



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2024 – 04:13 PM JST

PDB ID : 8IRK
Title : Carbon Sulfoxide lyase
Authors : Gong, W.M.; Wei, L.L.; Liu, L.
Deposited on : 2023-03-18
Resolution : 2.35 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

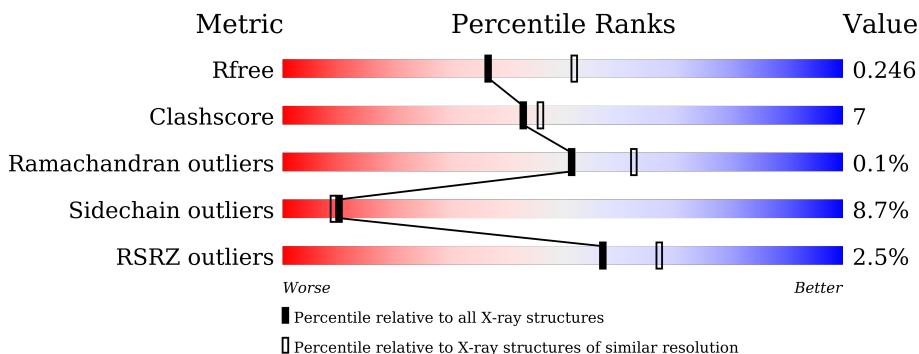
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	392	 3% 78% 16% . .
1	B	392	 2% 81% 12% . 5%
1	C	392	 3% 78% 16% . .
1	D	392	 % 78% 15% . 5%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 11429 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 Probable hercynylcysteine sulfoxide lyase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	379	2788	1739	513	526	10	0	0	0
1	B	373	2749	1713	504	522	10	0	0	0
1	C	376	2776	1732	508	526	10	0	0	0
1	D	372	2751	1718	502	521	10	0	0	0

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	MET	-	initiating methionine	UNP A0R5M7
A	-19	GLY	-	expression tag	UNP A0R5M7
A	-18	SER	-	expression tag	UNP A0R5M7
A	-17	SER	-	expression tag	UNP A0R5M7
A	-16	HIS	-	expression tag	UNP A0R5M7
A	-15	HIS	-	expression tag	UNP A0R5M7
A	-14	HIS	-	expression tag	UNP A0R5M7
A	-13	HIS	-	expression tag	UNP A0R5M7
A	-12	HIS	-	expression tag	UNP A0R5M7
A	-11	HIS	-	expression tag	UNP A0R5M7
A	-10	SER	-	expression tag	UNP A0R5M7
A	-9	SER	-	expression tag	UNP A0R5M7
A	-8	GLY	-	expression tag	UNP A0R5M7
A	-7	LEU	-	expression tag	UNP A0R5M7
A	-6	VAL	-	expression tag	UNP A0R5M7
A	-5	PRO	-	expression tag	UNP A0R5M7
A	-4	ARG	-	expression tag	UNP A0R5M7
A	-3	GLY	-	expression tag	UNP A0R5M7
A	-2	SER	-	expression tag	UNP A0R5M7
A	-1	HIS	-	expression tag	UNP A0R5M7
A	0	MET	-	expression tag	UNP A0R5M7

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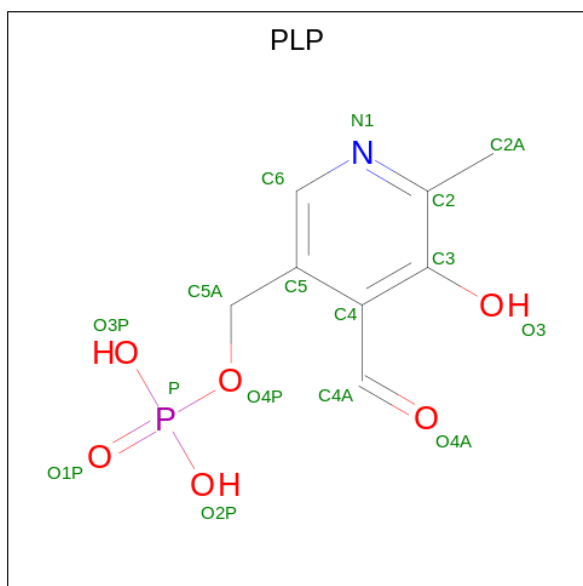
Chain	Residue	Modelled	Actual	Comment	Reference
B	-20	MET	-	initiating methionine	UNP A0R5M7
B	-19	GLY	-	expression tag	UNP A0R5M7
B	-18	SER	-	expression tag	UNP A0R5M7
B	-17	SER	-	expression tag	UNP A0R5M7
B	-16	HIS	-	expression tag	UNP A0R5M7
B	-15	HIS	-	expression tag	UNP A0R5M7
B	-14	HIS	-	expression tag	UNP A0R5M7
B	-13	HIS	-	expression tag	UNP A0R5M7
B	-12	HIS	-	expression tag	UNP A0R5M7
B	-11	HIS	-	expression tag	UNP A0R5M7
B	-10	SER	-	expression tag	UNP A0R5M7
B	-9	SER	-	expression tag	UNP A0R5M7
B	-8	GLY	-	expression tag	UNP A0R5M7
B	-7	LEU	-	expression tag	UNP A0R5M7
B	-6	VAL	-	expression tag	UNP A0R5M7
B	-5	PRO	-	expression tag	UNP A0R5M7
B	-4	ARG	-	expression tag	UNP A0R5M7
B	-3	GLY	-	expression tag	UNP A0R5M7
B	-2	SER	-	expression tag	UNP A0R5M7
B	-1	HIS	-	expression tag	UNP A0R5M7
B	0	MET	-	expression tag	UNP A0R5M7
C	-20	MET	-	initiating methionine	UNP A0R5M7
C	-19	GLY	-	expression tag	UNP A0R5M7
C	-18	SER	-	expression tag	UNP A0R5M7
C	-17	SER	-	expression tag	UNP A0R5M7
C	-16	HIS	-	expression tag	UNP A0R5M7
C	-15	HIS	-	expression tag	UNP A0R5M7
C	-14	HIS	-	expression tag	UNP A0R5M7
C	-13	HIS	-	expression tag	UNP A0R5M7
C	-12	HIS	-	expression tag	UNP A0R5M7
C	-11	HIS	-	expression tag	UNP A0R5M7
C	-10	SER	-	expression tag	UNP A0R5M7
C	-9	SER	-	expression tag	UNP A0R5M7
C	-8	GLY	-	expression tag	UNP A0R5M7
C	-7	LEU	-	expression tag	UNP A0R5M7
C	-6	VAL	-	expression tag	UNP A0R5M7
C	-5	PRO	-	expression tag	UNP A0R5M7
C	-4	ARG	-	expression tag	UNP A0R5M7
C	-3	GLY	-	expression tag	UNP A0R5M7
C	-2	SER	-	expression tag	UNP A0R5M7
C	-1	HIS	-	expression tag	UNP A0R5M7
C	0	MET	-	expression tag	UNP A0R5M7

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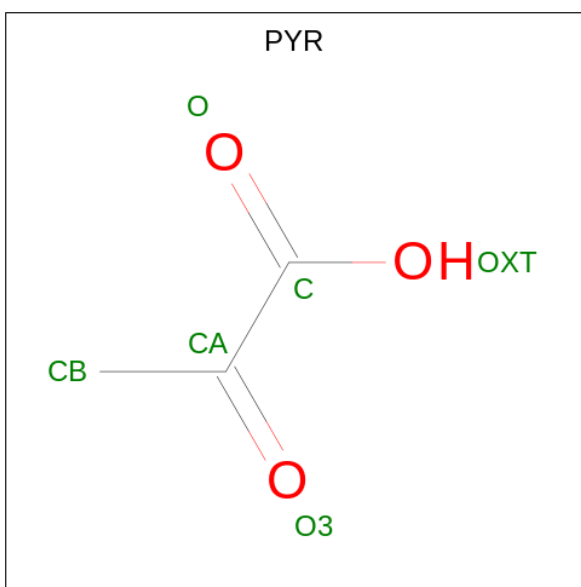
Chain	Residue	Modelled	Actual	Comment	Reference
D	-20	MET	-	initiating methionine	UNP A0R5M7
D	-19	GLY	-	expression tag	UNP A0R5M7
D	-18	SER	-	expression tag	UNP A0R5M7
D	-17	SER	-	expression tag	UNP A0R5M7
D	-16	HIS	-	expression tag	UNP A0R5M7
D	-15	HIS	-	expression tag	UNP A0R5M7
D	-14	HIS	-	expression tag	UNP A0R5M7
D	-13	HIS	-	expression tag	UNP A0R5M7
D	-12	HIS	-	expression tag	UNP A0R5M7
D	-11	HIS	-	expression tag	UNP A0R5M7
D	-10	SER	-	expression tag	UNP A0R5M7
D	-9	SER	-	expression tag	UNP A0R5M7
D	-8	GLY	-	expression tag	UNP A0R5M7
D	-7	LEU	-	expression tag	UNP A0R5M7
D	-6	VAL	-	expression tag	UNP A0R5M7
D	-5	PRO	-	expression tag	UNP A0R5M7
D	-4	ARG	-	expression tag	UNP A0R5M7
D	-3	GLY	-	expression tag	UNP A0R5M7
D	-2	SER	-	expression tag	UNP A0R5M7
D	-1	HIS	-	expression tag	UNP A0R5M7
D	0	MET	-	expression tag	UNP A0R5M7

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: C₈H₁₀NO₆P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total 15	C 8	N 1	O 5	P 1	0	0
2	B	1	Total 15	C 8	N 1	O 5	P 1	0	0
2	C	1	Total 15	C 8	N 1	O 5	P 1	0	0
2	D	1	Total 15	C 8	N 1	O 5	P 1	0	0

- Molecule 3 is PYRUVIC ACID (three-letter code: PYR) (formula: C₃H₄O₃) (labeled as "Ligand of Interest" by depositor).



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

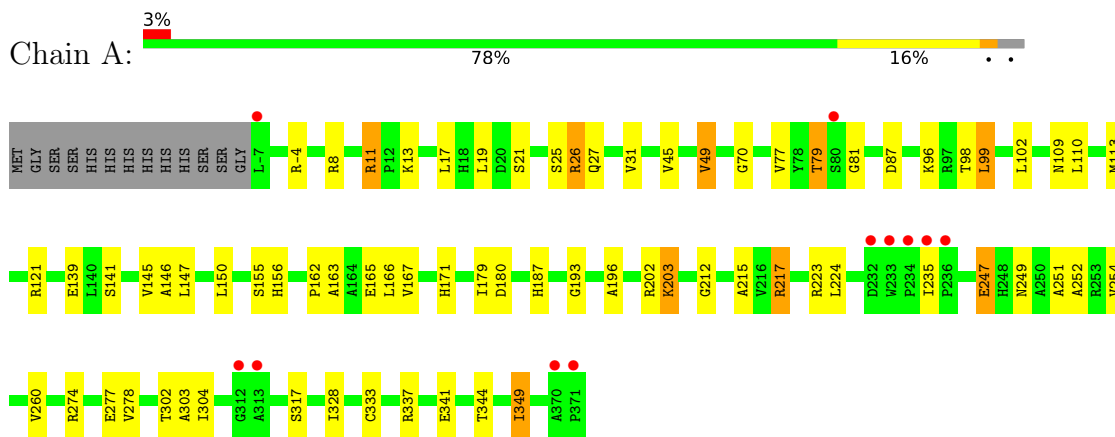
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	68	Total 68	O 68	0	0
4	B	79	Total 79	O 79	0	0
4	C	78	Total 78	O 78	0	0
4	D	74	Total 74	O 74	0	0

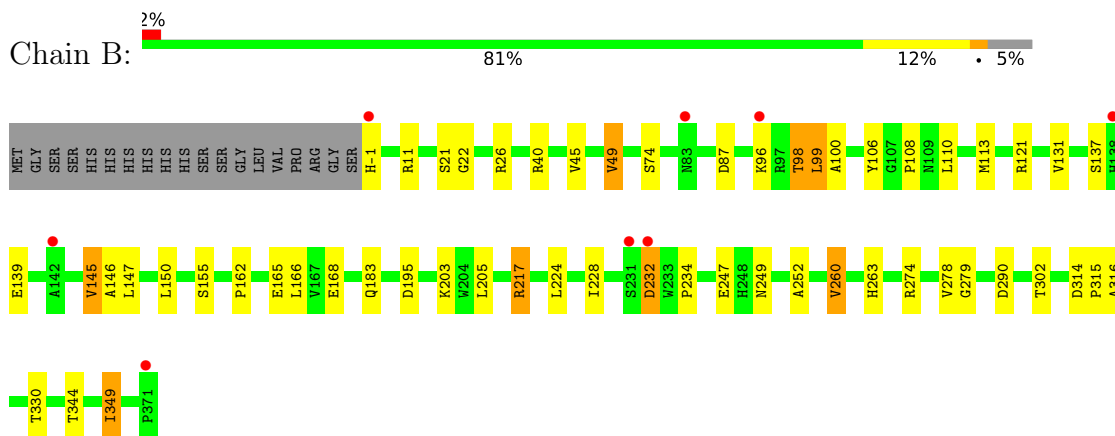
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

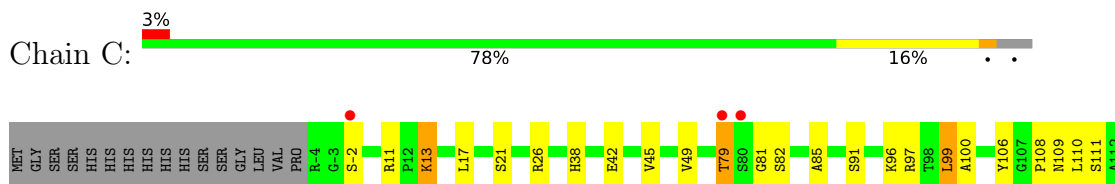
- Molecule 1: Probable hercynylcysteine sulfoxide lyase

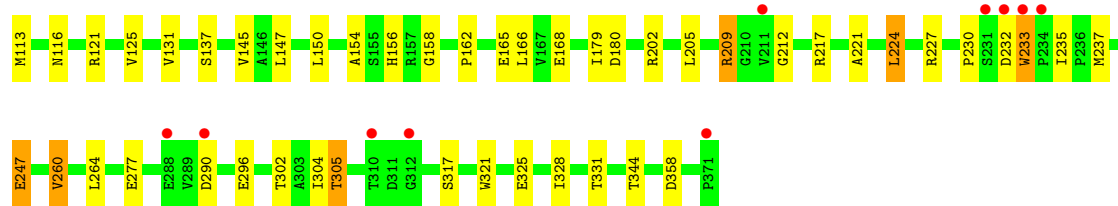


- Molecule 1: Probable hercynylcysteine sulfoxide lyase

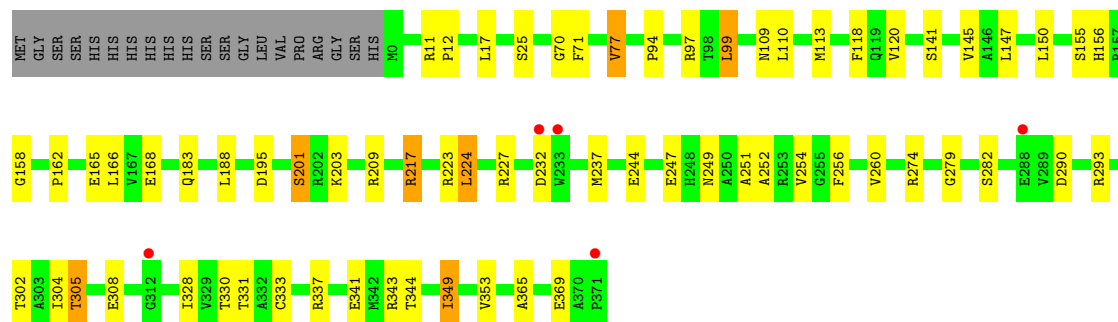
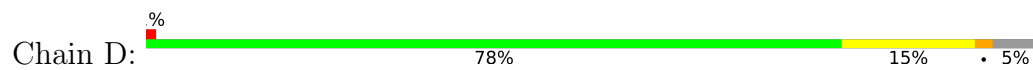


- Molecule 1: Probable hercynylcysteine sulfoxide lyase





• Molecule 1: Probable hercynylcysteine sulfoxide lyase



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	82.31Å 90.37Å 101.53Å 110.77° 105.95° 103.07°	Depositor
Resolution (Å)	41.81 – 2.35 41.77 – 2.35	Depositor EDS
% Data completeness (in resolution range)	92.6 (41.81-2.35) 92.6 (41.77-2.35)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.09 (at 2.34Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.198 , 0.246 0.204 , 0.246	Depositor DCC
R_{free} test set	4786 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	46.0	Xtrriage
Anisotropy	0.062	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 39.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.053 for -h,-k,h+k+l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11429	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.67% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PYR, PLP

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	0.79	0/2846	0.92	1/3891 (0.0%)
1	B	0.75	0/2806	0.92	0/3836
1	C	0.76	0/2835	0.93	0/3876
1	D	0.79	0/2809	0.96	1/3841 (0.0%)
All	All	0.78	0/11296	0.93	2/15444 (0.0%)

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	A	0	2
1	C	0	2
1	D	0	2
All	All	0	6

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	203	LYS	CB-CA-C	5.18	120.75	110.40
1	A	203	LYS	CB-CA-C	5.11	120.63	110.40

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	11	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	A	223	ARG	Sidechain
1	C	209	ARG	Sidechain
1	C	97	ARG	Sidechain
1	D	209	ARG	Sidechain
1	D	223	ARG	Sidechain

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2788	0	2757	41	0
1	B	2749	0	2714	31	0
1	C	2776	0	2740	44	0
1	D	2751	0	2723	39	0
2	A	15	0	6	2	0
2	B	15	0	6	1	0
2	C	15	0	6	1	0
2	D	15	0	6	0	0
3	A	6	0	0	3	0
4	A	68	0	0	0	0
4	B	79	0	0	1	0
4	C	78	0	0	0	0
4	D	74	0	0	1	0
All	All	11429	0	10958	150	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 7.

All (150) 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:C:110:LEU:HD23	1:C:113:MET:CE	1.93	0.98
2:A:400:PLP:C4A	3:A:401:PYR:CB	2.44	0.96
1:B:110:LEU:HD23	1:B:113:MET:HE2	1.48	0.95
1:D:110:LEU:HD23	1:D:113:MET:CE	2.01	0.91
1:B:110:LEU:HD23	1:B:113:MET:CE	2.00	0.90

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:302:THR:HG22	1:A:304:ILE:H	1.47	0.80
1:D:249:ASN:HD22	1:D:252:ALA:H	1.32	0.78
1:A:110:LEU:HD23	1:A:113:MET:HE2	1.65	0.77
1:A:110:LEU:HD23	1:A:113:MET:CE	2.15	0.76
1:C:110:LEU:HD23	1:C:113:MET:HE2	1.68	0.73
1:D:110:LEU:HD23	1:D:113:MET:HE2	1.71	0.72
1:A:249:ASN:HD22	1:A:252:ALA:H	1.41	0.68
1:A:98:THR:HG23	1:A:146:ALA:H	1.60	0.67
1:D:109:ASN:O	1:D:113:MET:HG3	1.95	0.67
1:A:150:LEU:HD22	1:A:166:LEU:HD23	1.78	0.65
1:A:79:THR:HG23	1:A:81:GLY:H	1.62	0.64
1:C:302:THR:HG22	1:C:304:ILE:H	1.63	0.64
1:D:330:THR:HG22	1:D:349:ILE:CD1	2.28	0.63
1:C:230:PRO:HG2	1:C:233:TRP:CD1	2.33	0.62
1:B:99:LEU:C	1:B:99:LEU:HD23	2.20	0.61
1:C:110:LEU:HD23	1:C:113:MET:HE3	1.78	0.61
1:D:99:LEU:C	1:D:99:LEU:HD23	2.21	0.61
1:C:180:ASP:OD1	1:C:180:ASP:C	2.39	0.60
1:A:249:ASN:HD21	1:A:251:ALA:HB3	1.69	0.58
1:B:195:ASP:HA	1:B:217:ARG:HG3	1.85	0.58
1:B:98:THR:HG22	1:B:146:ALA:H	1.69	0.57
1:A:79:THR:CG2	1:A:81:GLY:O	2.53	0.56
1:D:150:LEU:HD22	1:D:166:LEU:HD23	1.88	0.56
1:D:333:CYS:HB3	1:D:337:ARG:HD2	1.87	0.55
1:A:45:VAL:HG23	1:A:49:VAL:HG22	1.88	0.55
1:C:79:THR:O	1:C:212:GLY:N	2.34	0.55
1:C:99:LEU:C	1:C:99:LEU:HD23	2.27	0.55
1:A:247:GLU:HG3	1:C:202:ARG:NH1	2.21	0.54
1:A:333:CYS:HB3	1:A:337:ARG:HD2	1.90	0.54
1:C:109:ASN:O	1:C:113:MET:HG3	2.08	0.54
1:C:158:GLY:CA	1:C:302:THR:HG21	2.38	0.54
1:D:162:PRO:HB2	1:D:165:GLU:HG2	1.89	0.54
1:A:203:LYS:NZ	3:A:401:PYR:CB	2.70	0.53
1:A:19:LEU:HB3	1:A:349:ILE:HD12	1.89	0.53
1:B:249:ASN:HD22	1:B:252:ALA:H	1.57	0.53
1:D:249:ASN:HD21	1:D:251:ALA:HB3	1.74	0.53
1:C:79:THR:HG22	1:C:212:GLY:HA3	1.91	0.52
1:D:282:SER:HB2	1:D:305:THR:HG21	1.91	0.52
1:C:79:THR:CG2	1:C:81:GLY:O	2.57	0.52
1:A:202:ARG:NH1	1:C:247:GLU:HG2	2.25	0.52
1:D:70:GLY:O	1:D:217:ARG:NH2	2.43	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:87:ASP:OD1	1:D:227:ARG:NH2	2.44	0.51
1:C:302:THR:CG2	1:C:304:ILE:H	2.22	0.51
1:A:79:THR:HG22	1:A:212:GLY:CA	2.40	0.51
1:A:180:ASP:OD1	1:A:180:ASP:C	2.47	0.51
1:A:302:THR:CG2	1:A:304:ILE:H	2.21	0.51
1:B:45:VAL:HG23	1:B:49:VAL:HG22	1.91	0.51
1:A:203:LYS:HZ3	3:A:401:PYR:CB	2.05	0.51
1:D:195:ASP:HA	1:D:217:ARG:HG3	1.92	0.51
1:A:79:THR:HG22	1:A:212:GLY:HA3	1.94	0.50
1:D:293:ARG:NH1	1:D:308:GLU:OE2	2.44	0.50
1:C:162:PRO:HB2	1:C:165:GLU:HG2	1.93	0.50
1:A:79:THR:HG23	1:A:81:GLY:O	2.12	0.50
1:D:99:LEU:HA	1:D:147:LEU:O	2.12	0.50
1:C:99:LEU:HA	1:C:147:LEU:O	2.11	0.50
1:A:109:ASN:O	1:A:113:MET:HG3	2.12	0.49
1:C:221:ALA:O	1:C:224:LEU:HB2	2.12	0.49
1:D:99:LEU:HD11	1:D:113:MET:SD	2.53	0.49
1:C:125:VAL:HG12	1:C:131:VAL:HA	1.94	0.49
1:B:232:ASP:O	1:B:234:PRO:HD3	2.12	0.49
1:D:156:HIS:HE1	1:D:341:GLU:OE1	1.96	0.49
1:B:330:THR:HG22	1:B:349:ILE:CD1	2.43	0.48
1:B:98:THR:HG23	1:B:145:VAL:HG22	1.95	0.48
1:B:150:LEU:HD22	1:B:166:LEU:HD23	1.96	0.48
1:A:203:LYS:NZ	2:A:400:PLP:O3	2.45	0.48
1:D:94:PRO:HD3	1:D:224:LEU:HD12	1.95	0.47
1:A:121:ARG:HH21	1:A:139:GLU:HG2	1.79	0.47
1:D:110:LEU:HD23	1:D:113:MET:HE3	1.89	0.47
1:A:196:ALA:HA	1:A:215:ALA:O	2.15	0.47
1:A:202:ARG:NH1	1:C:247:GLU:CG	2.78	0.47
1:B:131:VAL:HG12	1:B:162:PRO:HD2	1.97	0.47
1:B:263:HIS:HE1	4:B:550:HOH:O	1.98	0.47
1:A:17:LEU:HB3	1:A:328:ILE:HG12	1.96	0.46
1:D:158:GLY:CA	1:D:302:THR:HG21	2.45	0.46
1:A:70:GLY:O	1:A:217:ARG:NH2	2.46	0.46
1:D:365:ALA:O	1:D:369:GLU:HG2	2.16	0.46
1:A:156:HIS:HE1	1:A:341:GLU:OE1	1.99	0.46
1:A:99:LEU:HA	1:A:147:LEU:O	2.16	0.46
1:C:38:HIS:O	1:C:42:GLU:HG3	2.16	0.46
1:D:158:GLY:O	1:D:302:THR:HG21	2.16	0.46
1:B:100:ALA:HA	1:B:121:ARG:O	2.15	0.46
1:D:183:GLN:CG	1:D:304:ILE:HD11	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:17:LEU:HB3	1:D:328:ILE:HG12	1.97	0.46
1:D:77:VAL:HG22	1:D:244:GLU:HB2	1.97	0.46
1:C:106:TYR:CG	1:C:108:PRO:HD2	2.50	0.45
1:A:162:PRO:HB2	1:A:165:GLU:HG2	1.98	0.45
1:D:97:ARG:HD3	1:D:118:PHE:CE1	2.51	0.45
1:B:279:GLY:HA3	1:B:302:THR:O	2.17	0.45
1:C:13:LYS:HB2	1:C:13:LYS:HE2	1.43	0.45
1:D:99:LEU:HD22	1:D:120:VAL:HG22	1.99	0.45
1:A:79:THR:CG2	1:A:81:GLY:H	2.29	0.44
1:A:249:ASN:HD22	1:A:252:ALA:N	2.13	0.44
1:B:110:LEU:CD2	1:B:113:MET:HE2	2.34	0.44
1:B:349:ILE:HD13	1:B:349:ILE:HA	1.76	0.44
1:C:82:SER:O	1:C:85:ALA:HB3	2.17	0.44
1:D:274:ARG:HG3	1:D:353:VAL:HG12	1.98	0.44
1:A:27:GLN:HE21	1:A:31:VAL:HG12	1.82	0.44
1:B:147:LEU:C	1:B:147:LEU:HD12	2.38	0.44
1:C:180:ASP:OD2	2:C:400:PLP:N1	2.51	0.44
1:C:205:LEU:HD13	1:C:260:VAL:HG13	1.99	0.43
1:C:247:GLU:HA	1:C:247:GLU:OE2	2.18	0.43
1:C:296:GLU:OE1	1:C:305:THR:HA	2.18	0.43
1:C:45:VAL:HG23	1:C:49:VAL:HG22	2.01	0.43
1:D:249:ASN:HD22	1:D:252:ALA:N	2.08	0.43
1:A:11:ARG:HD3	1:A:26:ARG:O	2.19	0.43
1:D:183:GLN:HG3	1:D:304:ILE:HD11	2.00	0.43
1:C:17:LEU:HB3	1:C:328:ILE:HG12	2.01	0.43
1:C:106:TYR:CD2	1:C:108:PRO:HD2	2.54	0.43
1:C:154:ALA:HB1	1:C:156:HIS:CD2	2.53	0.43
1:A:274:ARG:O	1:A:278:VAL:HG23	2.19	0.43
1:B:-1:HIS:CE1	1:C:232:ASP:OD2	2.72	0.42
1:D:156:HIS:CE1	1:D:341:GLU:OE1	2.72	0.42
1:A:150:LEU:O	1:A:179:ILE:HA	2.19	0.42
1:C:79:THR:CG2	1:C:81:GLY:H	2.32	0.42
1:D:201:SER:HB2	1:D:256:PHE:CD1	2.54	0.42
1:D:279:GLY:HA3	1:D:302:THR:O	2.19	0.42
1:D:17:LEU:O	1:D:328:ILE:HA	2.19	0.42
1:A:171:HIS:HE1	1:A:193:GLY:O	2.03	0.42
1:B:274:ARG:O	1:B:278:VAL:HG23	2.20	0.42
1:C:302:THR:HG22	1:C:304:ILE:N	2.33	0.42
1:B:330:THR:HG22	1:B:349:ILE:HD11	2.01	0.42
1:C:100:ALA:HA	1:C:121:ARG:O	2.19	0.42
1:C:150:LEU:O	1:C:179:ILE:HA	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:150:LEU:HD22	1:C:166:LEU:HD23	2.01	0.42
1:B:205:LEU:HD13	1:B:260:VAL:HG13	2.02	0.42
1:B:22:GLY:O	1:B:203:LYS:HD3	2.20	0.41
1:B:162:PRO:HB2	1:B:165:GLU:CG	2.50	0.41
1:B:110:LEU:HA	1:B:113:MET:HE2	2.02	0.41
1:C:91:SER:HA	1:C:116:ASN:ND2	2.36	0.41
1:C:79:THR:HG22	1:C:81:GLY:H	1.85	0.41
1:D:224:LEU:HD12	1:D:224:LEU:HA	1.85	0.41
1:A:163:ALA:O	1:A:167:VAL:HG23	2.21	0.41
1:D:162:PRO:HB2	1:D:165:GLU:CG	2.50	0.41
1:B:314:ASP:O	1:B:315:PRO:C	2.58	0.41
1:C:321:TRP:NE1	1:C:325:GLU:HG3	2.36	0.41
1:B:315:PRO:O	1:B:316:ALA:C	2.58	0.41
1:A:187:HIS:CE1	1:A:303:ALA:H	2.39	0.40
1:C:202:ARG:HD3	1:C:209:ARG:HG2	2.03	0.40
1:D:227:ARG:NH1	4:D:508:HOH:O	2.53	0.40
1:B:99:LEU:C	1:B:99:LEU:CD2	2.89	0.40
1:B:106:TYR:CG	1:B:108:PRO:HD2	2.57	0.40
1:C:79:THR:HG23	1:C:81:GLY:O	2.21	0.40
1:A:87:ASP:OD1	1:C:227:ARG:NH2	2.54	0.40
1:B:183:GLN:NE2	2:B:400:PLP:O3	2.54	0.40
1:D:71:PHE:CE2	1:D:217:ARG:HG2	2.57	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	377/392 (96%)	361 (96%)	15 (4%)	1 (0%)	41	47
1	B	371/392 (95%)	359 (97%)	12 (3%)	0	100	100
1	C	374/392 (95%)	349 (93%)	25 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	370/392 (94%)	355 (96%)	15 (4%)	0	100	100
All	All	1492/1568 (95%)	1424 (95%)	67 (4%)	1 (0%)	51	63

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	25	SER

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	282/298 (95%)	258 (92%)	24 (8%)	10	10
1	B	279/298 (94%)	256 (92%)	23 (8%)	11	11
1	C	282/298 (95%)	255 (90%)	27 (10%)	8	7
1	D	280/298 (94%)	256 (91%)	24 (9%)	10	9
All	All	1123/1192 (94%)	1025 (91%)	98 (9%)	10	9

All (98) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-4	ARG
1	A	8	ARG
1	A	13	LYS
1	A	21	SER
1	A	26	ARG
1	A	49	VAL
1	A	77	VAL
1	A	79	THR
1	A	96	LYS
1	A	99	LEU
1	A	102	LEU
1	A	141	SER
1	A	145	VAL

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Mol	Chain	Res	Type
1	A	155	SER
1	A	217	ARG
1	A	224	LEU
1	A	235	ILE
1	A	247	GLU
1	A	254	VAL
1	A	260	VAL
1	A	277	GLU
1	A	317	SER
1	A	344	THR
1	A	349	ILE
1	B	11	ARG
1	B	21	SER
1	B	26	ARG
1	B	40	ARG
1	B	49	VAL
1	B	74	SER
1	B	96	LYS
1	B	98	THR
1	B	99	LEU
1	B	137	SER
1	B	139	GLU
1	B	145	VAL
1	B	155	SER
1	B	168	GLU
1	B	217	ARG
1	B	224	LEU
1	B	228	ILE
1	B	232	ASP
1	B	247	GLU
1	B	260	VAL
1	B	290	ASP
1	B	344	THR
1	B	349	ILE
1	C	-2	SER
1	C	11	ARG
1	C	13	LYS
1	C	21	SER
1	C	26	ARG
1	C	79	THR
1	C	96	LYS
1	C	99	LEU

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Mol	Chain	Res	Type
1	C	111	SER
1	C	137	SER
1	C	145	VAL
1	C	168	GLU
1	C	217	ARG
1	C	224	LEU
1	C	233	TRP
1	C	235	ILE
1	C	237	MET
1	C	247	GLU
1	C	260	VAL
1	C	264	LEU
1	C	277	GLU
1	C	290	ASP
1	C	305	THR
1	C	317	SER
1	C	331	THR
1	C	344	THR
1	C	358	ASP
1	D	11	ARG
1	D	12	PRO
1	D	25	SER
1	D	77	VAL
1	D	99	LEU
1	D	141	SER
1	D	145	VAL
1	D	155	SER
1	D	168	GLU
1	D	188	LEU
1	D	201	SER
1	D	217	ARG
1	D	224	LEU
1	D	232	ASP
1	D	237	MET
1	D	247	GLU
1	D	254	VAL
1	D	260	VAL
1	D	290	ASP
1	D	305	THR
1	D	331	THR
1	D	343	ARG
1	D	344	THR

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Mol	Chain	Res	Type
1	D	349	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	27	GLN
1	A	116	ASN
1	A	156	HIS
1	A	249	ASN
1	A	284	GLN
1	B	-1	HIS
1	B	27	GLN
1	B	116	ASN
1	B	249	ASN
1	B	263	HIS
1	B	284	GLN
1	C	5	GLN
1	C	27	GLN
1	C	116	ASN
1	C	156	HIS
1	C	249	ASN
1	C	284	GLN
1	D	27	GLN
1	D	116	ASN
1	D	156	HIS
1	D	249	ASN
1	D	284	GLN
1	D	362	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

5 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	PLP	D	400	1	15,15,16	0.82	0	20,22,23	1.74	5 (25%)
2	PLP	C	400	1	15,15,16	0.88	1 (6%)	20,22,23	0.95	1 (5%)
3	PYR	A	401	-	5,5,5	3.27	2 (40%)	3,6,6	1.67	1 (33%)
2	PLP	A	400	1	15,15,16	0.93	1 (6%)	20,22,23	0.90	0
2	PLP	B	400	1	15,15,16	0.87	1 (6%)	20,22,23	1.24	4 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PLP	D	400	1	-	3/6/6/8	0/1/1/1
2	PLP	C	400	1	-	1/6/6/8	0/1/1/1
3	PYR	A	401	-	-	2/4/4/4	-
2	PLP	A	400	1	-	0/6/6/8	0/1/1/1
2	PLP	B	400	1	-	5/6/6/8	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	401	PYR	CA-C	-6.94	1.29	1.54
2	B	400	PLP	C4A-C4	-2.44	1.46	1.51
2	A	400	PLP	C4A-C4	-2.44	1.46	1.51
2	C	400	PLP	C4A-C4	-2.10	1.47	1.51
3	A	401	PYR	OXT-C	-2.04	1.24	1.30

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	400	PLP	O3P-P-O4P	-4.27	95.37	106.73
2	D	400	PLP	C4A-C4-C5	3.76	124.81	120.94
2	D	400	PLP	O4P-C5A-C5	2.89	114.86	109.35
2	D	400	PLP	O4P-P-O1P	2.69	114.03	106.47
3	A	401	PYR	OXT-C-CA	2.67	121.28	113.97
2	B	400	PLP	O3P-P-O4P	-2.57	99.89	106.73
2	B	400	PLP	O4P-C5A-C5	2.53	114.17	109.35
2	C	400	PLP	C4A-C4-C5	2.41	123.41	120.94
2	B	400	PLP	O4P-P-O1P	2.30	112.93	106.47
2	B	400	PLP	C4A-C4-C5	2.14	123.14	120.94
2	D	400	PLP	O3P-P-O2P	2.01	115.30	107.64

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	400	PLP	C4-C5-C5A-O4P
2	B	400	PLP	C6-C5-C5A-O4P
2	B	400	PLP	C5A-O4P-P-O1P
2	B	400	PLP	C5A-O4P-P-O2P
2	B	400	PLP	C5A-O4P-P-O3P
2	D	400	PLP	C5A-O4P-P-O2P
2	D	400	PLP	C5A-O4P-P-O3P
3	A	401	PYR	OXT-C-CA-CB
2	D	400	PLP	C5A-O4P-P-O1P
3	A	401	PYR	O-C-CA-CB
2	C	400	PLP	C5A-O4P-P-O2P

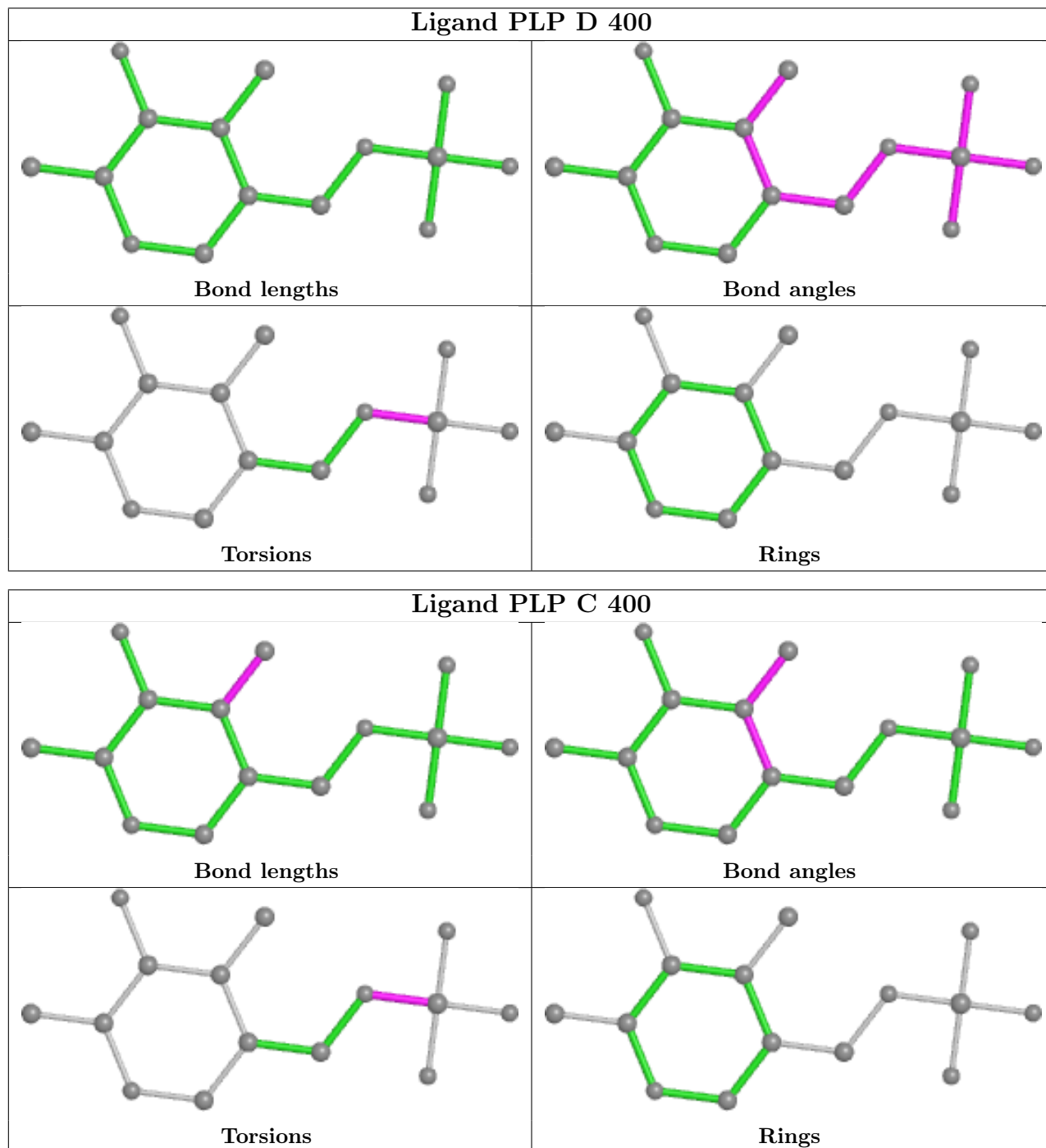
There are no ring outliers.

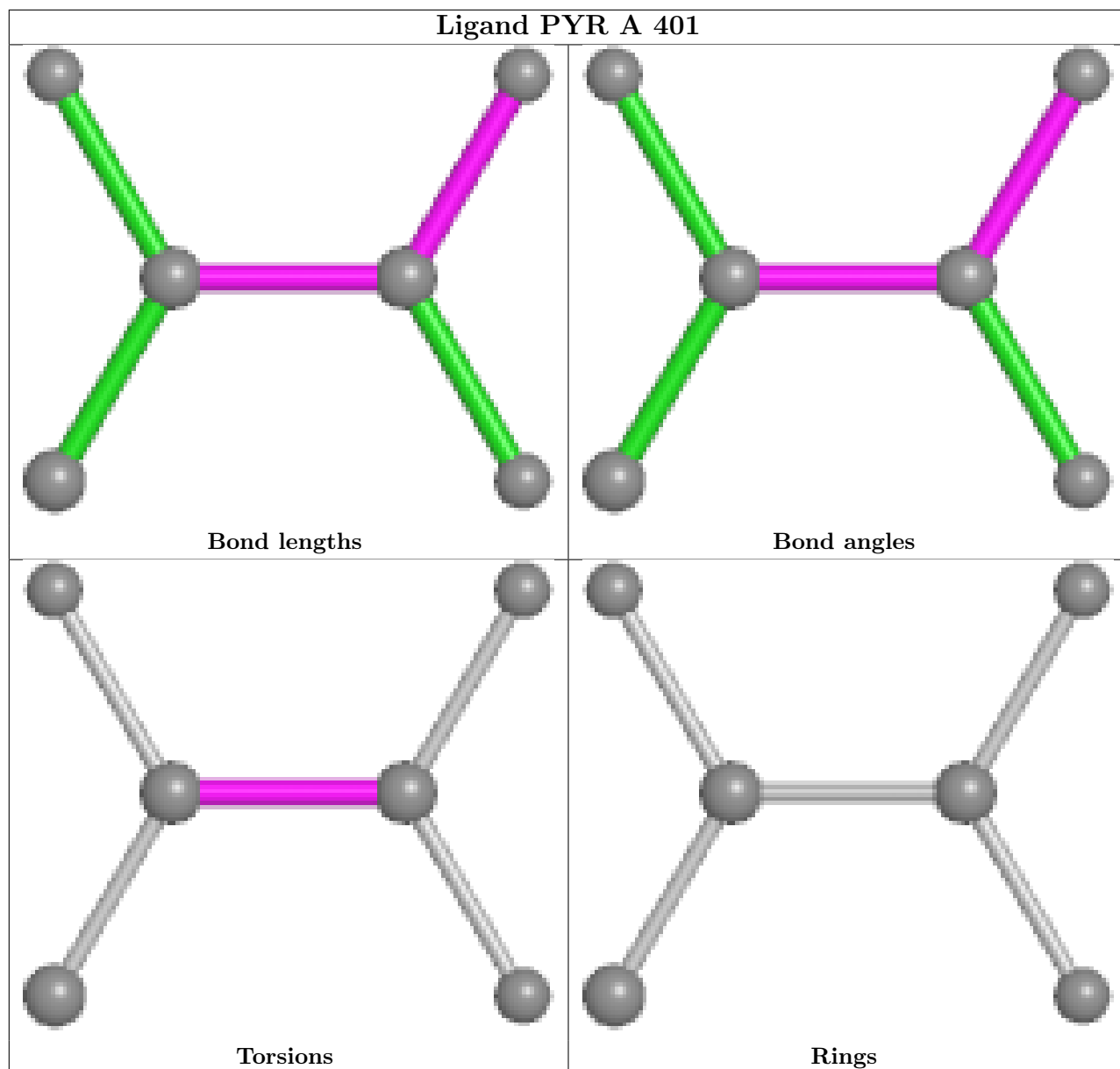
4 monomers are involved in 6 short contacts:

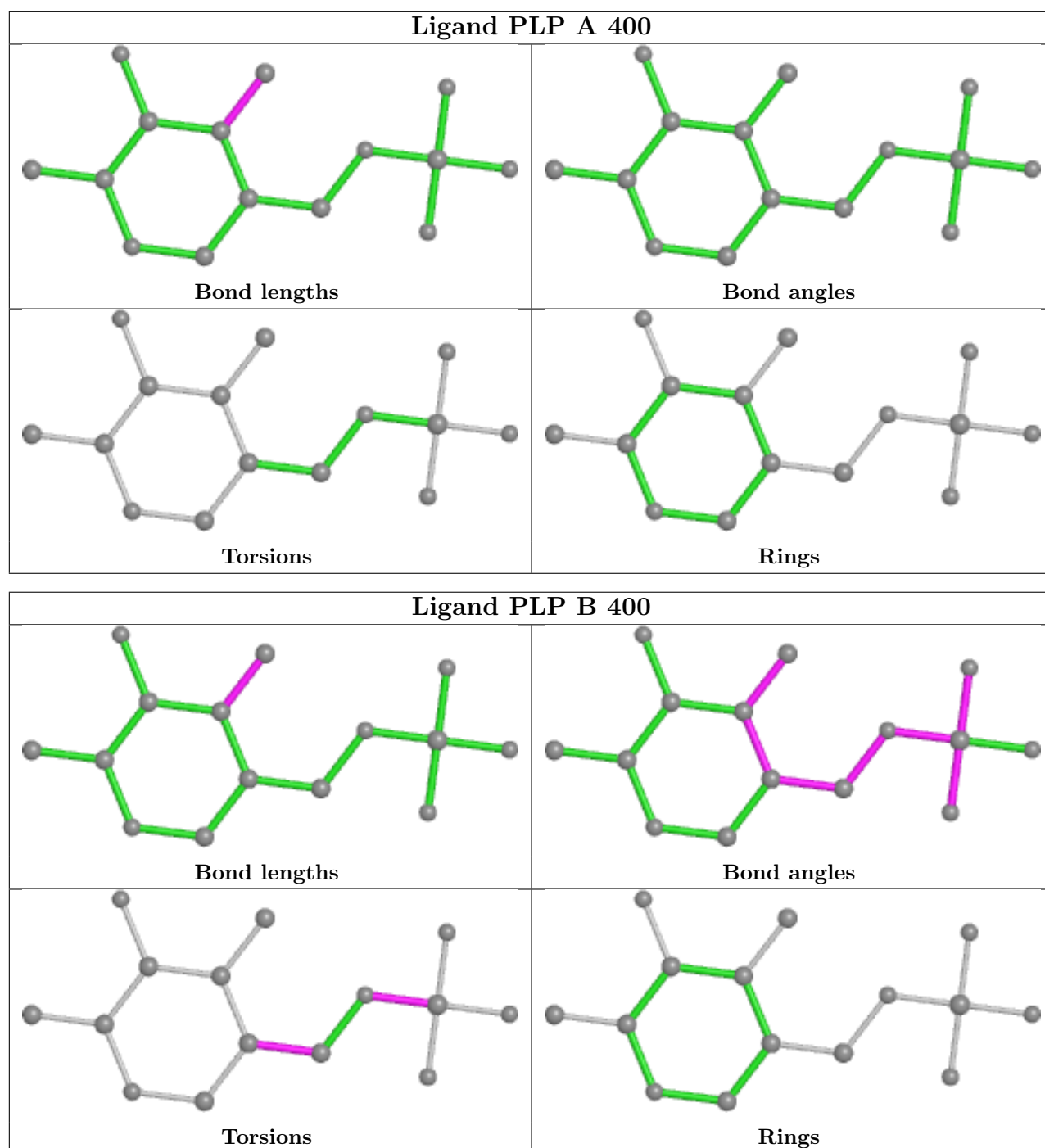
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	400	PLP	1	0
3	A	401	PYR	3	0
2	A	400	PLP	2	0
2	B	400	PLP	1	0

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

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







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [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	379/392 (96%)	-0.10	11 (2%) 51 62	30, 50, 77, 153	0
1	B	373/392 (95%)	-0.16	8 (2%) 63 74	33, 51, 82, 124	0
1	C	376/392 (95%)	-0.07	13 (3%) 44 56	31, 52, 83, 136	0
1	D	372/392 (94%)	-0.18	5 (1%) 77 84	31, 52, 78, 110	0
All	All	1500/1568 (95%)	-0.13	37 (2%) 57 67	30, 51, 80, 153	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	234	PRO	5.9
1	D	371	PRO	4.6
1	C	371	PRO	4.5
1	A	370	ALA	4.3
1	A	313	ALA	4.2
1	D	232	ASP	4.0
1	A	232	ASP	3.7
1	C	234	PRO	3.5
1	B	371	PRO	3.4
1	A	235	ILE	3.3
1	C	290	ASP	3.1
1	A	371	PRO	3.1
1	A	-7	LEU	3.0
1	C	288	GLU	2.9
1	A	233	TRP	2.9
1	B	232	ASP	2.8
1	D	233	TRP	2.6
1	B	231	SER	2.6
1	B	142	ALA	2.5
1	C	232	ASP	2.5
1	A	80	SER	2.5

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Mol	Chain	Res	Type	RSRZ
1	C	310	THR	2.4
1	C	80	SER	2.4
1	A	312	GLY	2.4
1	B	83	ASN	2.3
1	C	231	SER	2.3
1	A	236	PRO	2.2
1	B	96	LYS	2.2
1	C	211	VAL	2.2
1	C	233	TRP	2.2
1	D	288	GLU	2.2
1	D	312	GLY	2.2
1	C	-2	SER	2.1
1	B	138	HIS	2.1
1	C	79	THR	2.1
1	B	-1	HIS	2.1
1	C	312	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 monosaccharides in this entry.

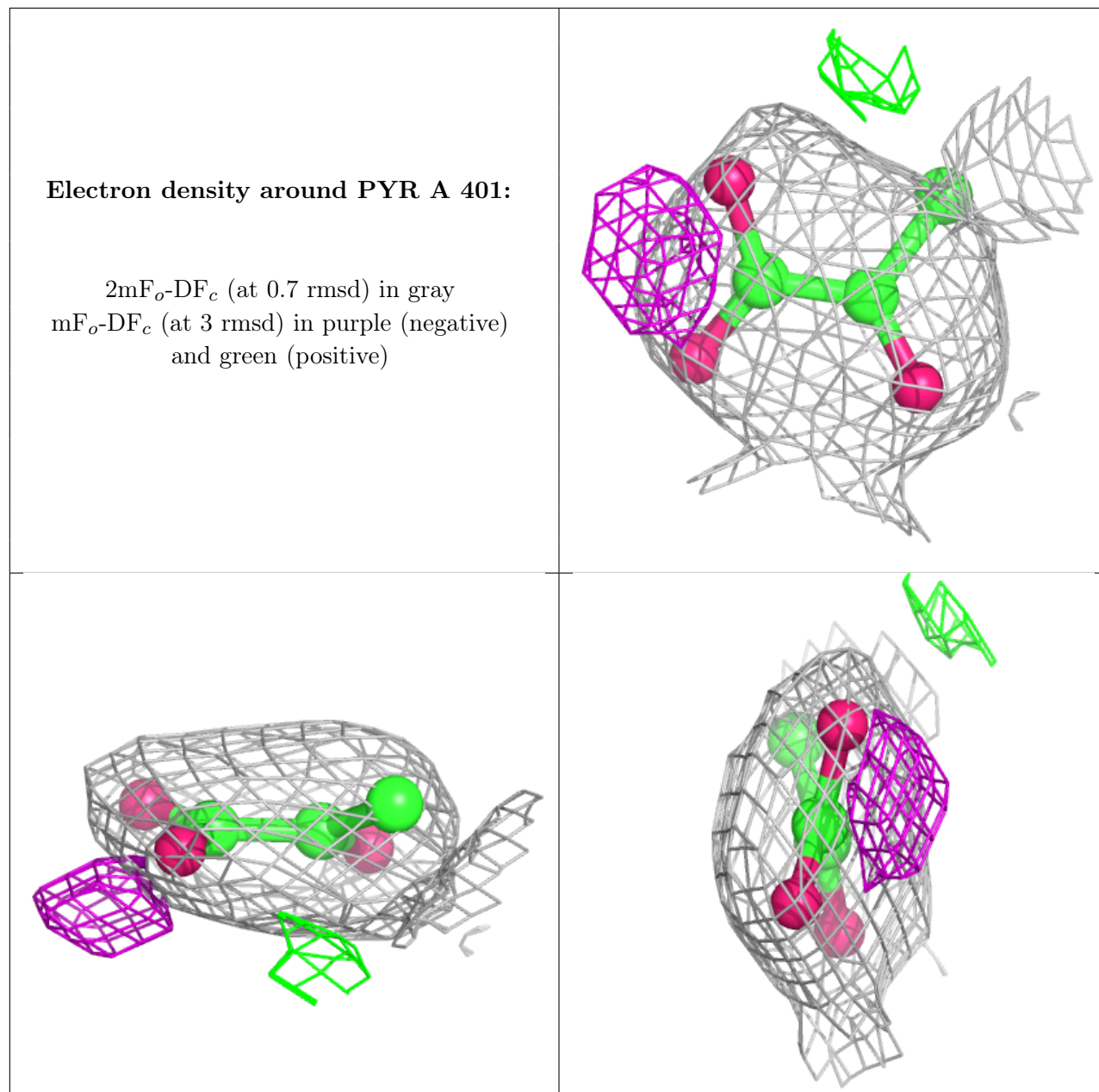
6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	PYR	A	401	6/6	0.94	0.21	61,65,72,78	0
2	PLP	B	400	15/16	0.98	0.20	33,39,48,52	0
2	PLP	C	400	15/16	0.99	0.18	32,41,47,53	0
2	PLP	D	400	15/16	0.99	0.18	36,43,50,53	0
2	PLP	A	400	15/16	0.99	0.19	33,37,47,52	0

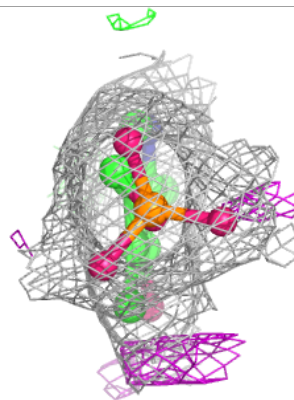
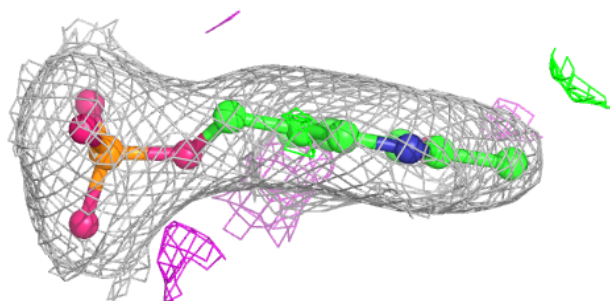
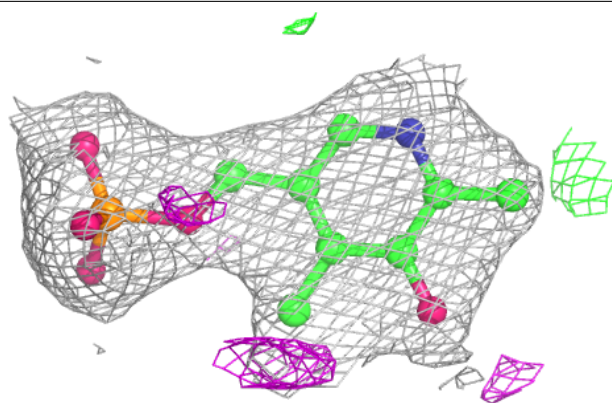
The following is a graphical depiction of the model fit to experimental electron density of all

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.

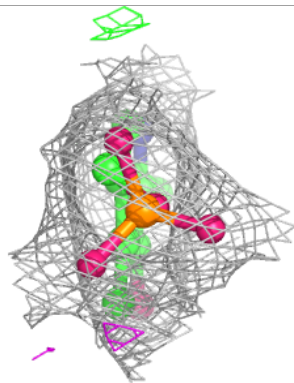
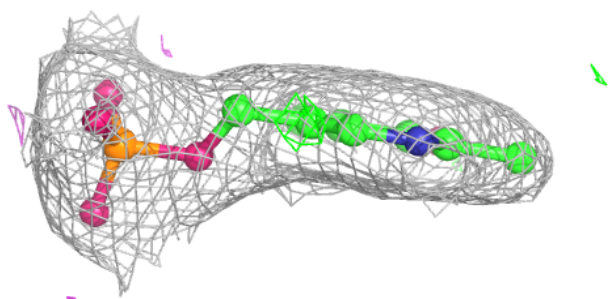
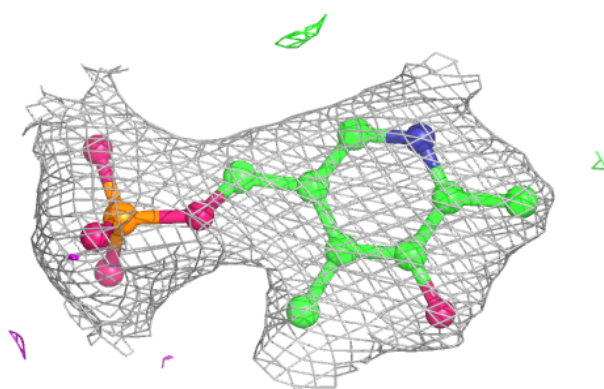


Electron density around PLP B 400:

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

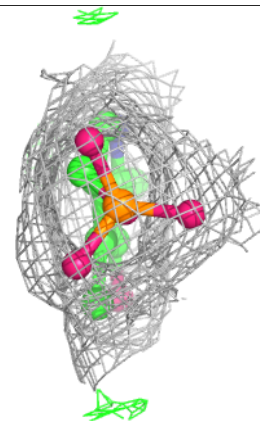
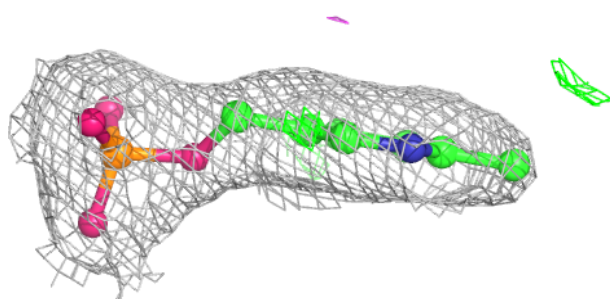
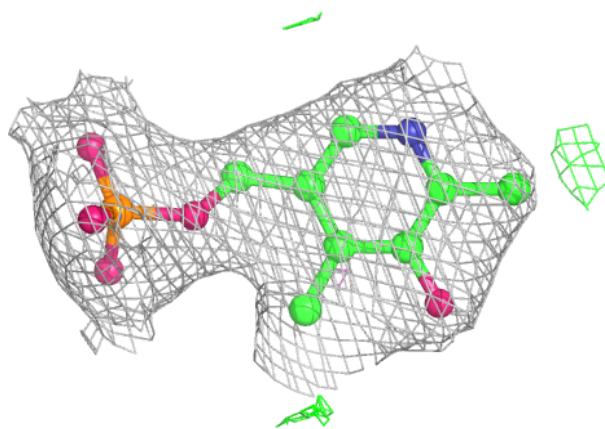
**Electron density around PLP C 400:**

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

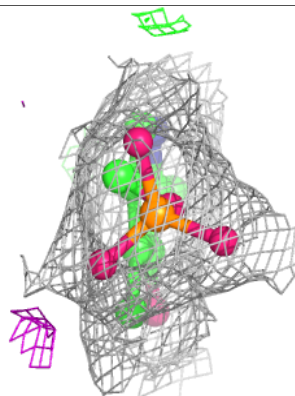
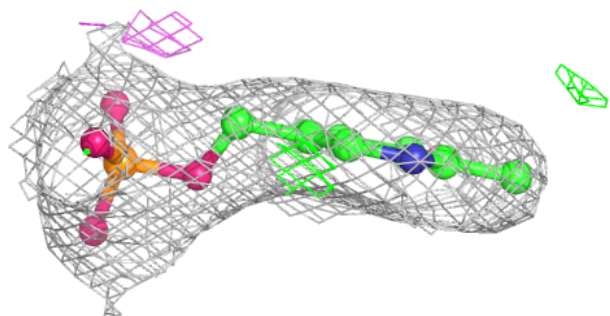
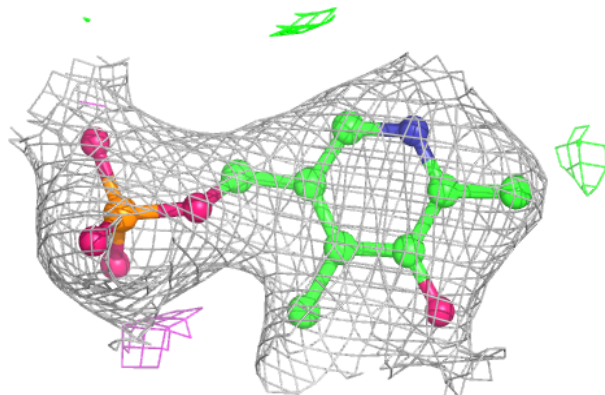


Electron density around PLP D 400:

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

**Electron density around PLP A 400:**

$2mF_o-DF_c$ (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.