	0.52
1:C:167:TRP:CZ2	1:C:171:LEU:HD11	2.45	0.52
1:B:215:LYS:HB2	1:B:218:LEU:HD23	1.90	0.52
1:C:383:GLN:HE21	1:C:392:GLU:CG	2.10	0.52
1:A:322:LEU:HD13	1:A:330:LEU:HD11	1.91	0.52
1:B:148:THR:HG21	1:B:381:ASP:OD2	2.11	0.51
1:C:414:VAL:O	1:C:421:ILE:HG12	2.10	0.51
1:A:181:LEU:CD2	1:A:222:MET:HE1	2.40	0.51
1:D:342:LEU:C	1:D:344:ASN:H	2.17	0.51
1:D:99:VAL:CG2	1:D:114:VAL:HG22	2.40	0.51
1:C:392:GLU:OE1	1:A:389:TYR:HE2	1.94	0.51
1:B:167:TRP:CD2	1:B:317:ARG:HD3	2.46	0.51
1:C:344:ASN:OD1	1:C:347:LYS:HG3	2.10	0.51
1:C:391:MET:SD	1:C:395:GLU:HB3	2.51	0.51
1:D:431:THR:O	1:D:431:THR:OG1	2.25	0.51
1:C:143:PHE:HA	1:C:153:GLY:HA2	1.92	0.51
1:C:384:ILE:HG23	1:C:393:LEU:HD21	1.93	0.51
1:A:181:LEU:HB2	1:A:228:ILE:HG21	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:45:GLN:O	4:C:605:HOH:O	2.19	0.51
1:D:446:ASP:OD1	1:D:450:ARG:HD2	2.11	0.50
1:B:147:SER:OG	4:B:609:HOH:O	2.19	0.50
1:C:3:ASP:O	1:C:7:LYS:HG3	2.12	0.50
1:D:354:PHE:CD1	1:D:359:ARG:HG2	2.47	0.50
1:D:363:THR:HG22	1:D:365:ASP:H	1.76	0.50
1:D:439:MET:HG2	1:D:442:ASN:OD1	2.12	0.50
1:A:380:ILE:HG23	1:A:383:GLN:NE2	2.27	0.50
1:B:86:ARG:CZ	1:B:150:GLU:HG2	2.41	0.50
1:B:469:THR:HG22	1:B:471:ASN:N	2.25	0.50
1:D:181:LEU:HD21	1:D:208:VAL:CG2	2.42	0.50
1:C:344:ASN:OD1	1:C:347:LYS:HB2	2.11	0.50
1:B:231:TRP:CE2	1:B:238:MET:HE1	2.47	0.50
1:C:325:THR:HG22	1:C:329:GLU:N	2.27	0.50
1:C:331:VAL:HG13	1:C:360:THR:HG23	1.93	0.50
1:A:387:ASN:OD1	1:A:454:TYR:HB2	2.12	0.50
1:D:440:THR:HA	1:D:443:ILE:HG22	1.93	0.50
1:B:400:LEU:CD2	1:B:447:LEU:HD11	2.42	0.50
1:D:325:THR:HG22	1:D:327:ASP:N	2.14	0.49
1:C:350:GLU:CG	4:C:612:HOH:O	2.60	0.49
1:D:385:LYS:CE	1:D:385:LYS:N	2.73	0.49
1:D:386:LEU:HB3	1:D:391:MET:SD	2.52	0.49
1:A:157:GLU:HG3	1:A:339:LEU:HD21	1.95	0.49
1:A:426:ALA:HB1	1:A:463:MET:HE2	1.94	0.49
1:C:134:LYS:HG2	1:C:135:ASP:H	1.77	0.49
1:C:155:GLN:O	1:C:338:SER:OG	2.29	0.49
1:C:419:LYS:HD3	1:C:420:VAL:H	1.77	0.49
1:B:454:TYR:CD1	1:B:455:MET:HG2	2.47	0.49
1:C:166:GLU:O	1:C:170:GLU:HG3	2.12	0.49
1:A:380:ILE:HG23	1:A:383:GLN:HE22	1.76	0.49
1:C:145:SER:N	3:C:502:ATP:O1G	2.39	0.49
1:C:419:LYS:HD3	1:C:420:VAL:N	2.28	0.49
1:D:40:LEU:HD22	1:D:67:GLY:HA3	1.95	0.49
1:A:1:MET:H2	1:A:2:THR:HA	1.78	0.48
1:B:99:VAL:CG2	1:B:114:VAL:HG22	2.43	0.48
1:C:36:GLU:OE2	1:C:60:TYR:OH	2.29	0.48
1:A:180:TRP:CD1	1:A:198:CYS:HG	2.31	0.48
1:D:43:ARG:O	1:D:43:ARG:HG2	2.12	0.48
1:D:181:LEU:CD2	1:D:222:MET:HE1	2.43	0.48
1:D:435:ASP:HB2	1:D:438:GLU:HG3	1.94	0.48
1:C:433:VAL:CG2	1:C:439:MET:HG3	2.43	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:326:ASP:OD1	1:C:326:ASP:N	2.38	0.48
1:C:384:ILE:HD11	1:C:396:ILE:HD11	1.94	0.48
1:D:191:SER:OG	4:D:607:HOH:O	2.18	0.48
1:B:89:MET:SD	1:B:93:LYS:HE2	2.53	0.48
1:B:356:ASP:OD2	4:B:610:HOH:O	2.20	0.48
1:B:369:PHE:CZ	1:B:372:GLY:HA2	2.49	0.48
1:D:371:ASN:O	4:D:608:HOH:O	2.20	0.47
1:B:78:VAL:HG13	1:B:82:ILE:HD12	1.95	0.47
1:B:167:TRP:CZ2	1:B:171:LEU:HD11	2.49	0.47
1:C:396:ILE:O	1:C:400:LEU:HD13	2.14	0.47
1:B:69:ILE:HG12	1:B:139:VAL:HG23	1.95	0.47
1:D:385:LYS:O	1:D:385:LYS:HG2	2.13	0.47
1:D:429:PRO:HG3	1:D:432:GLU:HG3	1.94	0.47
1:C:380:ILE:O	1:C:383:GLN:HG3	2.14	0.47
1:C:249:GLU:HB2	1:C:277:PHE:HA	1.96	0.47
1:A:1:MET:HE1	1:A:10:ALA:HB2	1.95	0.47
1:D:397:GLU:O	1:D:401:ARG:HG3	2.15	0.47
1:C:168:MET:HE1	1:C:259:PHE:CD2	2.49	0.47
1:D:167:TRP:CZ2	1:D:171:LEU:HD11	2.50	0.47
1:C:47:SER:O	1:C:73:CYS:HB3	2.15	0.47
1:A:330:LEU:O	1:A:363:THR:CG2	2.62	0.47
1:A:387:ASN:ND2	1:A:387:ASN:C	2.72	0.47
1:A:463:MET:CE	1:A:466:LEU:CD2	2.92	0.47
1:C:433:VAL:HG13	1:C:439:MET:HG3	1.96	0.46
1:A:167:TRP:CE2	1:A:171:LEU:HD11	2.51	0.46
1:D:416:LYS:NZ	1:D:419:LYS:HG3	2.30	0.46
1:A:190:LEU:HD13	1:A:261:CYS:HB3	1.97	0.46
1:B:391:MET:HE3	1:B:455:MET:CG	2.41	0.46
1:D:414:VAL:HG23	1:D:421:ILE:HG13	1.96	0.46
1:D:325:THR:CG2	1:D:327:ASP:H	2.18	0.46
1:D:257:GLU:HA	1:D:281:THR:O	2.16	0.46
1:C:91:ILE:HD12	1:C:92:ASN:N	2.31	0.46
1:B:86:ARG:HH22	1:B:150:GLU:CG	2.27	0.46
1:B:167:TRP:HZ2	1:B:297:SER:HB3	1.80	0.46
1:C:186:PHE:CD1	1:C:195:ILE:HD11	2.50	0.46
1:C:186:PHE:CE1	1:C:195:ILE:HD11	2.51	0.45
1:D:2:THR:HB	1:D:166:GLU:OE1	2.17	0.45
1:C:390:ARG:NH2	1:A:389:TYR:HD2	2.15	0.45
1:C:416:LYS:HD2	1:C:416:LYS:HA	1.74	0.45
1:A:53:LEU:HD11	1:A:61:MET:HA	1.98	0.45
1:D:49:LYS:HE2	1:D:95:GLN:O	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:456:ILE:O	4:D:609:HOH:O	2.21	0.45
1:A:391:MET:SD	1:A:455:MET:HG3	2.57	0.45
1:B:313:VAL:HG21	1:B:376:ILE:HG12	1.99	0.45
1:C:330:LEU:HG	1:C:331:VAL:N	2.32	0.45
1:B:215:LYS:CB	1:B:218:LEU:HD23	2.46	0.45
1:A:238:MET:HE3	1:A:260:PHE:CZ	2.51	0.45
1:D:8:LEU:HD21	1:D:34:MET:CE	2.40	0.45
1:D:447:LEU:HB3	1:D:456:ILE:HG12	1.97	0.45
1:D:458:ARG:HD3	1:D:458:ARG:HA	1.78	0.45
1:C:433:VAL:HG12	1:C:433:VAL:O	2.15	0.45
1:D:261:CYS:HB2	1:D:285:THR:OG1	2.17	0.44
1:D:416:LYS:HG3	1:D:419:LYS:H	1.82	0.44
1:B:284:ASN:HB3	1:B:298:ILE:CG2	2.47	0.44
1:D:31:GLN:NE2	1:D:35:ASP:OD2	2.50	0.44
1:C:354:PHE:HB3	1:C:359:ARG:HA	2.00	0.44
1:D:416:LYS:HE3	1:D:419:LYS:HB2	1.99	0.44
1:C:229:ASN:HA	1:C:254:SER:O	2.17	0.44
1:C:386:LEU:HD22	1:C:423:LEU:HD21	2.00	0.44
1:A:407:LYS:NZ	4:A:608:HOH:O	2.15	0.44
1:D:168:MET:HE1	1:D:259:PHE:CD2	2.52	0.44
1:B:264:ILE:H	1:B:264:ILE:CD1	2.26	0.44
1:B:264:ILE:HG13	3:B:502:ATP:H2	1.82	0.44
1:C:459:LYS:HB3	1:C:459:LYS:HE2	1.76	0.44
1:A:173:LYS:HD2	1:A:281:THR:HG21	1.99	0.44
1:B:55:GLY:C	1:B:80:THR:HG23	2.42	0.44
1:D:99:VAL:HG21	1:D:114:VAL:HG22	1.99	0.44
1:D:240:MET:HE2	1:D:240:MET:HB3	1.55	0.44
1:C:384:ILE:CG2	1:C:393:LEU:HD21	2.48	0.44
1:B:454:TYR:HD1	1:B:455:MET:HG2	1.82	0.44
1:D:386:LEU:HD23	1:D:391:MET:HE1	2.00	0.44
1:B:140:TYR:CD1	1:B:142:ILE:HG13	2.53	0.44
1:D:416:LYS:HZ1	1:D:419:LYS:HG3	1.82	0.44
1:D:416:LYS:HE3	1:D:419:LYS:CB	2.48	0.43
1:C:398:THR:HG22	1:C:402:GLN:OE1	2.19	0.43
1:D:408:GLU:HB2	1:D:428:VAL:HB	2.01	0.43
1:C:142:ILE:O	1:C:154:VAL:N	2.29	0.43
1:A:60:TYR:OH	1:A:121:LYS:HE3	2.18	0.43
1:A:84:GLU:O	1:A:88:LYS:HG2	2.17	0.43
1:A:445:ASN:HA	1:A:448:LYS:HD2	2.01	0.43
1:D:249:GLU:HB2	1:D:277:PHE:HA	2.00	0.43
1:B:144:THR:O	1:B:151:PRO:HB3	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:193:MET:O	1:B:197:PRO:HG2	2.19	0.43
1:D:153:GLY:O	1:D:341:TYR:HA	2.19	0.43
1:D:157:GLU:OE2	1:D:359:ARG:NH1	2.49	0.43
1:A:440:THR:HG23	1:A:460:PHE:CD2	2.53	0.43
1:A:445:ASN:HA	1:A:448:LYS:CD	2.49	0.43
1:C:363:THR:HG22	1:C:365:ASP:N	2.21	0.43
1:C:330:LEU:HB2	1:C:367:ALA:HB3	2.01	0.43
1:C:333:GLU:HA	1:C:359:ARG:O	2.19	0.43
1:B:273:LEU:HD23	1:B:282:ILE:HG12	2.00	0.43
1:C:84:GLU:HG2	4:C:610:HOH:O	2.19	0.43
1:C:350:GLU:CB	4:C:612:HOH:O	2.64	0.43
1:A:141:THR:HA	1:A:154:VAL:O	2.19	0.43
1:B:141:THR:HA	1:B:154:VAL:O	2.19	0.43
1:C:40:LEU:CD2	1:C:67:GLY:HA3	2.36	0.42
1:C:167:TRP:CE2	1:C:171:LEU:HD11	2.54	0.42
1:D:88:LYS:HA	1:D:88:LYS:HD2	1.69	0.42
1:C:372:GLY:C	1:C:373:GLN:HG2	2.43	0.42
1:C:384:ILE:HG12	1:C:393:LEU:HD23	2.00	0.42
1:A:409:ALA:HA	1:A:426:ALA:O	2.19	0.42
1:A:167:TRP:CZ2	1:A:297:SER:HB3	2.55	0.42
1:B:384:ILE:O	1:B:390:ARG:HA	2.19	0.42
1:D:386:LEU:HD21	1:D:454:TYR:O	2.20	0.42
1:A:1:MET:H2	1:A:2:THR:CA	2.33	0.42
1:A:210:LYS:NZ	4:A:621:HOH:O	2.50	0.42
1:B:383:GLN:NE2	4:B:620:HOH:O	2.43	0.42
1:D:49:LYS:HG3	1:D:97:GLU:HG3	2.02	0.42
1:C:298:ILE:HD11	1:C:304:ILE:HD12	2.02	0.42
1:B:188:PHE:CD2	1:B:471:ASN:HB3	2.54	0.42
1:C:140:TYR:CD1	1:C:142:ILE:HG13	2.54	0.42
1:A:391:MET:HE3	1:A:455:MET:HG3	2.01	0.42
1:B:286:TYR:CD1	1:B:286:TYR:C	2.97	0.42
1:D:7:LYS:HE2	1:D:7:LYS:HB2	1.71	0.42
1:B:167:TRP:CZ2	1:B:297:SER:HB3	2.55	0.42
1:D:181:LEU:HD23	1:D:222:MET:HE1	2.00	0.42
1:D:453:GLU:OE2	1:D:458:ARG:NH2	2.52	0.42
1:C:84:GLU:O	1:C:88:LYS:HG2	2.20	0.42
1:A:390:ARG:NH1	1:A:390:ARG:HG2	2.34	0.42
1:B:55:GLY:O	1:B:79:ASP:HA	2.20	0.42
1:B:235:PRO:HD2	1:B:263:GLU:CG	2.39	0.42
1:A:43:ARG:O	1:A:43:ARG:HG2	2.20	0.41
1:A:481:GLU:HG3	4:A:661:HOH:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:386:LEU:HD13	1:B:420:VAL:HG12	2.02	0.41
1:D:49:LYS:HG2	1:D:97:GLU:OE1	2.19	0.41
1:B:61:MET:HE3	1:B:102:THR:CG2	2.50	0.41
1:B:324:THR:HG22	4:B:612:HOH:O	2.19	0.41
1:B:400:LEU:HD21	1:B:447:LEU:HD11	2.02	0.41
1:B:433:VAL:HG21	1:B:462:TRP:CD2	2.55	0.41
1:D:8:LEU:HD13	1:D:199:LEU:HB3	1.95	0.41
1:D:405:PHE:CD1	1:D:405:PHE:N	2.88	0.41
1:A:135:ASP:HB3	1:A:159:ALA:HB2	2.02	0.41
1:B:301:THR:OG1	1:B:304:ILE:HG12	2.20	0.41
1:D:183:GLN:HG3	1:D:237:PHE:CD1	2.56	0.41
1:D:440:THR:CG2	1:D:444:LYS:HE3	2.47	0.41
1:C:354:PHE:HB3	1:C:359:ARG:HG2	2.03	0.41
1:D:416:LYS:HE2	1:D:419:LYS:CE	2.49	0.41
1:C:384:ILE:HG12	1:C:393:LEU:CD2	2.51	0.41
1:D:385:LYS:HB3	1:D:385:LYS:HE2	1.67	0.41
1:C:104:ASP:HB2	1:C:105:GLU:OE1	2.21	0.41
1:A:118:GLU:H	1:A:118:GLU:CD	2.22	0.41
1:A:157:GLU:HG3	1:A:339:LEU:HD11	2.03	0.41
1:B:44:LEU:HD21	1:B:51:MET:SD	2.60	0.41
1:D:143:PHE:HA	1:D:152:LYS:O	2.20	0.41
1:D:406:VAL:HG23	1:D:443:ILE:HD11	2.03	0.41
1:D:440:THR:O	1:D:444:LYS:HG3	2.20	0.41
1:A:346:GLN:O	1:A:350:GLU:HG3	2.20	0.41
1:B:29:THR:OG1	1:B:32:GLN:HG3	2.21	0.41
1:D:181:LEU:HD21	1:D:208:VAL:HG23	2.02	0.40
1:D:416:LYS:CE	1:D:419:LYS:HB2	2.51	0.40
1:B:235:PRO:CD	1:B:263:GLU:HG3	2.39	0.40
1:D:388:GLY:O	1:D:389:TYR:CG	2.75	0.40
1:D:321:ARG:HH11	1:D:321:ARG:HD2	1.54	0.40
1:D:435:ASP:CB	1:D:438:GLU:CG	2.99	0.40
1:C:433:VAL:CG1	1:C:439:MET:HG3	2.51	0.40
1:A:92:ASN:O	1:A:95:GLN:HG2	2.21	0.40
1:D:435:ASP:HB2	1:D:438:GLU:HB3	2.02	0.40
1:D:441:LYS:HD3	1:D:442:ASN:N	2.36	0.40
1:C:5:ILE:HD11	1:C:69:ILE:CG2	2.51	0.40
1:C:172:ASN:ND2	1:C:257:GLU:OE1	2.51	0.40
1:D:51:MET:O	1:D:75:TYR:HA	2.21	0.40

All (4) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:389:TYR:CE1	1:B:390:ARG:NH2[2_444]	1.75	0.45
4:C:628:HOH:O	4:B:668:HOH:O[2_444]	2.02	0.18
4:C:685:HOH:O	4:B:707:HOH:O[2_444]	2.07	0.13
4:C:675:HOH:O	4:B:685:HOH:O[2_444]	2.16	0.04

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	483/485 (100%)	467 (97%)	16 (3%)	0	100	100
1	B	483/485 (100%)	468 (97%)	15 (3%)	0	100	100
1	C	476/485 (98%)	458 (96%)	17 (4%)	1 (0%)	43	56
1	D	476/485 (98%)	456 (96%)	16 (3%)	4 (1%)	16	22
All	All	1918/1940 (99%)	1849 (96%)	64 (3%)	5 (0%)	36	45

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	438	GLU
1	D	418	ASP
1	D	439	MET
1	D	433	VAL
1	C	434	THR

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	431/431 (100%)	425 (99%)	6 (1%)	59	75
1	B	431/431 (100%)	430 (100%)	1 (0%)	87	93
1	C	427/431 (99%)	422 (99%)	5 (1%)	63	78
1	D	427/431 (99%)	423 (99%)	4 (1%)	70	82
All	All	1716/1724 (100%)	1700 (99%)	16 (1%)	70	82

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	145	SER
1	D	325	THR
1	D	363	THR
1	D	385	LYS
1	C	142	ILE
1	C	211	ASN
1	C	298	ILE
1	C	363	THR
1	C	469	THR
1	A	38	SER
1	A	49	LYS
1	A	148	THR
1	A	331	VAL
1	A	370	GLU
1	A	387	ASN
1	B	325	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	42	HIS
1	D	251	GLN
1	D	335	GLN
1	D	399	GLN
1	D	402	GLN
1	D	465	GLN
1	C	15	ASN
1	C	251	GLN
1	C	302	GLN
1	C	335	GLN
1	C	383	GLN

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Mol	Chain	Res	Type
1	A	17	GLN
1	A	172	ASN
1	A	251	GLN
1	A	302	GLN
1	A	335	GLN
1	A	402	GLN
1	B	155	GLN
1	B	178	GLN
1	B	377	GLN
1	B	442	ASN

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$
3	ATP	D	502	2	32,33,33	1.50	7 (21%)	48,52,52	1.60	7 (14%)
3	ATP	B	502	2	32,33,33	1.41	6 (18%)	48,52,52	1.81	10 (20%)
3	ATP	C	502	2	32,33,33	1.57	6 (18%)	48,52,52	1.77	8 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	ATP	A	502	2	32,33,33	1.61	7 (21%)	48,52,52	1.86	11 (22%)

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	ATP	D	502	2	-	7/22/38/38	0/3/3/3
3	ATP	B	502	2	-	6/22/38/38	0/3/3/3
3	ATP	C	502	2	-	5/22/38/38	0/3/3/3
3	ATP	A	502	2	-	8/22/38/38	0/3/3/3

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	502	ATP	C5-C4	5.05	1.48	1.39
3	D	502	ATP	C5-C4	5.04	1.48	1.39
3	C	502	ATP	C5-C4	4.97	1.48	1.39
3	B	502	ATP	C5-C4	4.36	1.46	1.39
3	C	502	ATP	PA-O3A	3.65	1.63	1.59
3	A	502	ATP	PB-O3A	3.63	1.63	1.59
3	A	502	ATP	PA-O3A	3.29	1.63	1.59
3	B	502	ATP	C8-N7	2.89	1.37	1.31
3	B	502	ATP	PB-O3A	2.87	1.62	1.59
3	A	502	ATP	C5-N7	-2.72	1.34	1.39
3	C	502	ATP	C5-C6	2.71	1.48	1.41
3	D	502	ATP	C8-N7	2.62	1.36	1.31
3	D	502	ATP	PA-O3A	2.57	1.62	1.59
3	C	502	ATP	C8-N7	2.53	1.36	1.31
3	D	502	ATP	C5-C6	2.43	1.47	1.41
3	C	502	ATP	C5-N7	-2.35	1.34	1.39
3	A	502	ATP	C5-C6	2.34	1.47	1.41
3	B	502	ATP	C5-N7	-2.32	1.34	1.39
3	D	502	ATP	PB-O3A	2.30	1.62	1.59
3	B	502	ATP	C5-C6	2.27	1.47	1.41
3	D	502	ATP	C4-N9	-2.26	1.33	1.37
3	D	502	ATP	C5-N7	-2.19	1.35	1.39
3	C	502	ATP	PB-O3B	2.11	1.61	1.59
3	A	502	ATP	C4-N9	-2.04	1.33	1.37
3	B	502	ATP	PB-O3B	2.03	1.61	1.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	502	ATP	C8-N7	2.02	1.35	1.31

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	502	ATP	C5-C4-N3	-6.29	118.06	126.72
3	B	502	ATP	C5-C4-N3	-6.06	118.37	126.72
3	A	502	ATP	C5-C4-N3	-5.76	118.79	126.72
3	D	502	ATP	C5-C4-N3	-5.28	119.45	126.72
3	C	502	ATP	N3-C4-N9	4.85	135.41	127.17
3	A	502	ATP	N3-C4-N9	4.48	134.79	127.17
3	B	502	ATP	N3-C4-N9	4.47	134.77	127.17
3	B	502	ATP	C2-N3-C4	4.24	122.18	111.83
3	B	502	ATP	N3-C2-N1	-4.00	122.52	128.58
3	D	502	ATP	N3-C4-N9	3.95	133.89	127.17
3	A	502	ATP	C4-C5-N7	-3.74	106.31	110.58
3	C	502	ATP	C2-N3-C4	3.74	120.96	111.83
3	C	502	ATP	C4-C5-N7	-3.57	106.50	110.58
3	A	502	ATP	C2-N3-C4	3.44	120.22	111.83
3	D	502	ATP	C2-N3-C4	3.38	120.09	111.83
3	D	502	ATP	N3-C2-N1	-3.38	123.47	128.58
3	A	502	ATP	O2A-PA-O3A	3.08	115.59	107.27
3	A	502	ATP	C2'-C1'-N9	-3.06	105.71	113.30
3	B	502	ATP	C4-C5-N7	-3.01	107.14	110.58
3	A	502	ATP	N3-C2-N1	-2.97	124.08	128.58
3	C	502	ATP	N3-C2-N1	-2.89	124.21	128.58
3	D	502	ATP	C4-C5-N7	-2.87	107.30	110.58
3	A	502	ATP	C5-N7-C8	2.65	107.62	103.45
3	C	502	ATP	C5-N7-C8	2.64	107.59	103.45
3	D	502	ATP	C2-N1-C6	2.55	122.91	118.73
3	C	502	ATP	C4-N9-C8	2.45	108.31	105.74
3	B	502	ATP	C2'-C1'-N9	-2.37	107.42	113.30
3	B	502	ATP	C2-N1-C6	2.28	122.48	118.73
3	A	502	ATP	C2-N1-C6	2.27	122.45	118.73
3	A	502	ATP	C4-N9-C8	2.24	108.09	105.74
3	A	502	ATP	O5'-C5'-C4'	-2.19	101.55	108.99
3	B	502	ATP	O2A-PA-O1A	2.17	122.55	112.44
3	B	502	ATP	C6-C5-N7	2.14	136.21	132.09
3	D	502	ATP	O3'-C3'-C2'	2.05	118.38	111.82
3	B	502	ATP	C5-N7-C8	2.04	106.66	103.45
3	C	502	ATP	N9-C8-N7	-2.03	111.06	113.94

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	502	ATP	C5'-O5'-PA-O1A
3	D	502	ATP	C5'-O5'-PA-O2A
3	D	502	ATP	C5'-O5'-PA-O3A
3	C	502	ATP	C5'-O5'-PA-O1A
3	C	502	ATP	C5'-O5'-PA-O2A
3	C	502	ATP	C5'-O5'-PA-O3A
3	A	502	ATP	PB-O3A-PA-O5'
3	A	502	ATP	C5'-O5'-PA-O1A
3	A	502	ATP	C5'-O5'-PA-O2A
3	A	502	ATP	C5'-O5'-PA-O3A
3	B	502	ATP	C5'-O5'-PA-O1A
3	B	502	ATP	C5'-O5'-PA-O2A
3	B	502	ATP	C5'-O5'-PA-O3A
3	D	502	ATP	PB-O3A-PA-O5'
3	C	502	ATP	PB-O3A-PA-O5'
3	B	502	ATP	PB-O3A-PA-O5'
3	D	502	ATP	PG-O3B-PB-O2B
3	B	502	ATP	PG-O3B-PB-O2B
3	D	502	ATP	PG-O3B-PB-O1B
3	A	502	ATP	PG-O3B-PB-O2B
3	C	502	ATP	PB-O3A-PA-O1A
3	D	502	ATP	PB-O3A-PA-O1A
3	A	502	ATP	PG-O3B-PB-O1B
3	A	502	ATP	PB-O3A-PA-O1A
3	A	502	ATP	PB-O3A-PA-O2A
3	B	502	ATP	PG-O3B-PB-O1B

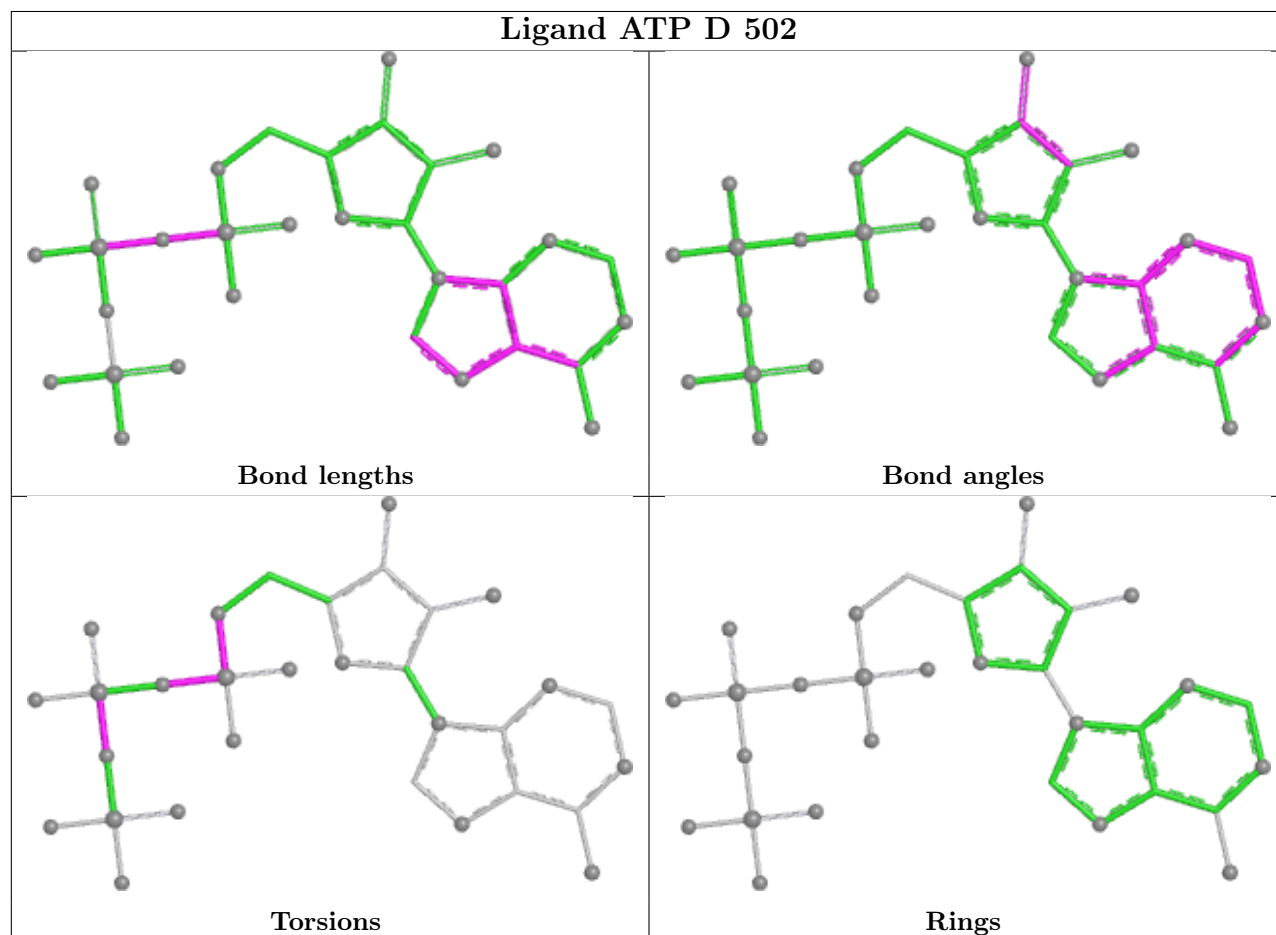
There are no ring outliers.

3 monomers are involved in 4 short contacts:

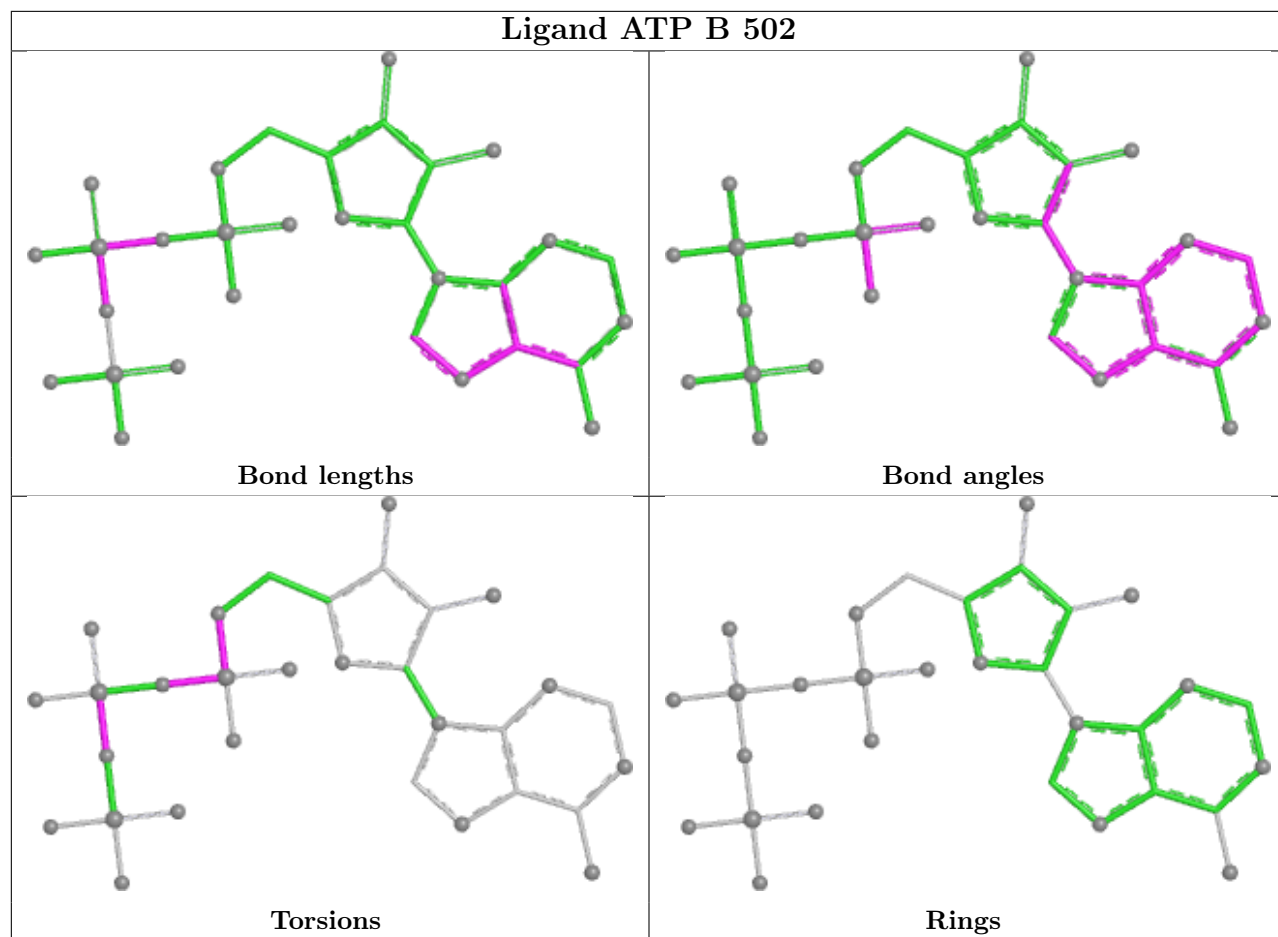
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	502	ATP	2	0
3	B	502	ATP	1	0
3	C	502	ATP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

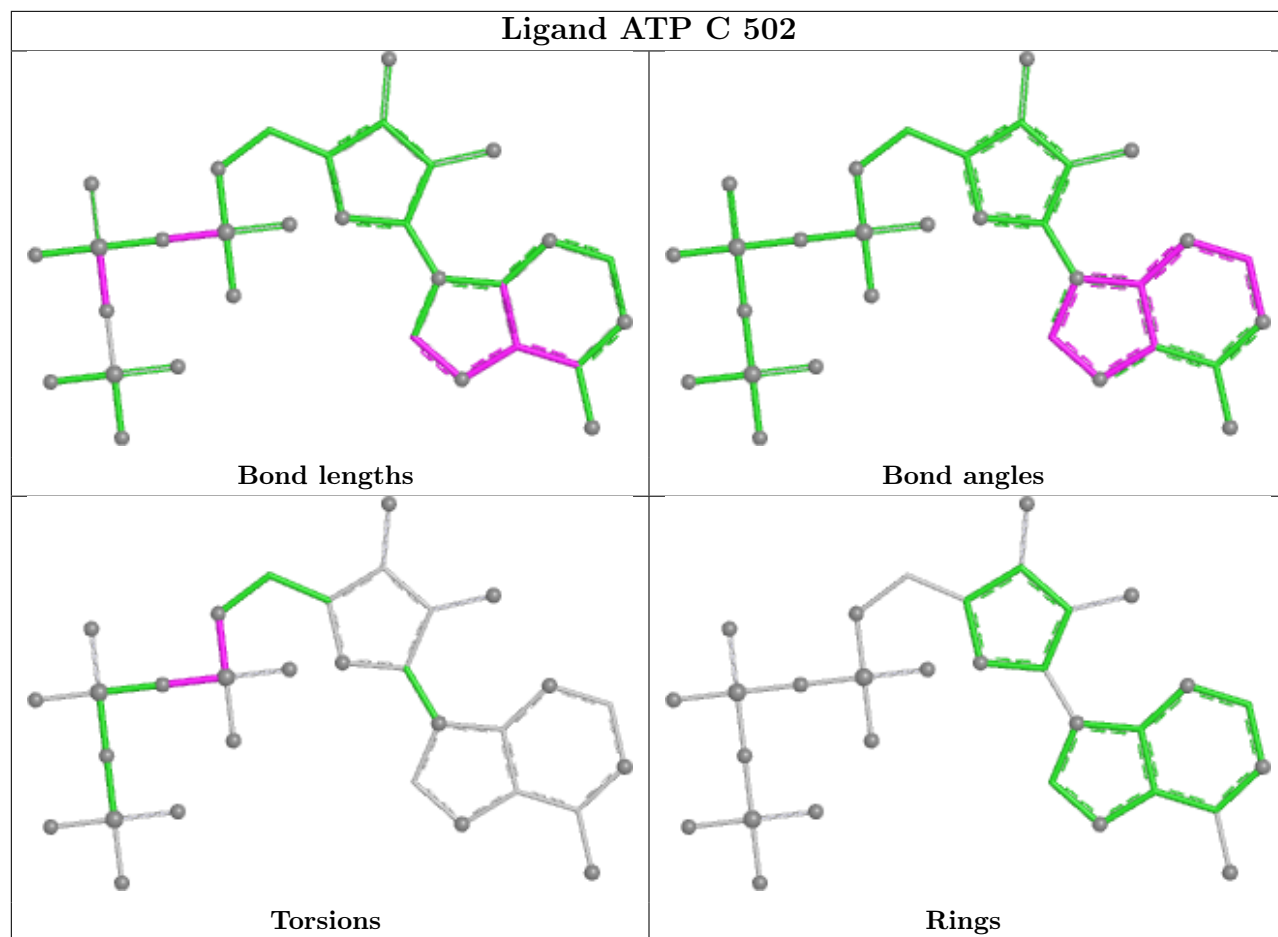
Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

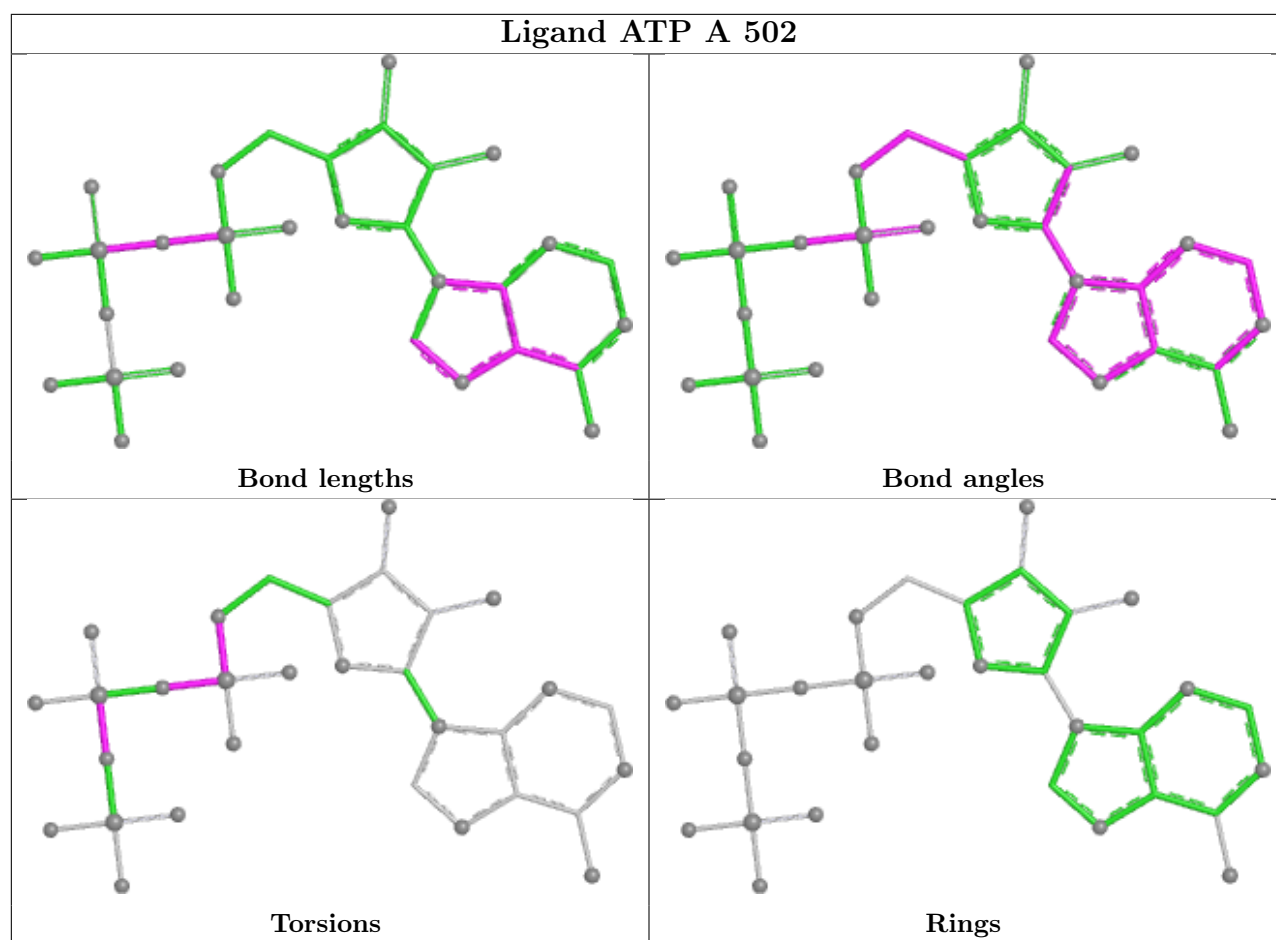


Ligand ATP B 502



Ligand ATP C 502





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	485/485 (100%)	-1.52	0 100 100	28, 44, 67, 83	0
1	B	485/485 (100%)	-1.55	0 100 100	29, 42, 57, 77	0
1	C	480/485 (98%)	-1.41	0 100 100	27, 51, 84, 110	0
1	D	480/485 (98%)	-1.47	0 100 100	29, 47, 76, 107	0
All	All	1930/1940 (99%)	-1.49	0 100 100	27, 45, 73, 110	0

There are no RSRZ outliers to report.

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(Å ²)	Q<0.9
2	MG	B	501	1/1	0.98	0.04	49,49,49,49	0
2	MG	C	501	1/1	0.99	0.06	55,55,55,55	0
2	MG	D	501	1/1	0.99	0.04	44,44,44,44	0
3	ATP	C	502	31/31	0.99	0.02	39,44,63,70	0

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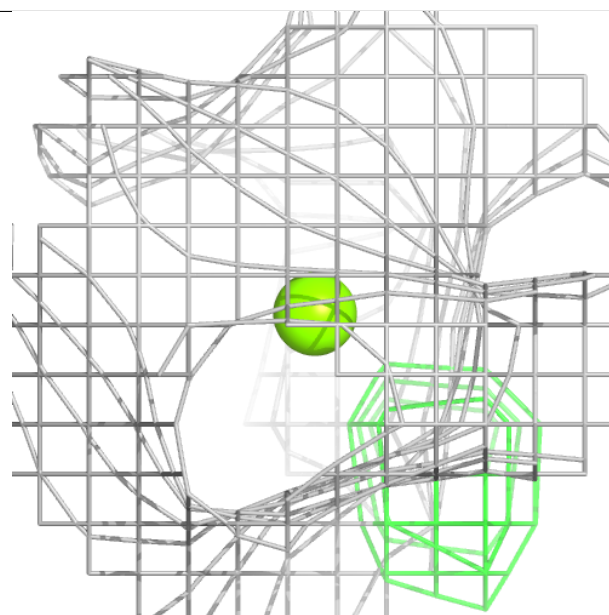
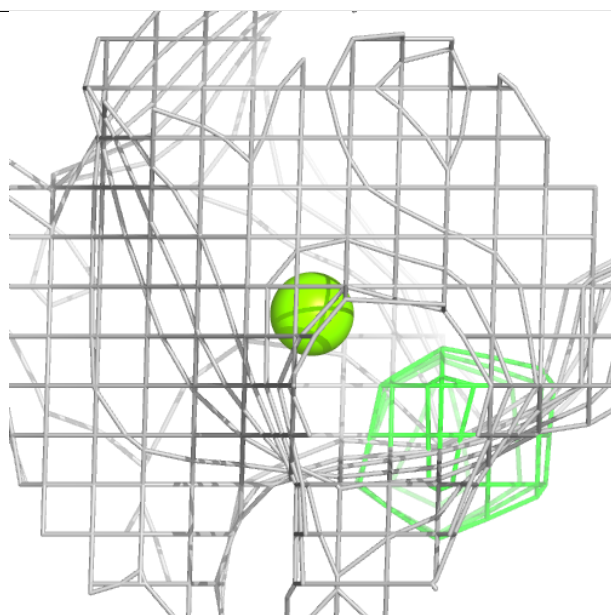
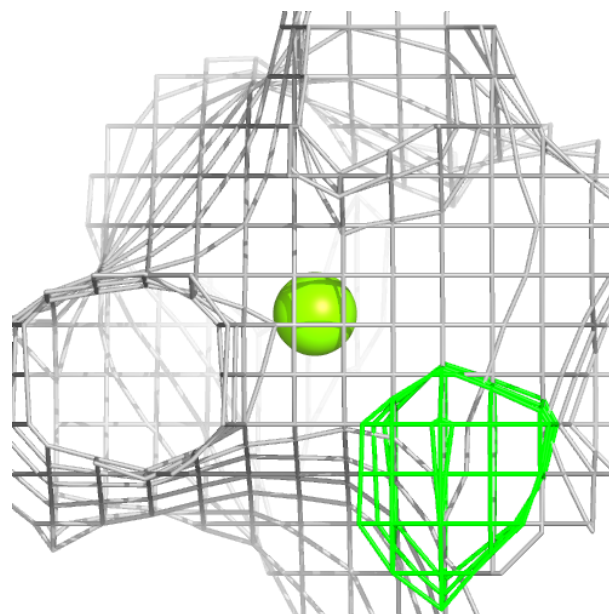
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	ATP	A	502	31/31	0.99	0.03	29,36,46,51	0
2	MG	A	501	1/1	1.00	0.01	38,38,38,38	0
3	ATP	D	502	31/31	1.00	0.02	36,42,57,58	0
3	ATP	B	502	31/31	1.00	0.02	32,37,47,52	0

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.

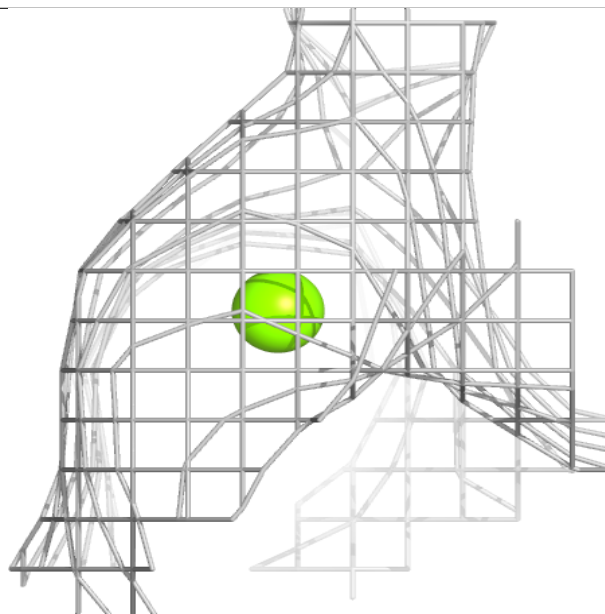
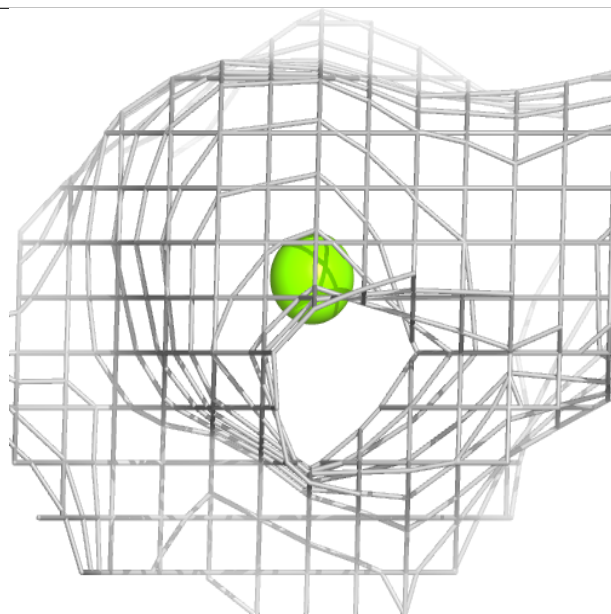
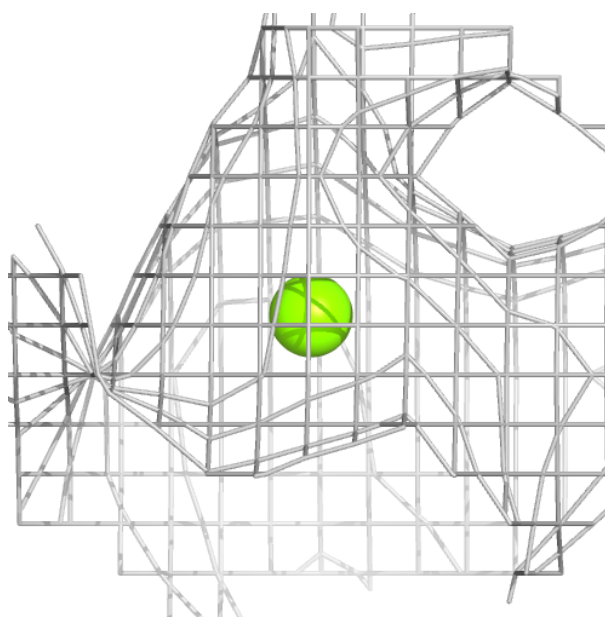
Electron density around MG B 501:

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



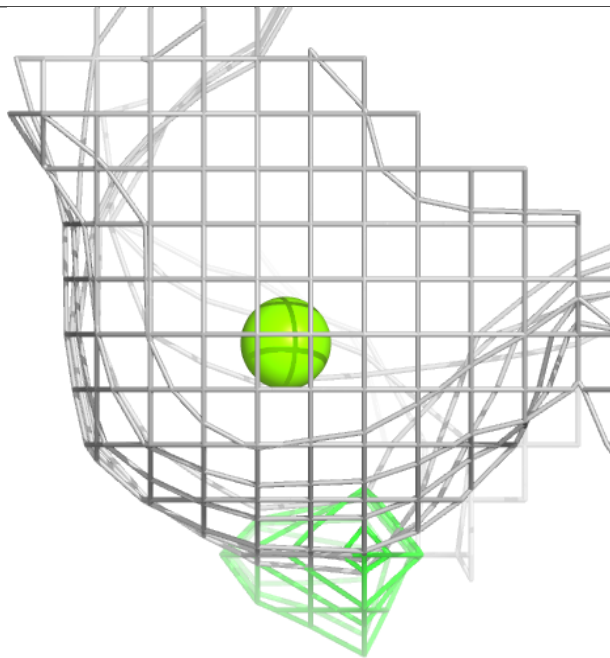
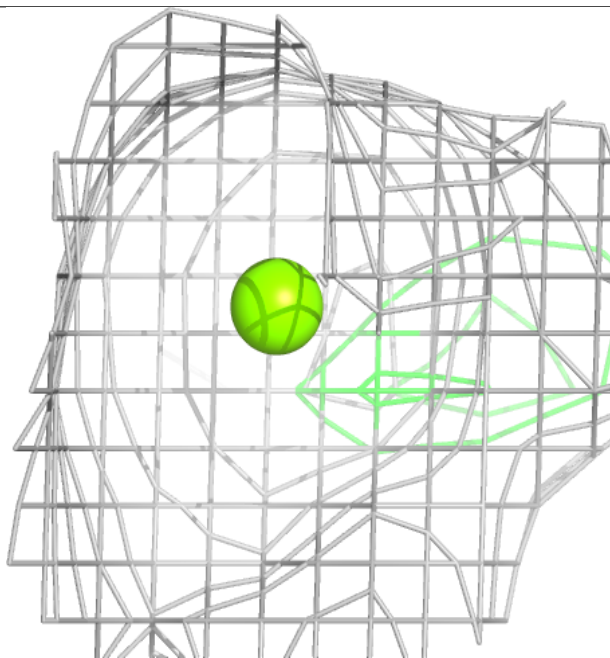
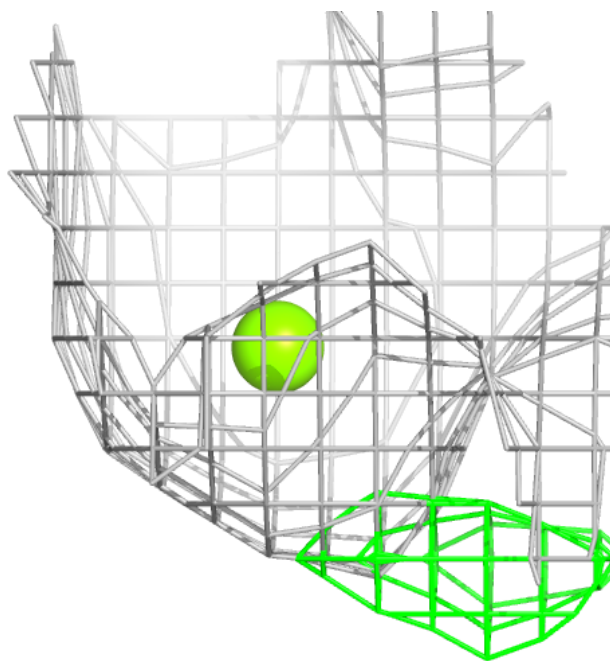
Electron density around MG C 501:

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



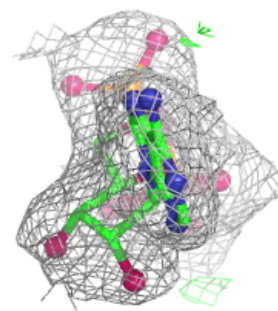
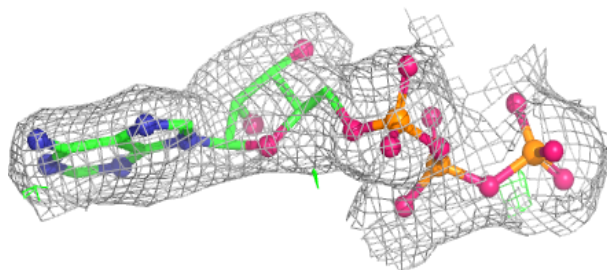
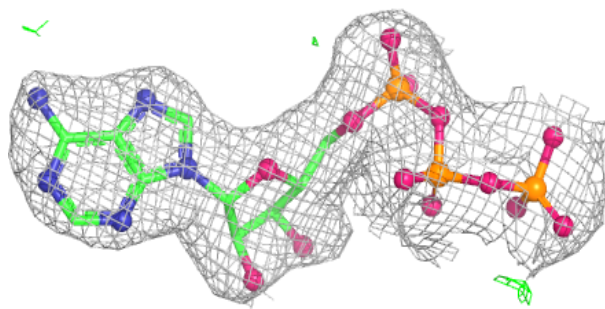
Electron density around MG D 501:

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

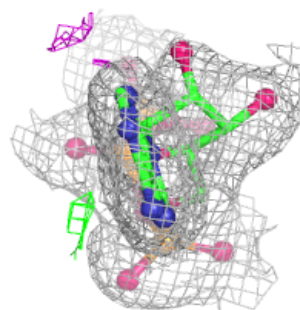
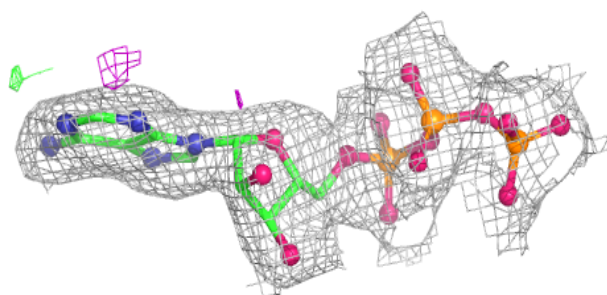
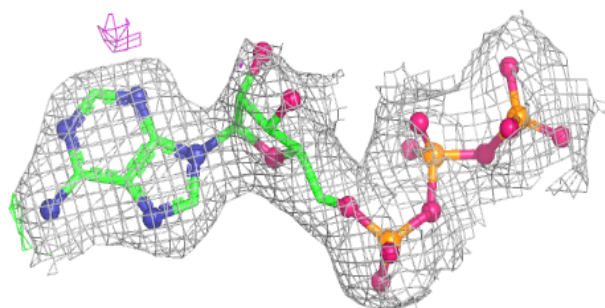


Electron density around ATP C 502:

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

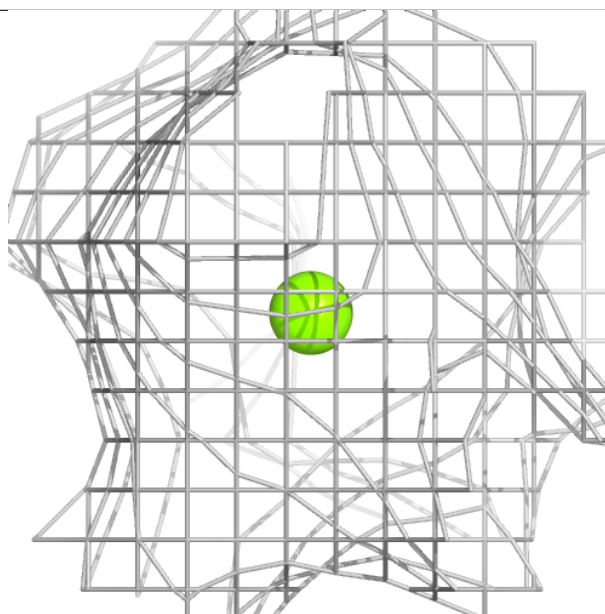
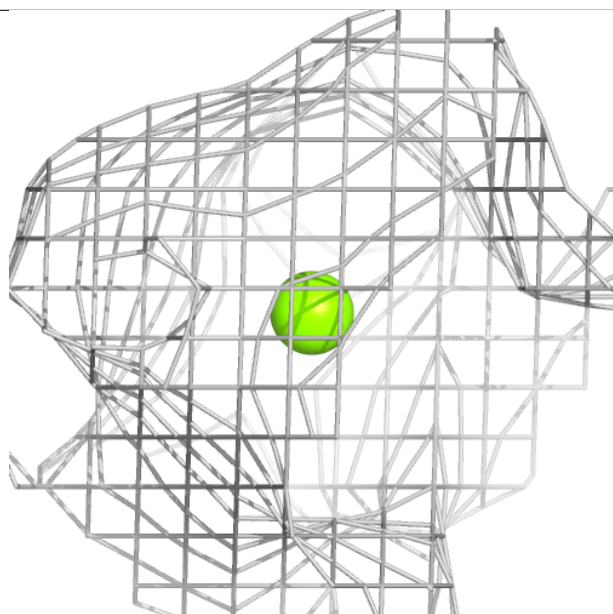
**Electron density around ATP A 502:**

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



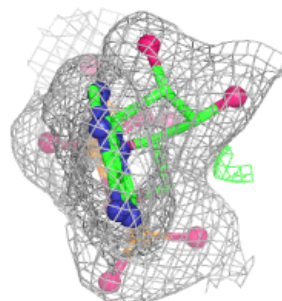
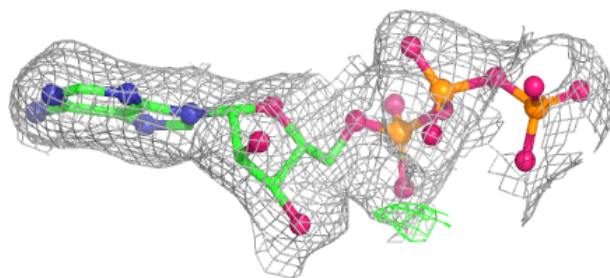
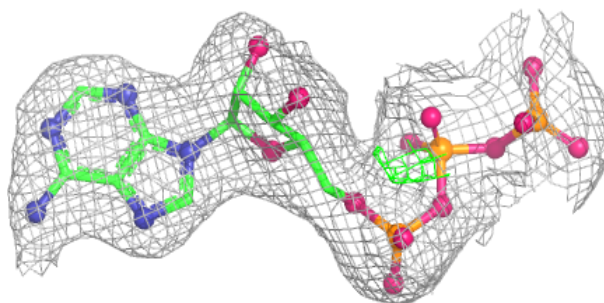
Electron density around MG A 501:

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

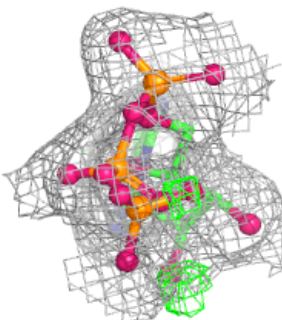
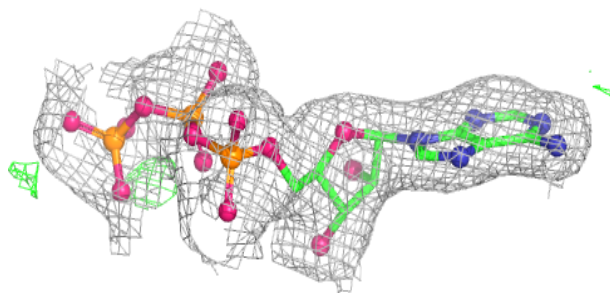
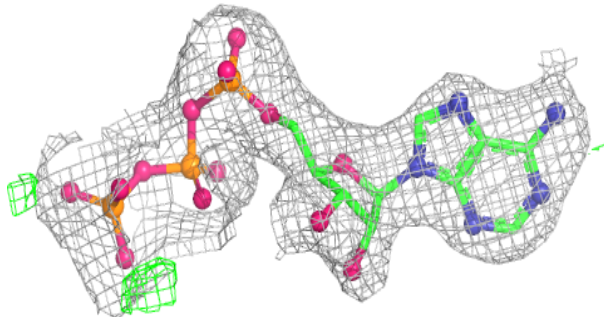


Electron density around ATP D 502:

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

**Electron density around ATP B 502:**

$2mF_o-DF_c$ (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.