



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 26, 2024 – 09:19 AM EDT

PDB ID : 6YRW
Title : SHMT from Streptococcus thermophilus Tyr55Ser variant as internal aldimine and as non-covalent complex with D-Ser
Authors : Petrillo, G.; Hernandez, K.; Bujons, J.; Clapes, P.; Uson, I.
Deposited on : 2020-04-20
Resolution : 2.50 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	:	2.37.1
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)	:	2.37.1

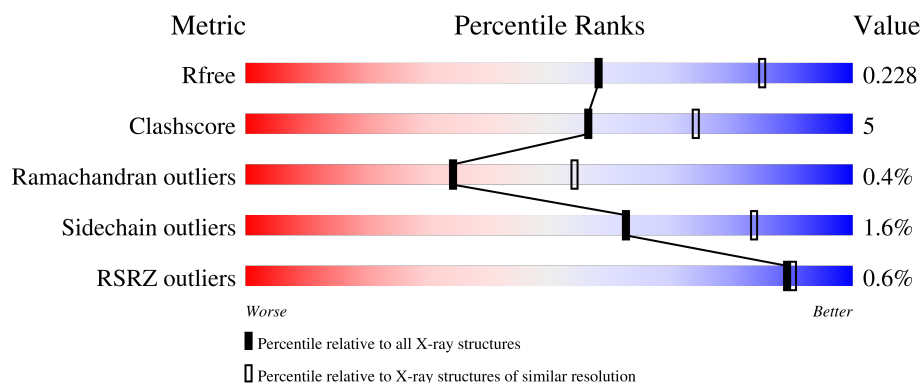
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION





The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	416	 87% 11% ..
1	B	416	 87% 11% .
1	C	416	 86% 12% ..
1	D	416	 85% 13% .

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 12948 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.

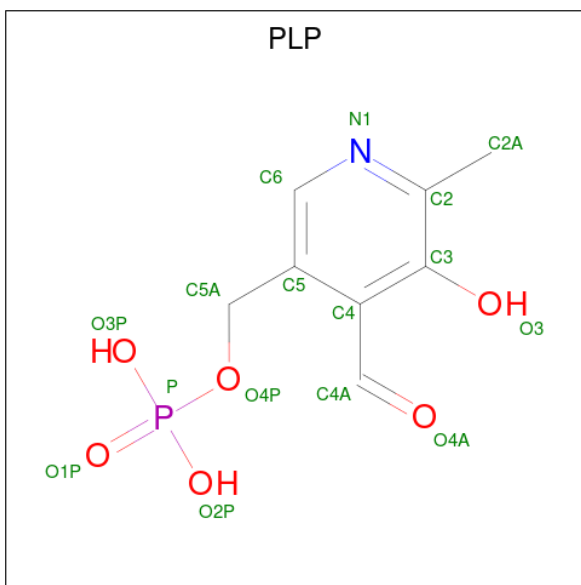
- Molecule 1 is a protein called Serine hydroxymethyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	410	Total	C	N	O	S	0	2	0
			3118	1973	536	600	9			
1	C	410	Total	C	N	O	S	0	1	0
			3118	1973	536	600	9			
1	B	410	Total	C	N	O	S	0	0	0
			3118	1973	536	600	9			
1	D	410	Total	C	N	O	S	0	1	0
			3118	1973	536	600	9			

There are 4 discrepancies between the modelled and reference sequences:

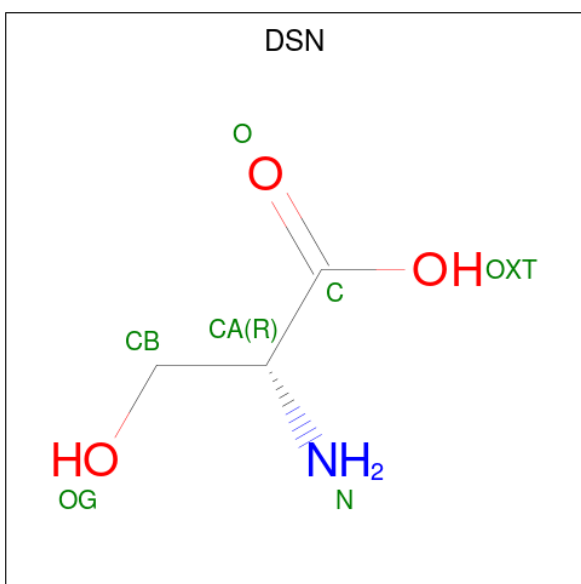
Chain	Residue	Modelled	Actual	Comment	Reference
A	55	SER	TYR	engineered mutation	UNP Q5MCK9
C	55	SER	TYR	engineered mutation	UNP Q5MCK9
B	55	SER	TYR	engineered mutation	UNP Q5MCK9
D	55	SER	TYR	engineered mutation	UNP Q5MCK9

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



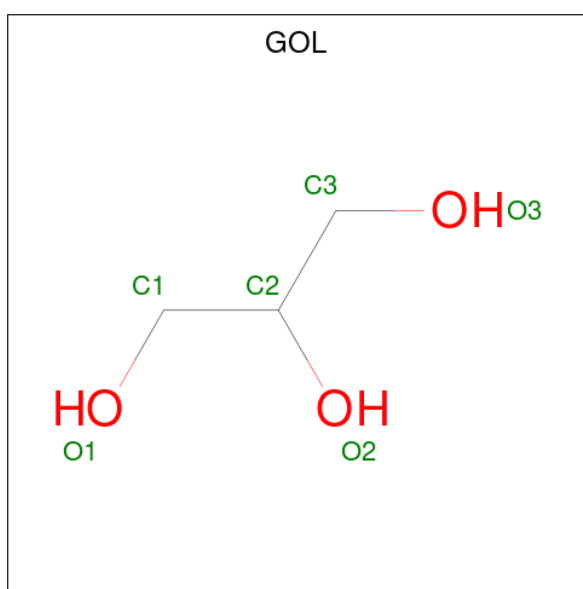
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	C	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	B	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	D	1	Total	C	N	O	P	0	0
			15	8	1	5	1		

- Molecule 3 is D-SERINE (three-letter code: DSN) (formula: $C_3H_7NO_3$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	114	Total O 114 114	0	0
5	C	115	Total O 115 115	0	0
5	B	96	Total O 96 96	0	0

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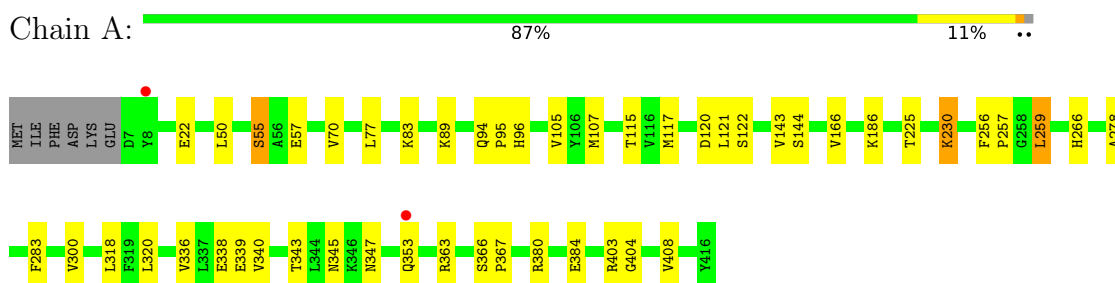
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	51	Total	O	0	0
			51	51		

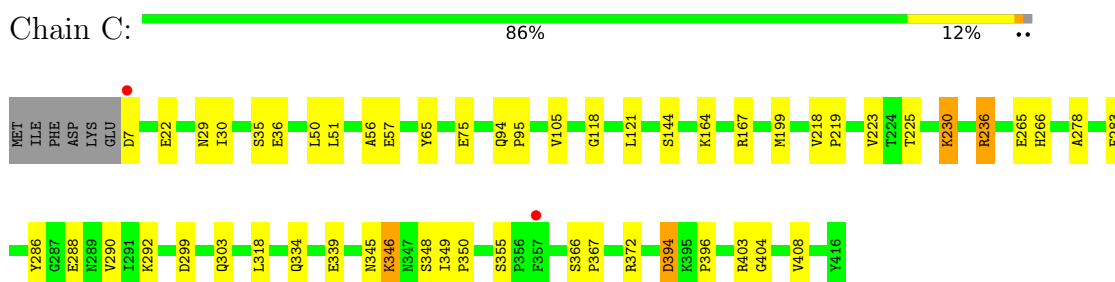
3 Residue-property plots [i](#)

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.

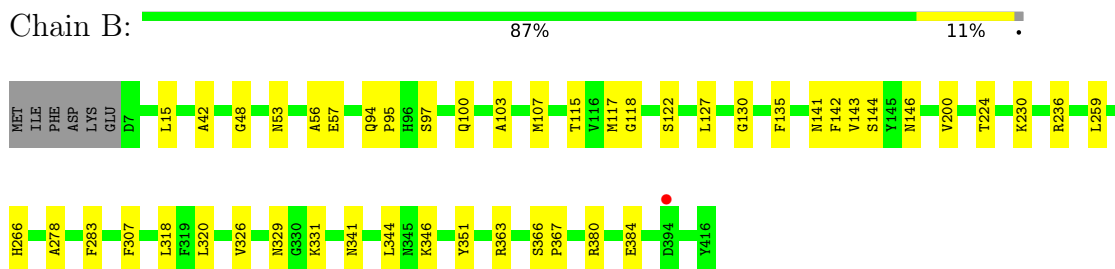
- Molecule 1: Serine hydroxymethyltransferase



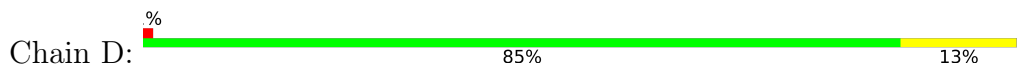
- Molecule 1: Serine hydroxymethyltransferase

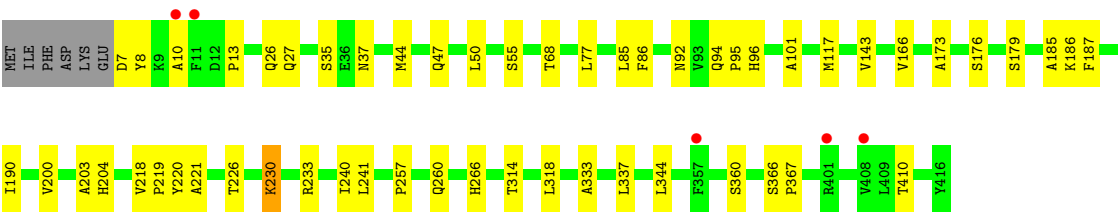


- Molecule 1: Serine hydroxymethyltransferase



- Molecule 1: Serine hydroxymethyltransferase





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	199.96Å 113.66Å 132.48Å 90.00° 94.13° 90.00°	Depositor
Resolution (Å)	47.85 – 2.50 47.80 – 2.50	Depositor EDS
% Data completeness (in resolution range)	76.0 (47.85-2.50) 76.0 (47.80-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.21 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.176 , 0.227 0.180 , 0.228	Depositor DCC
R_{free} test set	3838 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	41.9	Xtriage
Anisotropy	0.117	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 40.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	12948	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.39% 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: GOL, PLP, DSN

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	0.71	0/3180	0.87	0/4317
1	B	0.72	0/3180	0.83	0/4317
1	C	0.72	0/3179	0.88	2/4314 (0.0%)
1	D	0.70	0/3180	0.84	0/4317
All	All	0.71	0/12719	0.86	2/17265 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	394	ASP	CB-CA-C	-6.29	97.82	110.40
1	C	236	ARG	NE-CZ-NH2	-5.03	117.79	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3118	0	3093	37	0
1	B	3118	0	3095	29	0
1	C	3118	0	3088	37	0
1	D	3118	0	3088	32	0
2	A	15	0	6	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	15	0	6	0	0
2	C	15	0	6	1	0
2	D	15	0	6	0	0
3	A	7	0	6	1	0
3	B	7	0	6	0	0
3	C	7	0	6	0	0
3	D	7	0	6	0	0
4	A	6	0	8	0	0
4	B	6	0	8	0	0
5	A	114	0	0	4	1
5	B	96	0	0	0	0
5	C	115	0	0	1	0
5	D	51	0	0	1	0
All	All	12948	0	12428	125	1

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 5.

All (125) 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:107:MET:HE1	1:A:259:LEU:HD12	1.53	0.90
1:A:107:MET:CE	1:A:259:LEU:HD12	2.04	0.86
1:C:29[A]:ASN:C	1:C:30:ILE:N	2.38	0.77
1:C:366:SER:N	1:C:367:PRO:HD3	2.08	0.69
1:D:96:HIS:H	1:D:260:GLN:HE22	1.42	0.68
1:A:55:SER:HB2	1:C:36:GLU:OE2	1.98	0.62
1:A:340:VAL:HA	1:A:403:ARG:HG3	1.80	0.62
1:C:94:GLN:N	1:C:95:PRO:CD	2.65	0.60
1:D:7:ASP:HA	5:D:601:HOH:O	2.02	0.59
1:A:366:SER:N	1:A:367:PRO:CD	2.66	0.59
1:C:366:SER:H	1:C:367:PRO:HD3	1.67	0.59
1:A:404:GLY:O	1:A:408:VAL:HG23	2.03	0.58
1:B:146:ASN:ND2	1:B:351:TYR:CZ	2.71	0.58
1:B:97:SER:OG	1:B:100:GLN:NE2	2.37	0.58
1:A:366:SER:N	1:A:367:PRO:HD3	2.19	0.57
1:C:366:SER:N	1:C:367:PRO:CD	2.67	0.56
1:C:394:ASP:O	1:C:396:PRO:HD3	2.04	0.56
1:B:318:LEU:C	1:B:318:LEU:HD12	2.26	0.56
1:B:127:LEU:HD13	1:D:257:PRO:HB3	1.88	0.56
1:A:266:HIS:H	1:A:266:HIS:CD2	2.23	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:94:GLN:N	1:D:95:PRO:CD	2.69	0.55
1:B:278:ALA:HA	1:B:283:PHE:CG	2.42	0.55
1:D:186:LYS:O	1:D:190:ILE:HG13	2.06	0.55
1:B:320:LEU:CD2	1:B:363:ARG:HB2	2.37	0.55
1:C:105:VAL:HG21	1:C:225:THR:CG2	2.38	0.54
1:A:353:GLN:HA	1:A:353:GLN:HE21	1.72	0.54
1:C:266:HIS:H	1:C:266:HIS:CD2	2.25	0.54
1:B:118:GLY:O	1:B:144:SER:HA	2.07	0.54
1:D:37:ASN:CG	1:D:233:ARG:HG3	2.28	0.54
1:B:366:SER:N	1:B:367:PRO:HD3	2.23	0.53
1:B:366:SER:N	1:B:367:PRO:CD	2.71	0.53
1:A:96:HIS:HD2	5:A:651:HOH:O	1.92	0.53
1:C:404:GLY:O	1:C:408:VAL:HG23	2.08	0.53
1:C:94:GLN:N	1:C:95:PRO:HD3	2.24	0.52
1:D:117:MET:HA	1:D:143:VAL:O	2.09	0.52
1:A:107:MET:HE1	1:A:259:LEU:CD1	2.35	0.52
1:D:366:SER:N	1:D:367:PRO:CD	2.73	0.52
1:D:27:GLN:O	1:D:410:THR:HG23	2.09	0.52
1:C:56:ALA:O	1:C:57:GLU:C	2.49	0.52
1:A:278:ALA:HA	1:A:283:PHE:CG	2.44	0.51
1:D:200:VAL:HG23	1:D:221:ALA:HB2	1.92	0.51
1:B:103:ALA:HB2	1:B:135:PHE:CZ	2.46	0.51
1:C:230:LYS:NZ	2:C:501:PLP:O3	2.42	0.50
1:C:288:GLU:HG2	1:C:292:LYS:HE2	1.94	0.50
1:C:286:TYR:O	1:C:290:VAL:HG23	2.12	0.50
1:B:107:MET:HE1	1:B:259:LEU:HD13	1.93	0.50
1:D:10:ALA:O	1:D:13:PRO:HD3	2.11	0.50
1:A:318:LEU:C	1:A:318:LEU:HD12	2.32	0.49
1:D:173:ALA:O	1:D:200:VAL:HA	2.12	0.49
1:B:115:THR:HA	1:B:141:ASN:O	2.12	0.49
1:D:143:VAL:HG11	1:D:166:VAL:HG21	1.95	0.49
1:A:107:MET:CE	1:A:259:LEU:CD1	2.84	0.49
1:D:185:ALA:HA	1:D:220:TYR:CD1	2.47	0.48
1:A:120:ASP:C	1:A:122:SER:H	2.17	0.48
1:D:366:SER:N	1:D:367:PRO:HD3	2.28	0.48
1:A:366:SER:H	1:A:367:PRO:HD3	1.77	0.48
1:C:118:GLY:O	1:C:144:SER:HA	2.14	0.47
1:B:117:MET:HA	1:B:143:VAL:O	2.14	0.47
1:C:164:LYS:O	1:C:167:ARG:HD3	2.15	0.47
1:D:203:ALA:HA	1:D:226:THR:OG1	2.14	0.47
1:B:307:PHE:CZ	1:B:326:VAL:HG21	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:94:GLN:N	1:A:95:PRO:CD	2.77	0.47
1:C:7:ASP:N	5:C:604:HOH:O	2.48	0.46
1:A:96:HIS:CD2	5:A:651:HOH:O	2.66	0.46
1:C:334:GLN:NE2	1:C:346:LYS:H	2.14	0.46
1:B:42:ALA:HB2	1:D:8:TYR:HB2	1.98	0.46
1:C:318:LEU:C	1:C:318:LEU:HD12	2.36	0.45
1:A:345:ASN:HD21	1:A:363:ARG:HE	1.63	0.45
1:D:266:HIS:CD2	1:D:266:HIS:H	2.35	0.45
1:A:117:MET:HA	1:A:143:VAL:O	2.16	0.45
1:C:75:GLU:OE1	1:C:265:GLU:OE2	2.35	0.45
1:A:340:VAL:HG23	1:A:340:VAL:O	2.17	0.45
1:B:48:GLY:O	1:D:44:MET:HB3	2.17	0.45
1:C:334:GLN:HE21	1:C:346:LYS:HB3	1.83	0.44
1:D:318:LEU:HD12	1:D:318:LEU:C	2.38	0.44
1:C:339:GLU:O	1:C:403:ARG:HD3	2.17	0.44
1:A:22:GLU:HG2	1:C:51:LEU:HD22	1.99	0.44
1:A:115:THR:HG21	1:A:166:VAL:CG1	2.48	0.44
1:A:186:LYS:HD2	1:A:186:LYS:HA	1.80	0.44
1:D:218:VAL:HB	1:D:219:PRO:HD3	2.00	0.43
1:A:120:ASP:HA	1:A:144:SER:HB2	2.00	0.43
1:A:83:LYS:HE3	1:A:89:LYS:O	2.18	0.43
1:A:300:VAL:CG2	1:A:380:ARG:HG3	2.49	0.43
1:D:176:SER:HA	1:D:204:HIS:CD2	2.53	0.43
1:D:35:SER:O	1:D:230:LYS:HA	2.19	0.43
1:A:380:ARG:O	1:A:384:GLU:HG2	2.18	0.43
1:B:53:ASN:HD22	1:D:26:GLN:HE22	1.67	0.43
1:D:179:SER:HB2	1:D:314:THR:HA	2.01	0.43
1:C:278:ALA:HA	1:C:283:PHE:CG	2.54	0.42
1:A:320:LEU:CD2	1:A:363:ARG:HB2	2.49	0.42
1:A:96:HIS:HE1	5:A:638:HOH:O	2.01	0.42
1:C:121:LEU:HD12	1:C:121:LEU:N	2.34	0.42
1:D:101:ALA:HA	1:D:240:ILE:HD11	2.01	0.42
1:B:15:LEU:C	1:B:15:LEU:HD13	2.40	0.42
1:B:56:ALA:O	1:B:57:GLU:C	2.58	0.42
1:B:130:GLY:HA3	1:B:142:PHE:CG	2.55	0.42
1:C:349:ILE:O	1:C:350:PRO:C	2.58	0.42
1:B:380:ARG:O	1:B:384:GLU:HG2	2.19	0.42
1:A:105:VAL:HG21	1:A:225:THR:CG2	2.50	0.42
1:C:345:ASN:C	1:C:346:LYS:O	2.55	0.42
1:B:53:ASN:HD22	1:D:26:GLN:NE2	2.18	0.42
1:A:336:VAL:O	1:A:339:GLU:HB2	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:347:ASN:ND2	5:A:607:HOH:O	2.54	0.41
1:A:340:VAL:HA	1:A:403:ARG:CG	2.47	0.41
1:C:218:VAL:HB	1:C:219:PRO:HD3	2.03	0.41
1:B:236:ARG:HH22	1:D:55:SER:HB3	1.85	0.41
1:B:329:ASN:OD1	1:B:331:LYS:HB3	2.20	0.41
1:B:200:VAL:O	1:B:224:THR:HA	2.20	0.41
1:D:92:ASN:OD1	1:D:95:PRO:HD3	2.21	0.41
1:D:85:LEU:HD23	1:D:86:PHE:CE2	2.56	0.41
1:B:341:ASN:HD22	1:B:341:ASN:HA	1.72	0.41
1:B:366:SER:H	1:B:367:PRO:HD3	1.86	0.41
1:B:94:GLN:N	1:B:95:PRO:CD	2.84	0.41
1:A:230:LYS:NZ	2:A:501:PLP:O3	2.53	0.41
1:A:70:VAL:HG11	1:C:22:GLU:HB2	2.03	0.40
1:A:256:PHE:CD1	1:A:257:PRO:HA	2.55	0.40
1:B:266:HIS:HE1	1:D:47:GLN:NE2	2.20	0.40
1:D:333:ALA:O	1:D:337:LEU:HG	2.21	0.40
1:C:35:SER:HB2	1:C:230:LYS:HE2	2.04	0.40
1:C:299:ASP:O	1:C:303:GLN:HG2	2.20	0.40
1:C:199:MET:HA	1:C:223:VAL:O	2.21	0.40
3:A:502:DSN:OXT	1:C:65:TYR:OH	2.35	0.40

All (1) 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)
5:A:705:HOH:O	5:A:705:HOH:O[2_555]	2.19	0.01

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	408/416 (98%)	386 (95%)	20 (5%)	2 (0%)	29 48

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	408/416 (98%)	388 (95%)	19 (5%)	1 (0%)	47 68
1	C	406/416 (98%)	389 (96%)	14 (3%)	3 (1%)	22 39
1	D	408/416 (98%)	393 (96%)	14 (3%)	1 (0%)	47 68
All	All	1630/1664 (98%)	1556 (96%)	67 (4%)	7 (0%)	34 54

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	230	LYS
1	C	230	LYS
1	C	346	LYS
1	B	230	LYS
1	D	230	LYS
1	A	121	LEU
1	C	348	SER

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	327/333 (98%)	320 (98%)	7 (2%)	53 78
1	B	327/333 (98%)	324 (99%)	3 (1%)	78 92
1	C	327/333 (98%)	323 (99%)	4 (1%)	71 88
1	D	327/333 (98%)	320 (98%)	7 (2%)	53 78
All	All	1308/1332 (98%)	1287 (98%)	21 (2%)	62 84

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	LEU
1	A	55	SER
1	A	57	GLU
1	A	77	LEU

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Mol	Chain	Res	Type
1	A	259	LEU
1	A	338	GLU
1	A	343	THR
1	C	50	LEU
1	C	236	ARG
1	C	355	SER
1	C	372	ARG
1	B	122	SER
1	B	344	LEU
1	B	346	LYS
1	D	50	LEU
1	D	68	THR
1	D	77	LEU
1	D	187	PHE
1	D	241	LEU
1	D	344	LEU
1	D	360	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (34) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	17	ASN
1	A	96	HIS
1	A	266	HIS
1	A	341	ASN
1	A	345	ASN
1	A	347	ASN
1	A	353	GLN
1	A	392	ASN
1	C	17	ASN
1	C	29[A]	ASN
1	C	47	GLN
1	C	96	HIS
1	C	266	HIS
1	C	334	GLN
1	C	341	ASN
1	C	345	ASN
1	C	347	ASN
1	B	17	ASN
1	B	47	GLN
1	B	96	HIS
1	B	100	GLN

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Mol	Chain	Res	Type
1	B	266	HIS
1	B	341	ASN
1	B	345	ASN
1	B	347	ASN
1	D	17	ASN
1	D	26	GLN
1	D	29[A]	ASN
1	D	47	GLN
1	D	96	HIS
1	D	260	GLN
1	D	266	HIS
1	D	345	ASN
1	D	347	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 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	C	501	1	15,15,16	2.29	4 (26%)	20,22,23	1.51	3 (15%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	GOL	B	503	-	5,5,5	0.32	0	5,5,5	0.78	0
2	PLP	D	501	1	15,15,16	2.42	4 (26%)	20,22,23	1.66	2 (10%)
2	PLP	B	501	1	15,15,16	2.45	3 (20%)	20,22,23	2.02	4 (20%)
3	DSN	A	502	-	5,6,6	1.01	1 (20%)	5,7,7	1.98	2 (40%)
4	GOL	A	503	-	5,5,5	0.18	0	5,5,5	0.47	0
2	PLP	A	501	1	15,15,16	2.28	3 (20%)	20,22,23	2.03	7 (35%)
3	DSN	D	502	-	5,6,6	1.04	1 (20%)	5,7,7	2.45	2 (40%)
3	DSN	B	502	-	5,6,6	0.92	0	5,7,7	1.42	1 (20%)
3	DSN	C	502	-	5,6,6	1.43	1 (20%)	5,7,7	0.94	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	PLP	C	501	1	-	4/6/6/8	0/1/1/1
4	GOL	B	503	-	-	0/4/4/4	-
2	PLP	D	501	1	-	0/6/6/8	0/1/1/1
2	PLP	B	501	1	-	0/6/6/8	0/1/1/1
3	DSN	A	502	-	-	4/6/6/6	-
4	GOL	A	503	-	-	2/4/4/4	-
2	PLP	A	501	1	-	0/6/6/8	0/1/1/1
3	DSN	D	502	-	-	2/6/6/6	-
3	DSN	B	502	-	-	6/6/6/6	-
3	DSN	C	502	-	-	1/6/6/6	-

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	PLP	C5-C4	7.28	1.48	1.40
2	D	501	PLP	C5-C4	6.89	1.48	1.40
2	C	501	PLP	C5-C4	6.43	1.47	1.40
2	A	501	PLP	C3-C2	5.94	1.46	1.40
2	A	501	PLP	C5-C4	5.46	1.46	1.40
2	D	501	PLP	C3-C2	4.94	1.45	1.40
2	B	501	PLP	C3-C2	4.60	1.45	1.40
2	C	501	PLP	C3-C2	4.35	1.45	1.40
2	B	501	PLP	C3-C4	2.84	1.46	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	PLP	C3-C4	2.67	1.45	1.40
2	C	501	PLP	C3-C4	2.55	1.45	1.40
2	A	501	PLP	C3-C4	2.43	1.45	1.40
3	C	502	DSN	OXT-C	-2.41	1.22	1.30
2	C	501	PLP	C4A-C4	-2.33	1.46	1.51
3	A	502	DSN	OXT-C	-2.15	1.23	1.30
3	D	502	DSN	OXT-C	-2.09	1.23	1.30
2	D	501	PLP	C4A-C4	-2.03	1.47	1.51

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	PLP	C4A-C4-C5	5.42	126.52	120.94
3	D	502	DSN	OXT-C-O	-4.58	113.70	124.09
2	B	501	PLP	O4P-C5A-C5	4.56	118.05	109.35
2	D	501	PLP	C4A-C4-C5	4.31	125.38	120.94
2	A	501	PLP	O4P-C5A-C5	3.90	116.78	109.35
2	A	501	PLP	C4A-C4-C5	3.70	124.75	120.94
2	D	501	PLP	O4P-C5A-C5	3.50	116.02	109.35
2	A	501	PLP	C3-C4-C5	-3.45	115.02	118.74
2	C	501	PLP	C4A-C4-C5	3.26	124.30	120.94
2	C	501	PLP	O4P-C5A-C5	3.23	115.51	109.35
3	A	502	DSN	OXT-C-CA	3.07	123.83	113.38
2	A	501	PLP	C6-C5-C4	3.04	120.55	118.16
2	A	501	PLP	O3-C3-C2	2.95	123.92	117.49
3	D	502	DSN	OXT-C-CA	2.88	123.21	113.38
3	A	502	DSN	OXT-C-O	-2.80	117.74	124.09
2	C	501	PLP	C3-C4-C5	-2.74	115.78	118.74
2	A	501	PLP	O3P-P-O2P	2.49	117.17	107.64
3	B	502	DSN	OXT-C-O	-2.48	118.45	124.09
2	B	501	PLP	C3-C4-C5	-2.45	116.09	118.74
2	A	501	PLP	O2P-P-O4P	-2.28	100.66	106.73
2	B	501	PLP	C6-N1-C2	2.26	123.36	119.17

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	501	PLP	C6-C5-C5A-O4P
2	C	501	PLP	C5A-O4P-P-O1P
3	A	502	DSN	O-C-CA-CB
3	A	502	DSN	OXT-C-CA-CB

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Mol	Chain	Res	Type	Atoms
3	C	502	DSN	N-CA-CB-OG
3	B	502	DSN	O-C-CA-CB
3	B	502	DSN	OXT-C-CA-CB
3	D	502	DSN	N-CA-CB-OG
4	A	503	GOL	O1-C1-C2-C3
3	B	502	DSN	C-CA-CB-OG
4	A	503	GOL	O1-C1-C2-O2
3	A	502	DSN	OXT-C-CA-N
3	D	502	DSN	C-CA-CB-OG
3	B	502	DSN	O-C-CA-N
2	C	501	PLP	C4-C5-C5A-O4P
3	B	502	DSN	N-CA-CB-OG
3	A	502	DSN	O-C-CA-N
2	C	501	PLP	C5A-O4P-P-O3P
3	B	502	DSN	OXT-C-CA-N

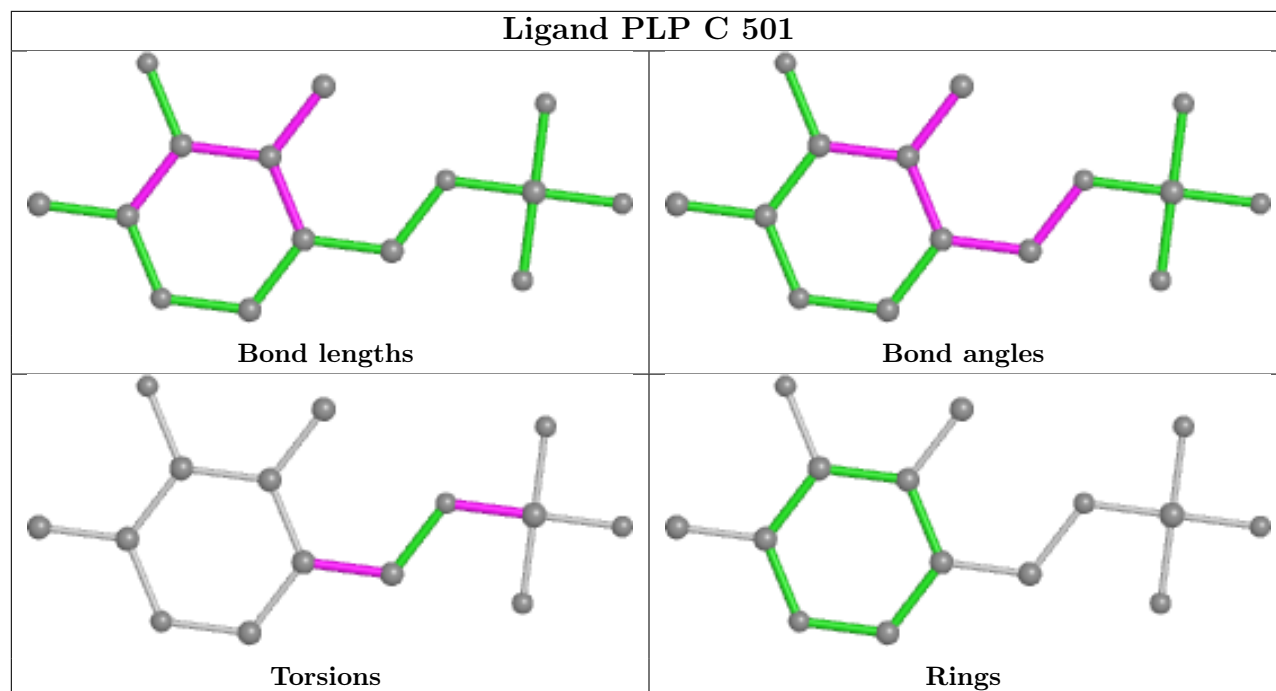
There are no ring outliers.

3 monomers are involved in 3 short contacts:

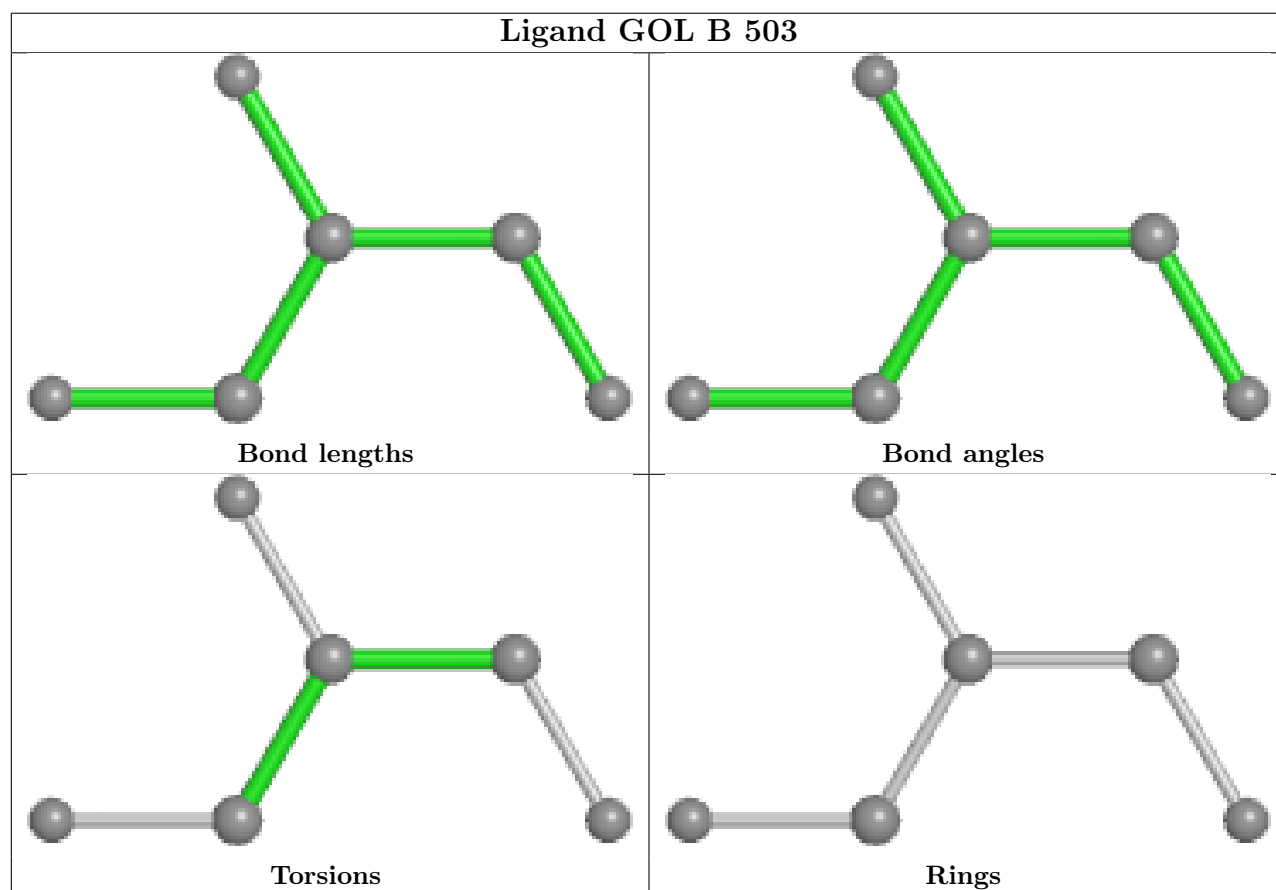
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	501	PLP	1	0
3	A	502	DSN	1	0
2	A	501	PLP	1	0

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.

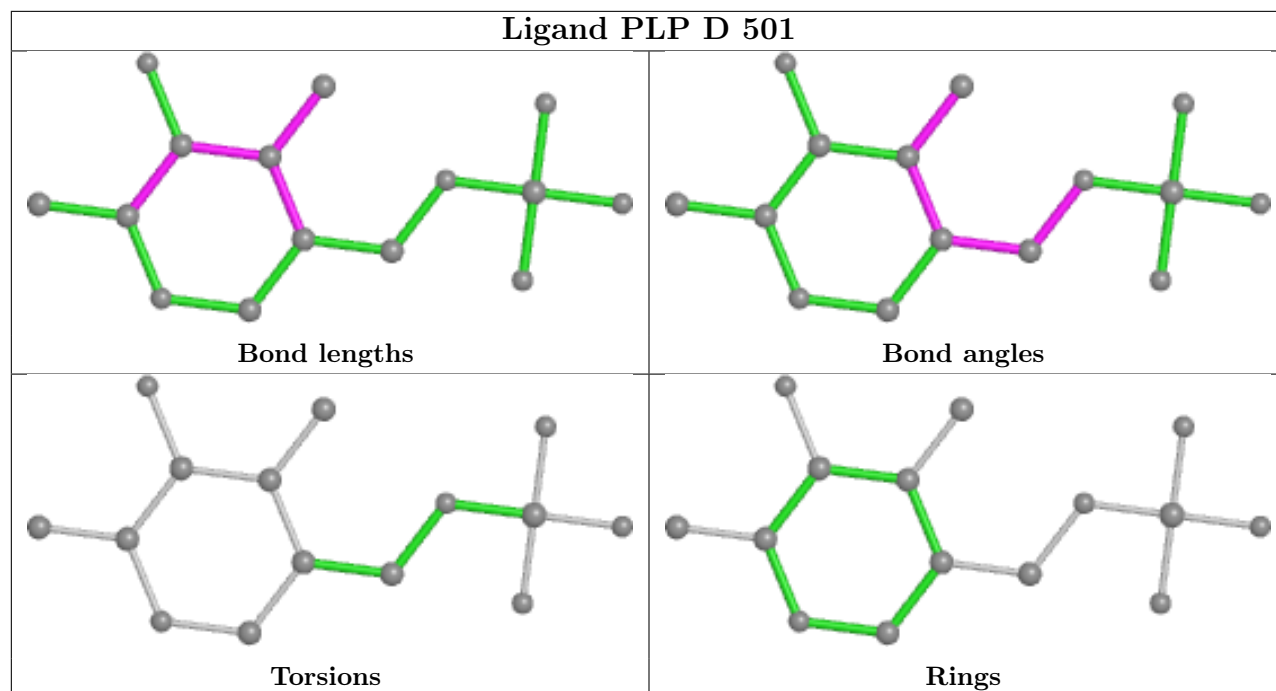
Ligand PLP C 501



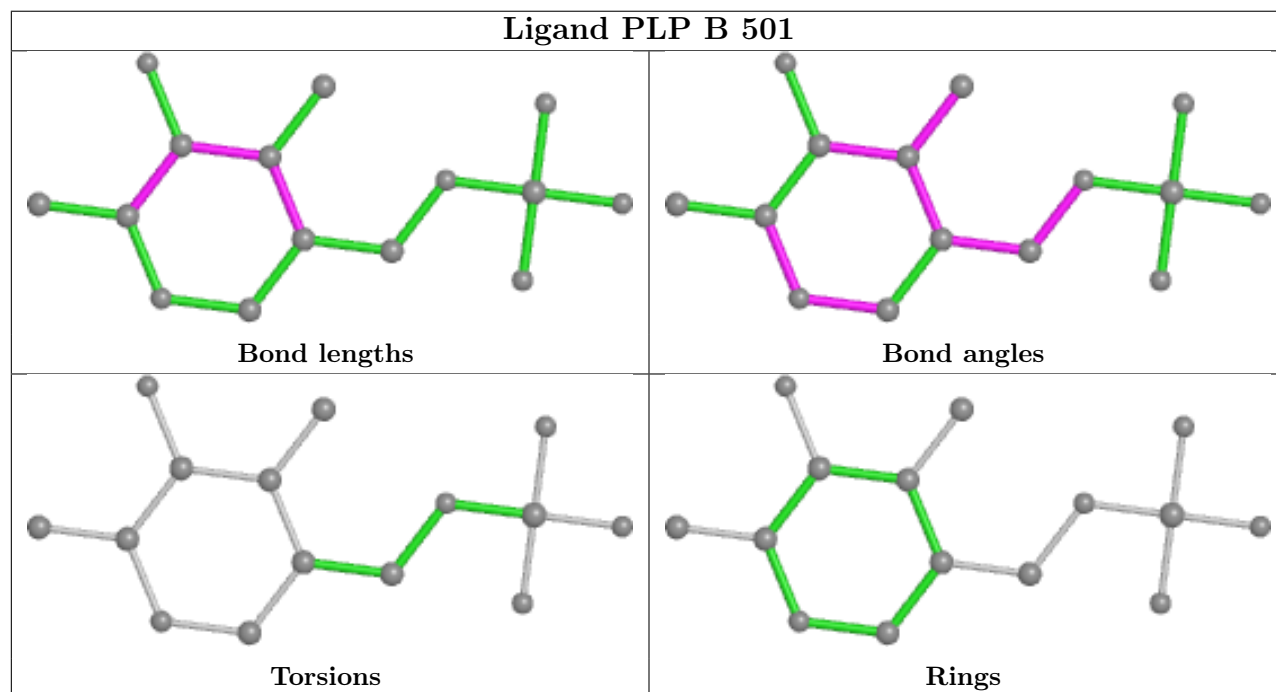
Ligand GOL B 503

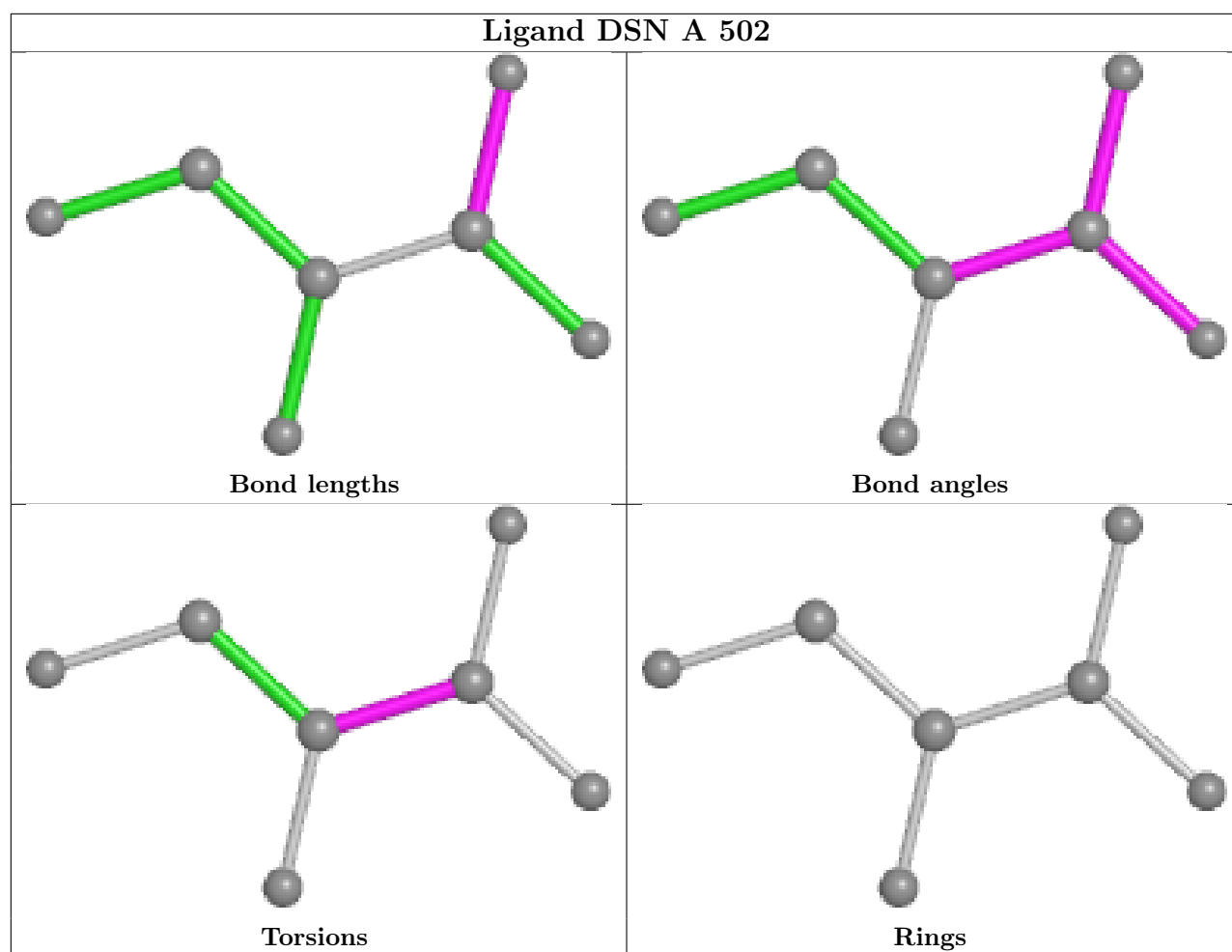


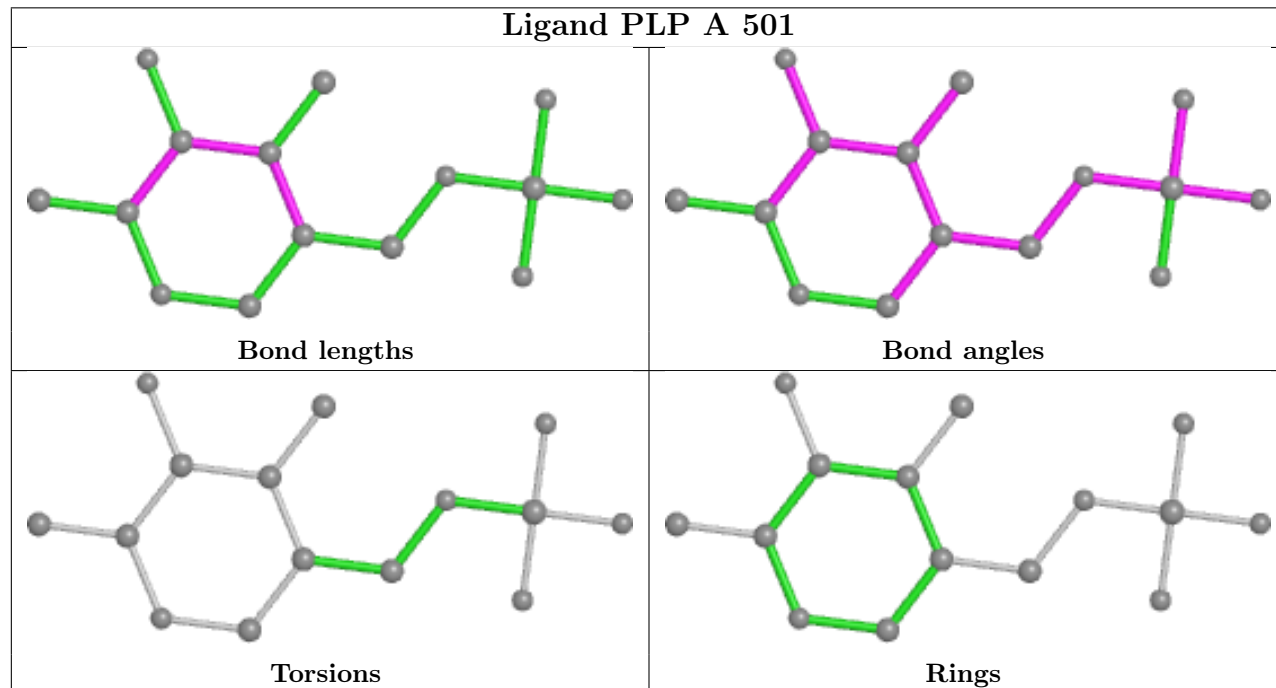
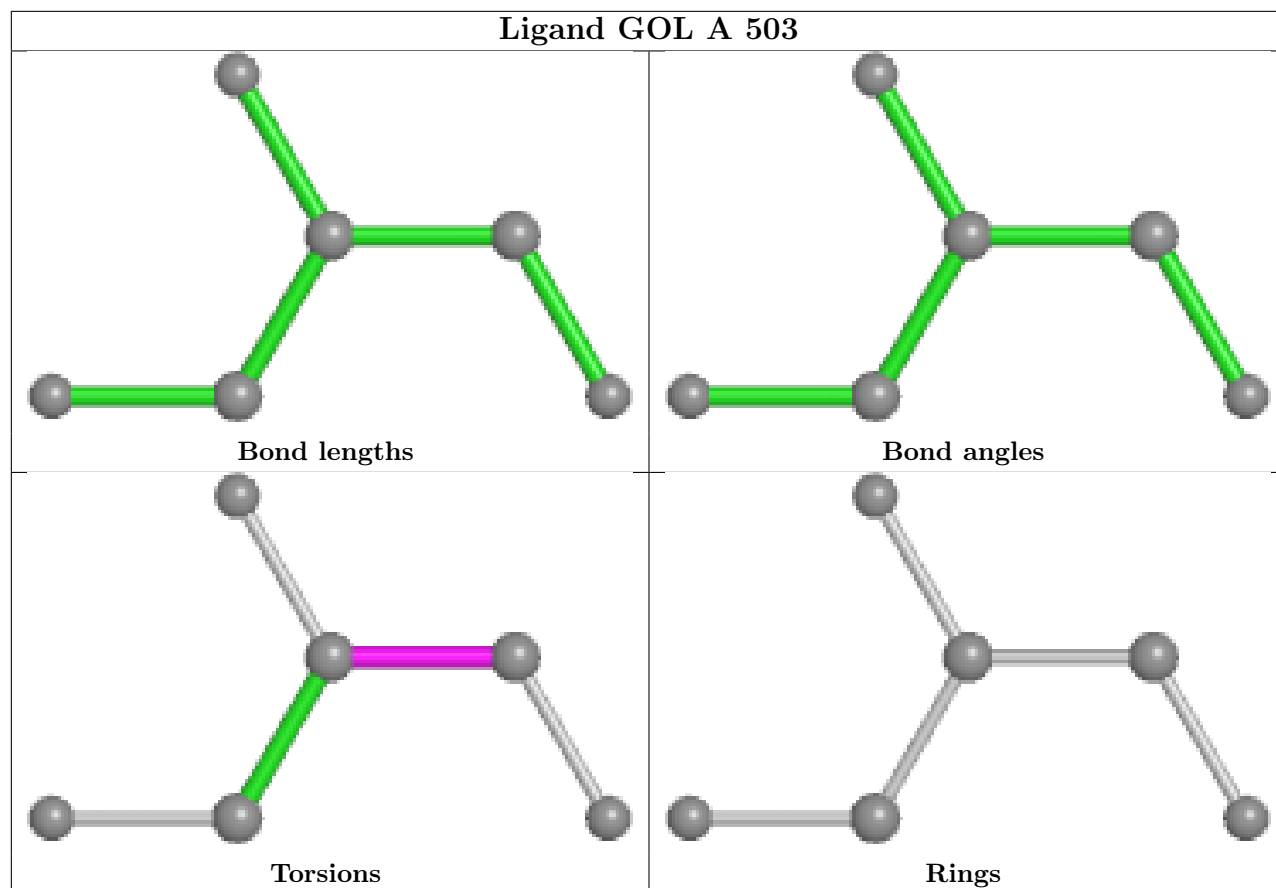
Ligand PLP D 501

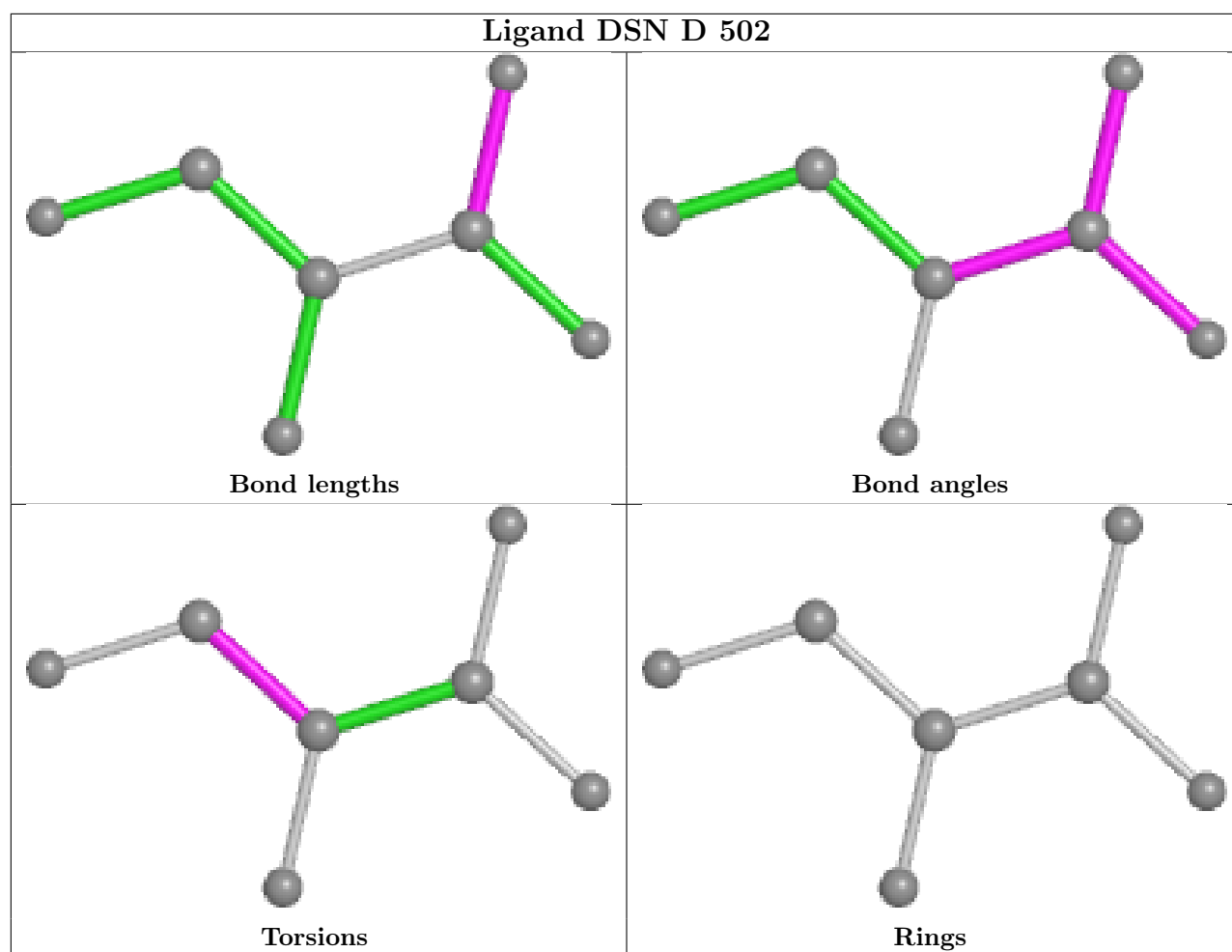


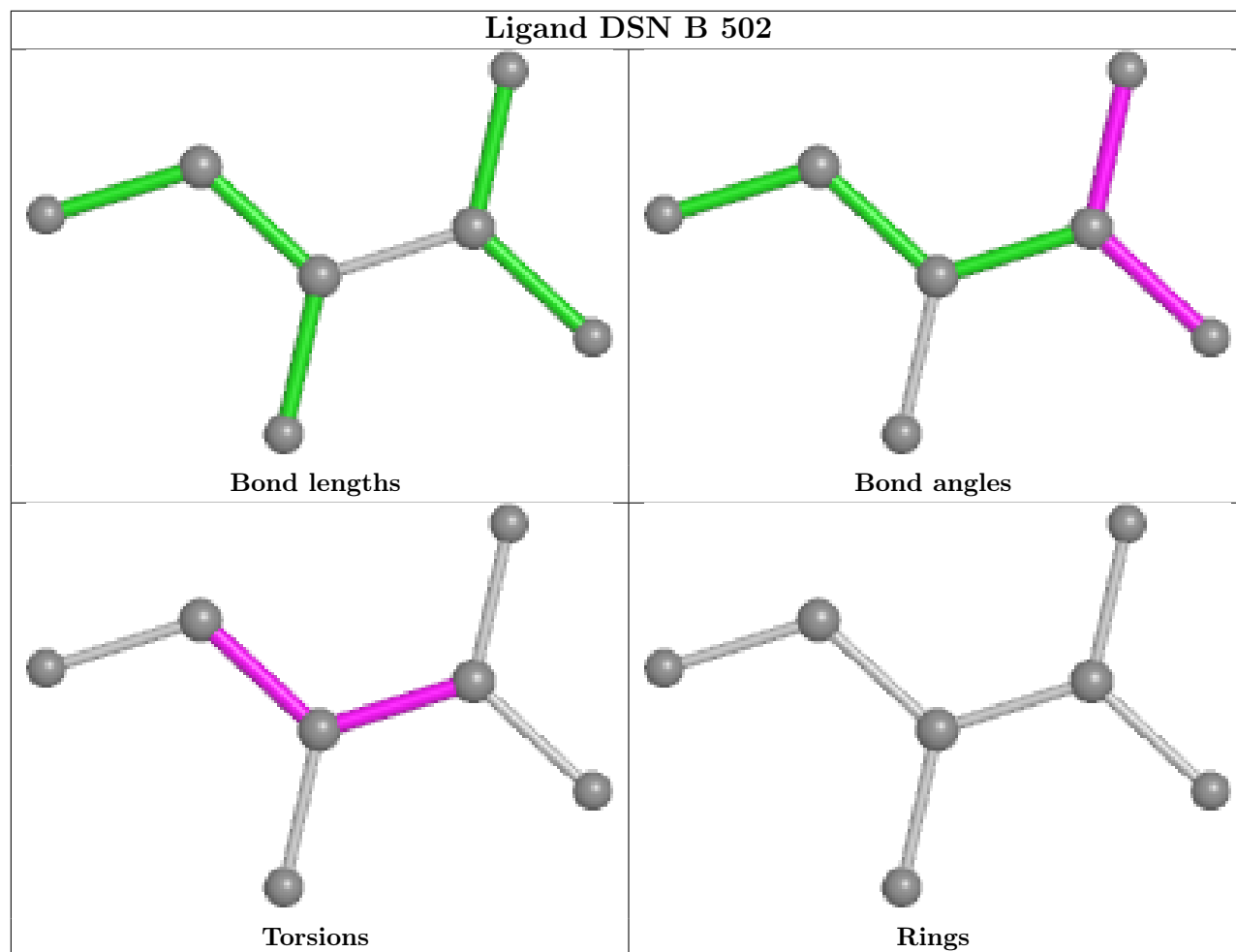
Ligand PLP B 501

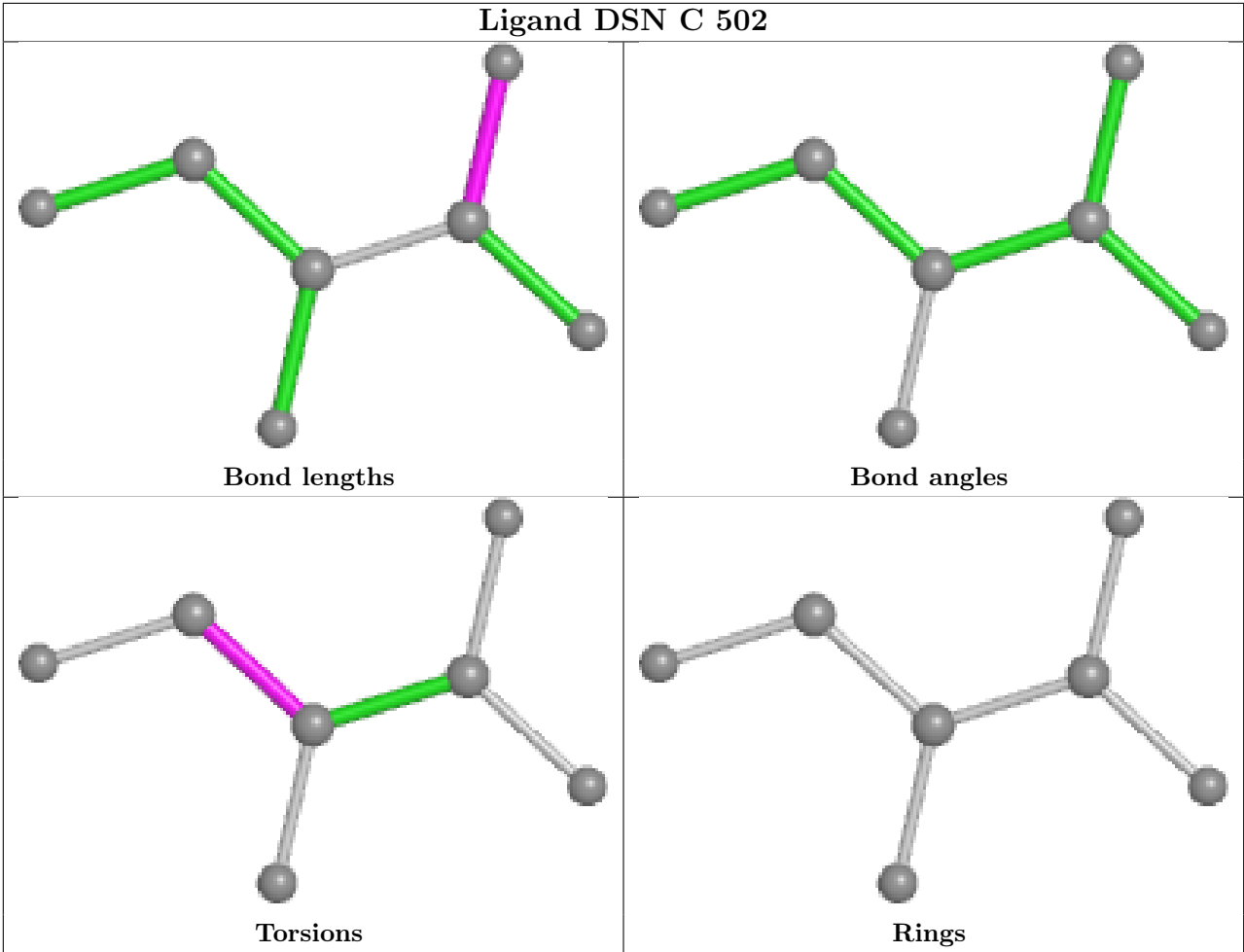












5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	C	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	29[A]:ASN	C	30:ILE	N	2.38

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	410/416 (98%)	-0.39	2 (0%) 91 91	21, 35, 63, 91	0
1	B	410/416 (98%)	-0.38	1 (0%) 95 95	26, 39, 63, 100	0
1	C	410/416 (98%)	-0.41	2 (0%) 91 91	23, 36, 60, 82	0
1	D	410/416 (98%)	-0.32	5 (1%) 79 80	32, 50, 74, 104	0
All	All	1640/1664 (98%)	-0.37	10 (0%) 89 90	21, 41, 68, 104	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	10	ALA	3.7
1	C	7	ASP	3.1
1	D	357	PHE	3.0
1	C	357	PHE	2.8
1	D	11	PHE	2.7
1	A	353	GLN	2.7
1	D	401	ARG	2.6
1	A	8	TYR	2.6
1	B	394	ASP	2.4
1	D	408	VAL	2.1

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands

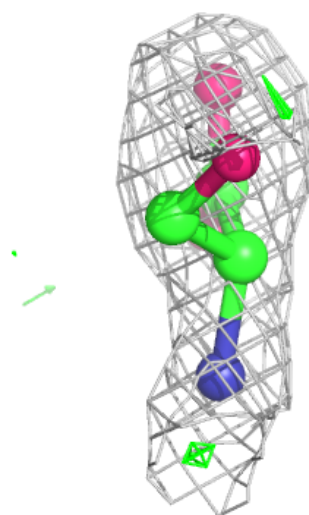
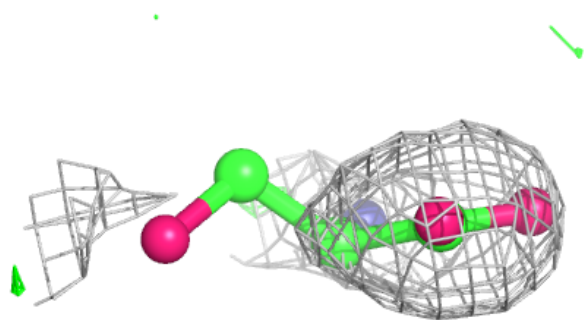
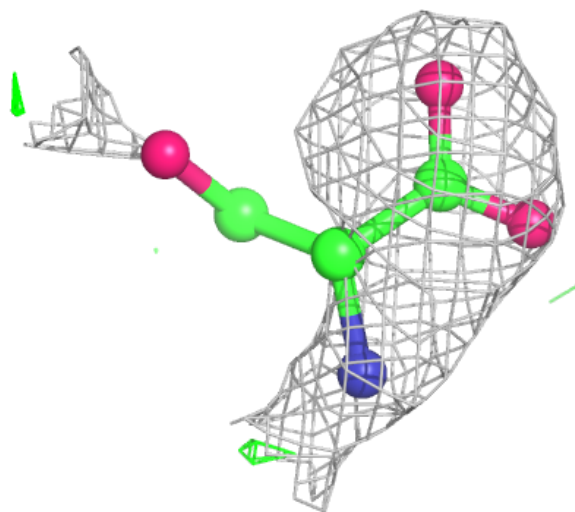
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	DSN	D	502	7/7	0.74	0.38	49,60,67,72	7
3	DSN	C	502	7/7	0.85	0.26	39,45,53,54	7
3	DSN	B	502	7/7	0.87	0.46	50,65,69,70	7
3	DSN	A	502	7/7	0.91	0.40	63,70,81,82	7
4	GOL	A	503	6/6	0.92	0.15	44,47,48,50	0
4	GOL	B	503	6/6	0.94	0.11	37,40,43,44	0
2	PLP	D	501	15/16	0.98	0.15	34,47,54,54	0
2	PLP	C	501	15/16	0.99	0.17	27,31,33,34	0
2	PLP	B	501	15/16	0.99	0.14	28,30,35,38	0
2	PLP	A	501	15/16	0.99	0.16	23,26,29,31	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.

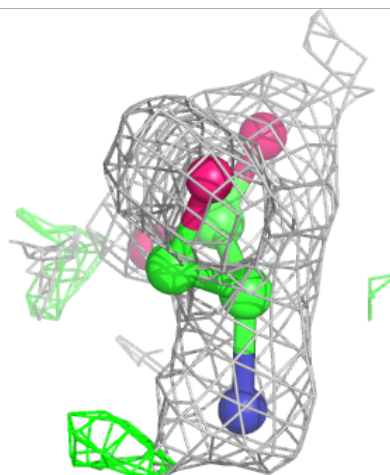
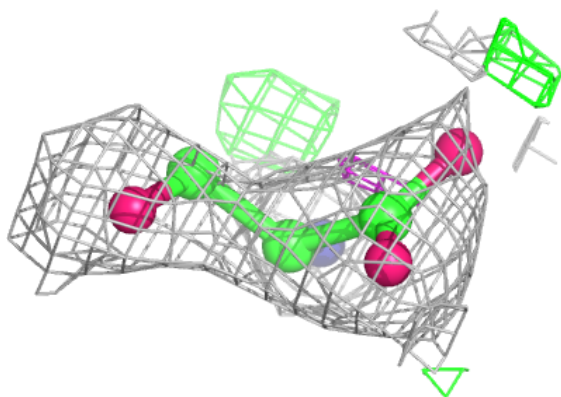
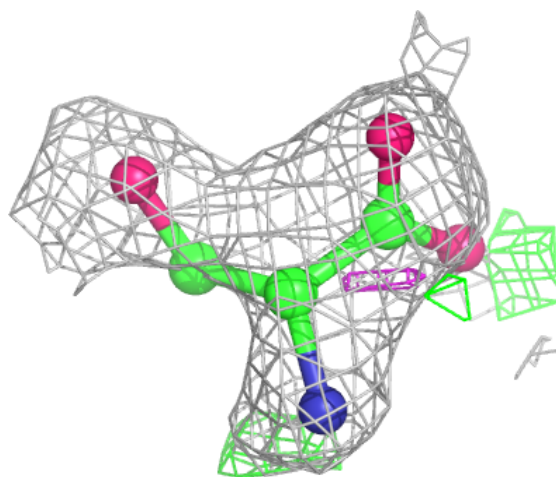
Electron density around DSN D 502:

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



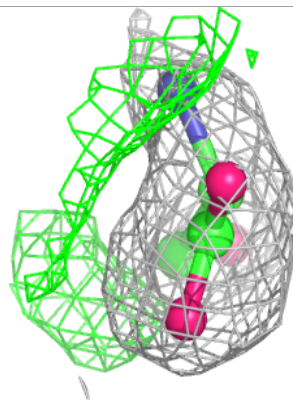
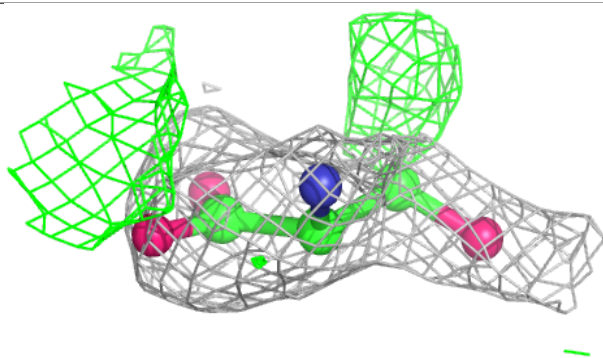
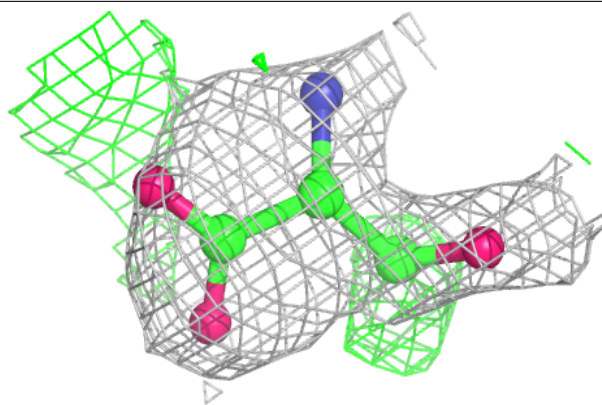
Electron density around DSN C 502:

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



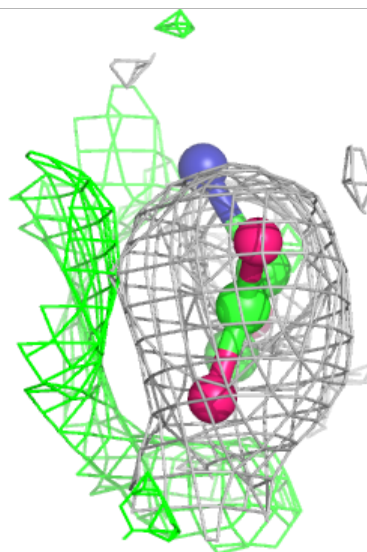
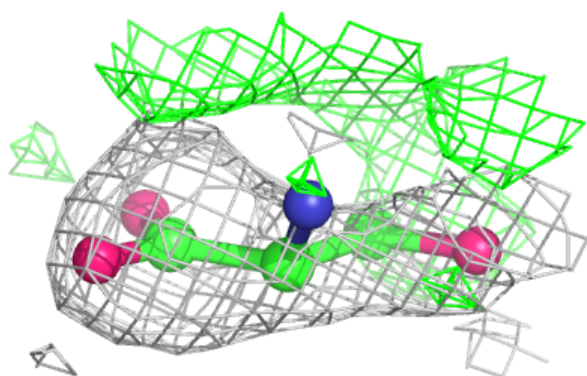
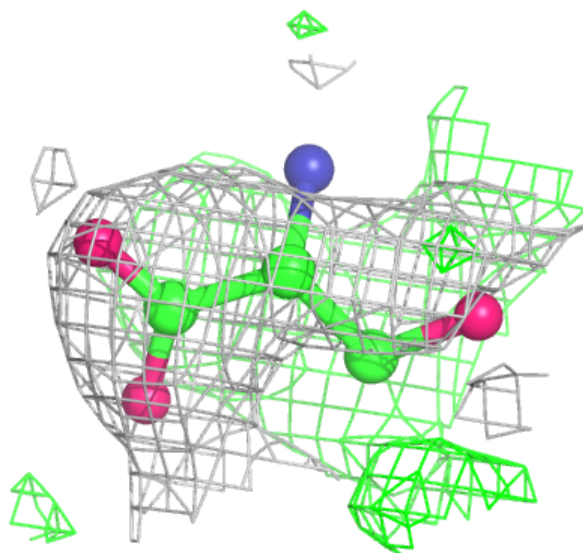
Electron density around DSN B 502:

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



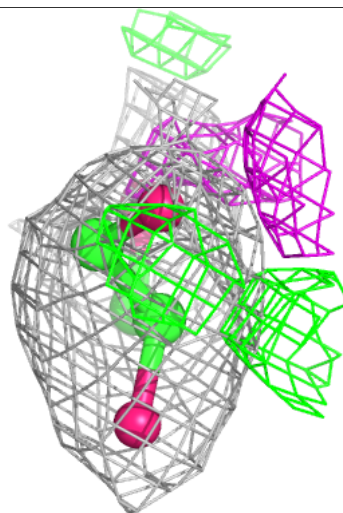
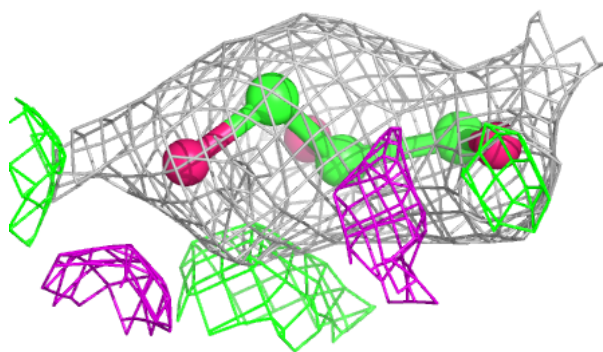
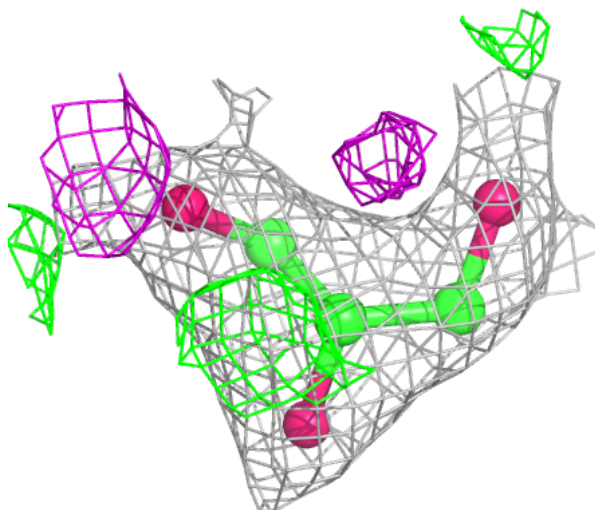
Electron density around DSN A 502:

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



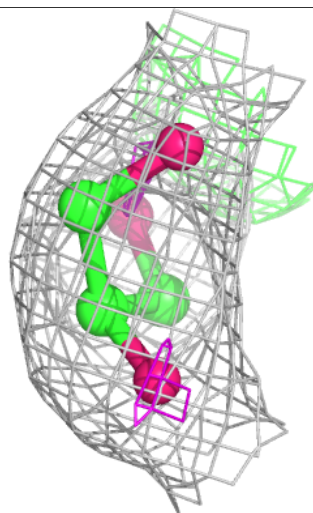
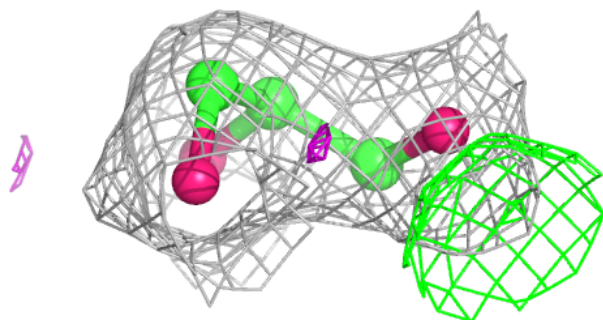
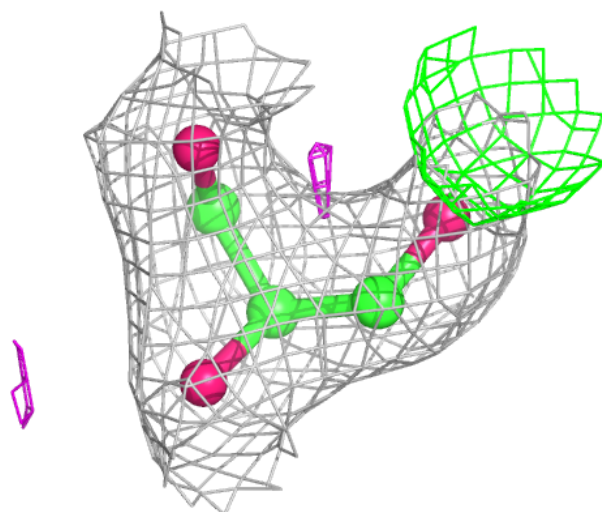
Electron density around GOL A 503:

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



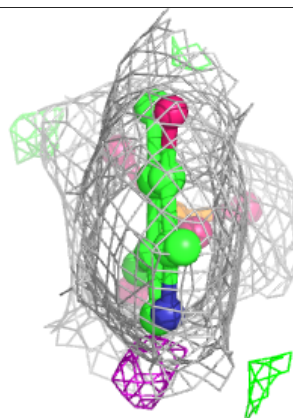
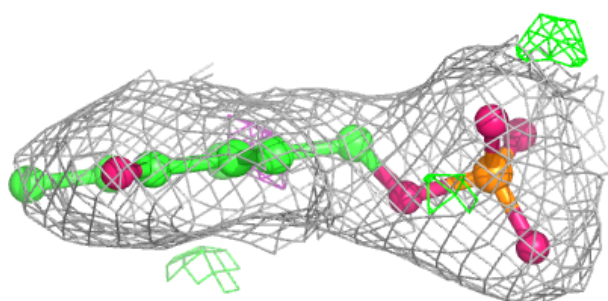
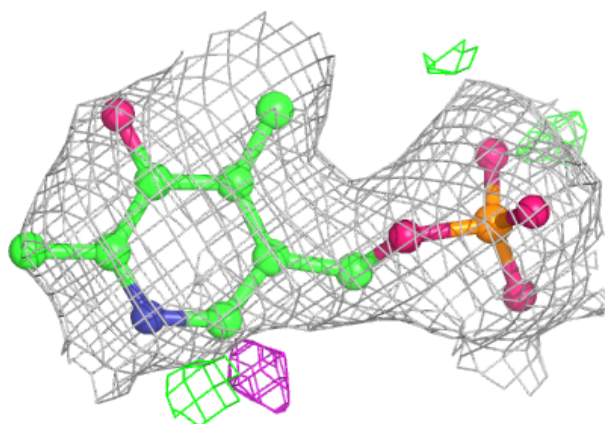
Electron density around GOL B 503:

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

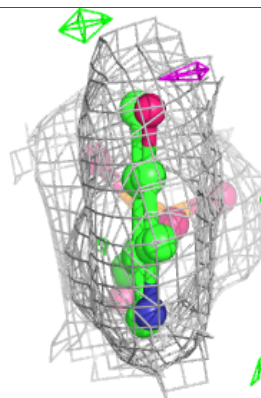
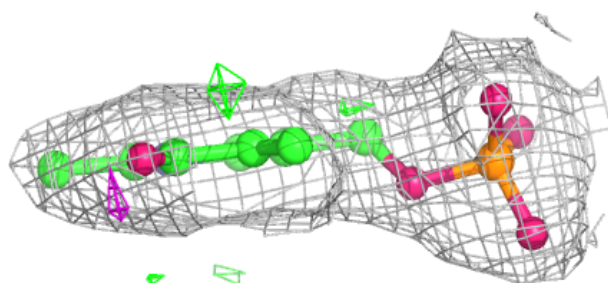


Electron density around PLP D 501:

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

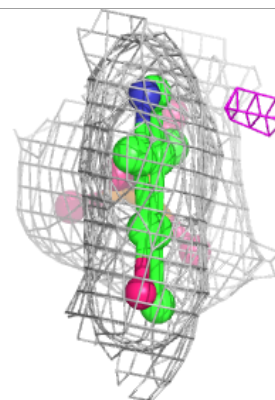
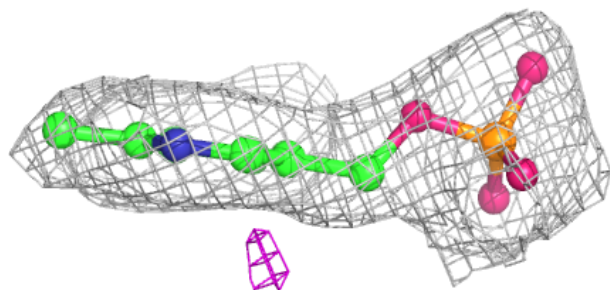
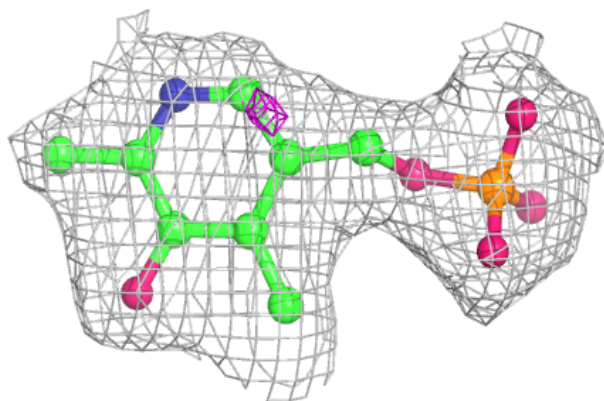
**Electron density around PLP C 501:**

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

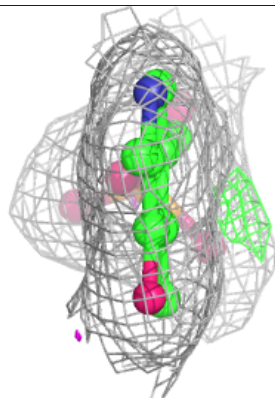
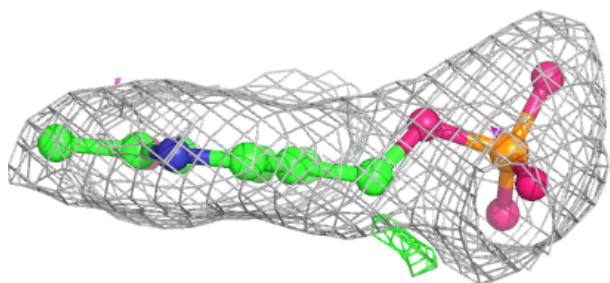
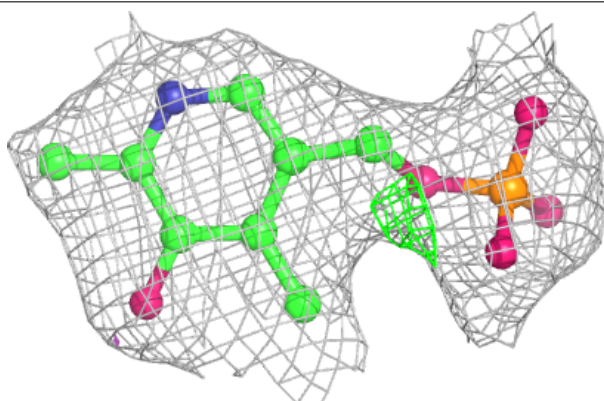


Electron density around PLP B 501:

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

**Electron density around PLP 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.