WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Oct 4, 2023 – 07:47 AM EDT

PDB ID : 6UB9
Title : Crystal structure of tryptophan synthase from M. tuberculosis - AMINOACRYLATE- AND BRD6309-BOUND FORM
Authors : Chang, C.; Michalska, K.; Maltseva, N.I.; Jedrzejczak, R.; McCarren, P.; Nag, P.P.; Joachimiak, A.; Satchell, K.; Center for Structural Genomics of Infectious Diseases (CSGID)
Deposited on : 2019-09-11
Resolution : 2.78 Å(reported)

The following versions of software and data (see references ①) were used in the production of this report:

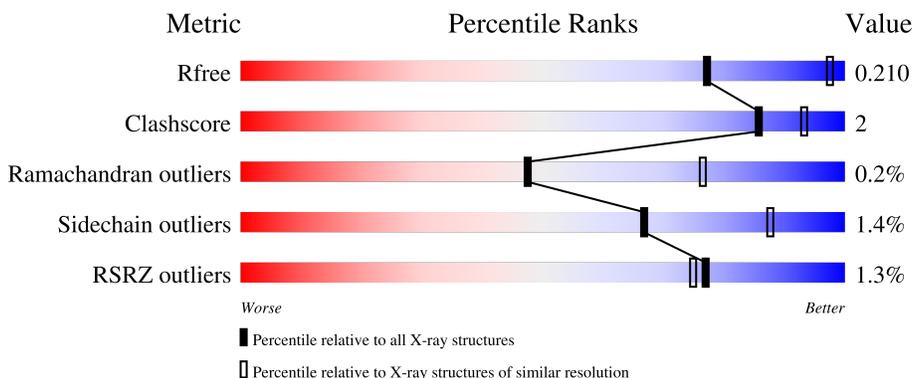|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

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 2.78 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	Percentile Ranks	Value
Rfree		0.210
Clashscore		2
Ramachandran outliers		0.2%
Sidechain outliers		1.4%
RSRZ outliers		1.3%

Worse   *Better*

■ Percentile relative to all X-ray structures
❚ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4107 (2.80-2.76)
Clashscore	141614	4575 (2.80-2.76)
Ramachandran outliers	138981	4487 (2.80-2.76)
Sidechain outliers	138945	4489 (2.80-2.76)
RSRZ outliers	127900	4027 (2.80-2.76)

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 <=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	276	% 85% 5% 10%
1	C	276	% 84% 5% 10%
1	E	276	3% 81% 8% 11%
1	G	276	% 84% 6% 10%
2	B	410	% 90% 9% •

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Mol	Chain	Length	Quality of chain
2	D	410	.% 92% 5% ·
2	F	410	92% 5% ·
2	H	410	.% 92% 6% ·

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	ACT	B	507	-	-	-	X

2 Entry composition (i)

There are 11 unique types of molecules in this entry. The entry contains 19666 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 Tryptophan synthase alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	249	Total	C	N	O	S	0	0	0
			1803	1131	323	344	5			
1	C	248	Total	C	N	O	S	0	0	0
			1799	1129	322	343	5			
1	E	247	Total	C	N	O	S	0	0	0
			1778	1117	318	338	5			
1	G	248	Total	C	N	O	S	0	1	0
			1805	1132	326	342	5			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	271	HIS	-	expression tag	UNP P9WFY1
A	272	HIS	-	expression tag	UNP P9WFY1
A	273	HIS	-	expression tag	UNP P9WFY1
A	274	HIS	-	expression tag	UNP P9WFY1
A	275	HIS	-	expression tag	UNP P9WFY1
A	276	HIS	-	expression tag	UNP P9WFY1
C	271	HIS	-	expression tag	UNP P9WFY1
C	272	HIS	-	expression tag	UNP P9WFY1
C	273	HIS	-	expression tag	UNP P9WFY1
C	274	HIS	-	expression tag	UNP P9WFY1
C	275	HIS	-	expression tag	UNP P9WFY1
C	276	HIS	-	expression tag	UNP P9WFY1
E	271	HIS	-	expression tag	UNP P9WFY1
E	272	HIS	-	expression tag	UNP P9WFY1
E	273	HIS	-	expression tag	UNP P9WFY1
E	274	HIS	-	expression tag	UNP P9WFY1
E	275	HIS	-	expression tag	UNP P9WFY1
E	276	HIS	-	expression tag	UNP P9WFY1
G	271	HIS	-	expression tag	UNP P9WFY1
G	272	HIS	-	expression tag	UNP P9WFY1
G	273	HIS	-	expression tag	UNP P9WFY1

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Chain	Residue	Modelled	Actual	Comment	Reference
G	274	HIS	-	expression tag	UNP P9WFY1
G	275	HIS	-	expression tag	UNP P9WFY1
G	276	HIS	-	expression tag	UNP P9WFY1

• Molecule 2 is a protein called Tryptophan synthase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	404	Total	C	N	O	S	0	2	0
			3015	1883	546	572	14			
2	D	399	Total	C	N	O	S	0	2	0
			2992	1868	544	567	13			
2	F	400	Total	C	N	O	S	0	2	0
			2996	1870	544	569	13			
2	H	403	Total	C	N	O	S	0	2	0
			3018	1886	545	573	14			

• Molecule 3 is FORMIC ACID (three-letter code: FMT) (formula: CH_2O_2).
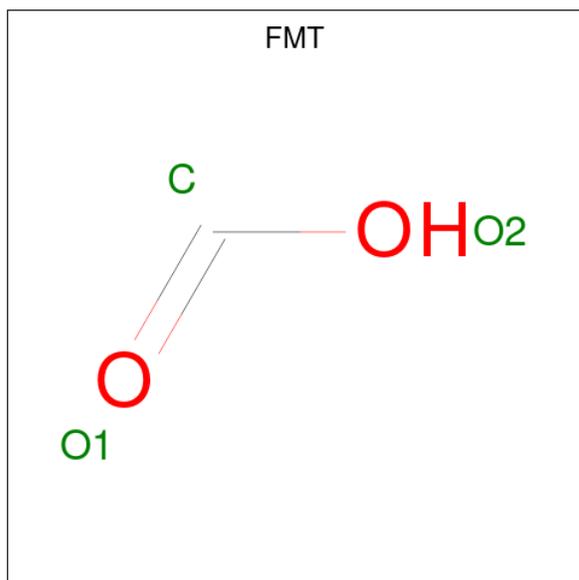
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			3	1	2		
3	A	1	Total	C	O	0	0
			3	1	2		
3	B	1	Total	C	O	0	0
			3	1	2		
3	B	1	Total	C	O	0	0
			3	1	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total 3	C 1	O 2	0	0
3	B	1	Total 3	C 1	O 2	0	0
3	B	1	Total 3	C 1	O 2	0	0
3	C	1	Total 3	C 1	O 2	0	0
3	E	1	Total 3	C 1	O 2	0	0
3	F	1	Total 3	C 1	O 2	0	0
3	F	1	Total 3	C 1	O 2	0	0
3	H	1	Total 3	C 1	O 2	0	0
3	H	1	Total 3	C 1	O 2	0	0
3	H	1	Total 3	C 1	O 2	0	0
3	H	1	Total 3	C 1	O 2	0	0

- Molecule 4 is MALONIC ACID (three-letter code: MLA) (formula: $C_3H_4O_4$).
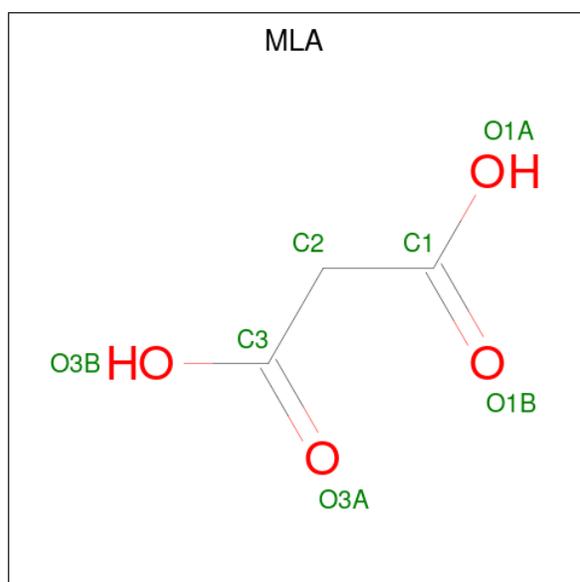
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 7	C 3	O 4	0	0
4	C	1	Total 7	C 3	O 4	0	0
4	E	1	Total 7	C 3	O 4	0	0
4	F	1	Total 7	C 3	O 4	0	0
4	G	1	Total 7	C 3	O 4	0	0

- Molecule 5 is 2-[({3-HYDROXY-2-METHYL-5-[(PHOSPHONOOXY)METHYL]PY RIDIN-4-YL}METHYL)AMINO]ACRYLIC ACID (three-letter code: P1T) (formula: $C_{11}H_{15}N_2O_7P$).
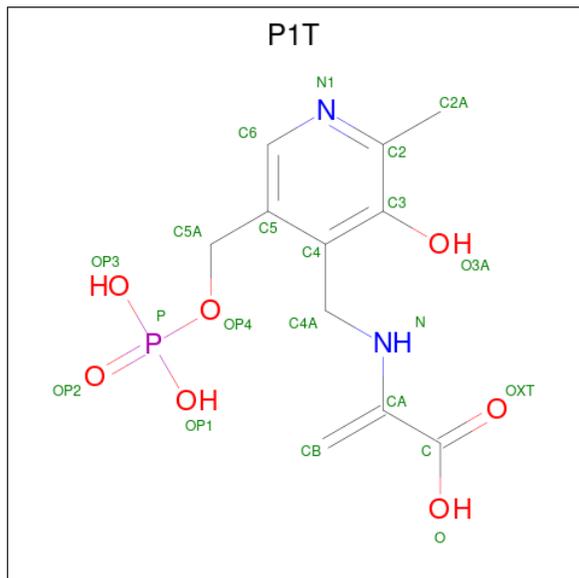
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	B	1	Total 21	C 11	N 2	O 7	P 1	0	0
5	D	1	Total 21	C 11	N 2	O 7	P 1	0	0
5	F	1	Total 21	C 11	N 2	O 7	P 1	0	0
5	H	1	Total 21	C 11	N 2	O 7	P 1	0	0

- Molecule 6 is (2R,3S,4R)-3-(4'-chloro-2',6'-difluoro[1,1'-biphenyl]-4-yl)-4-(fluoromethyl)azet idine-2-carbonitrile (three-letter code: H9V) (formula: $C_{17}H_{12}ClF_3N_2$) (labeled as "Ligand of Interest" by depositor).
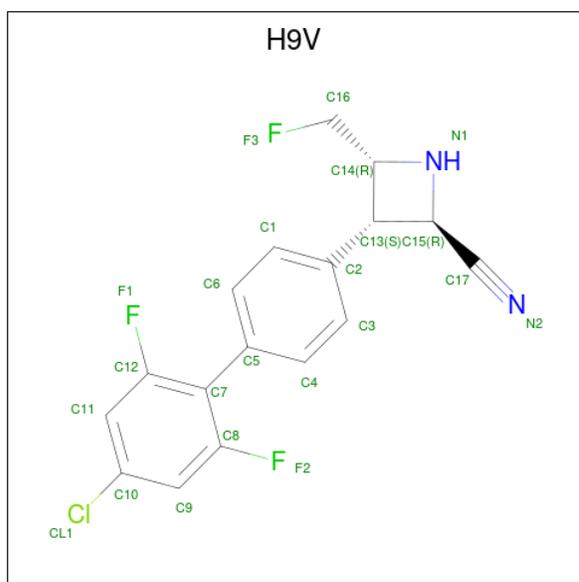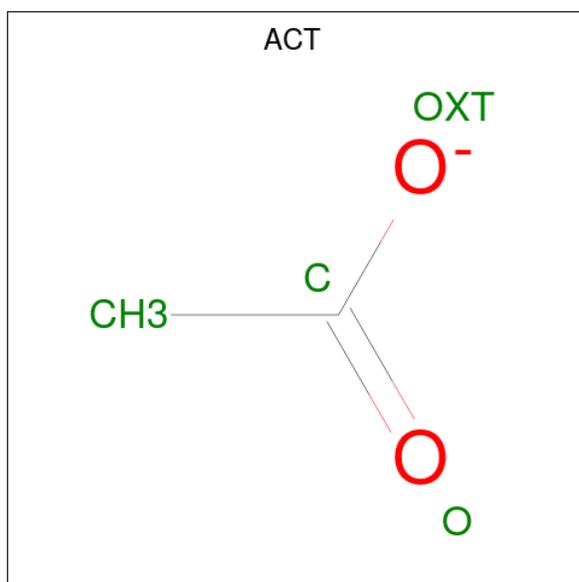
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total	C	Cl	F	N	0	0
			23	17	1	3	2		
6	D	1	Total	C	Cl	F	N	0	0
			23	17	1	3	2		
6	F	1	Total	C	Cl	F	N	0	0
			23	17	1	3	2		
6	H	1	Total	C	Cl	F	N	0	0
			23	17	1	3	2		

- Molecule 7 is CESIUM ION (three-letter code: CS) (formula: Cs).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	1	Total	Cs	0	0
			1	1		
7	D	1	Total	Cs	0	0
			1	1		
7	F	1	Total	Cs	0	0
			1	1		
7	H	1	Total	Cs	0	0
			1	1		

- Molecule 8 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).

ACT

OXT

O⁻

C

CH3

O

O

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total 4	C 2	O 2	0	0

- Molecule 9 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: $C_6H_{14}O_4$).

PGE

O4
OH

C5

C6

C4

O

O3

O2

O

C3

C1

C2

HO

O1
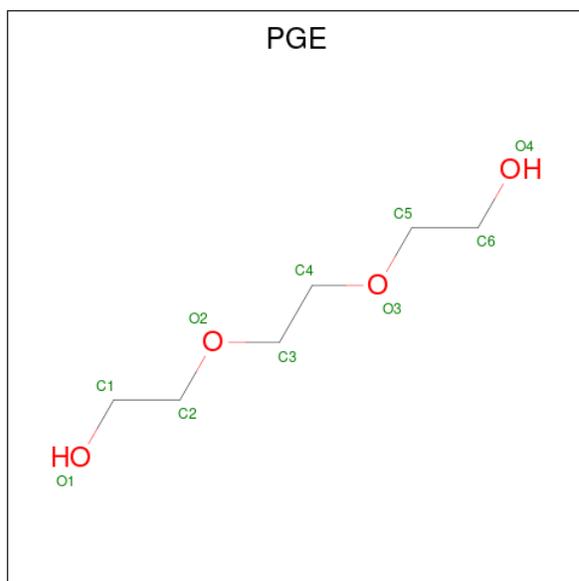
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	D	1	Total 10	C 6	O 4	0	0
9	F	1	Total 10	C 6	O 4	0	0

- Molecule 10 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

O2
OH

C1

C2

HO

O1
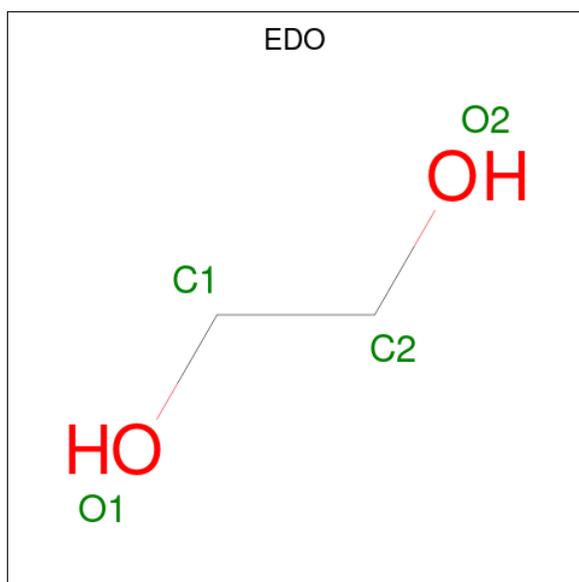
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	H	1	Total 4	C 2	O 2	0	0

- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	8	Total 8	O 8	0	0
11	B	40	Total 40	O 40	0	0
11	C	6	Total 6	O 6	0	0
11	D	40	Total 40	O 40	0	0
11	E	2	Total 2	O 2	0	0
11	F	25	Total 25	O 25	0	0
11	G	11	Total 11	O 11	0	0
11	H	40	Total 40	O 40	0	0

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: Tryptophan synthase alpha chain

• Molecule 1: Tryptophan synthase alpha chain

• Molecule 1: Tryptophan synthase alpha chain

• Molecule 1: Tryptophan synthase alpha chain

SER ALA HIS HIS HIS HIS

● Molecule 2: Tryptophan synthase beta chain
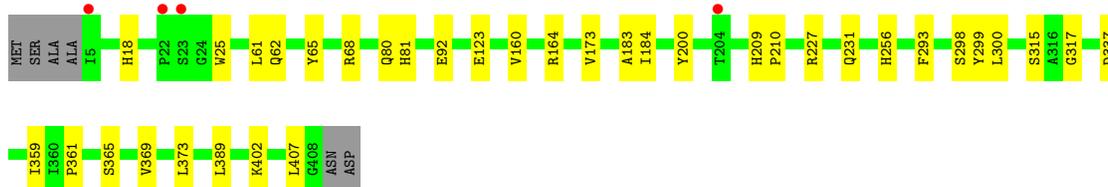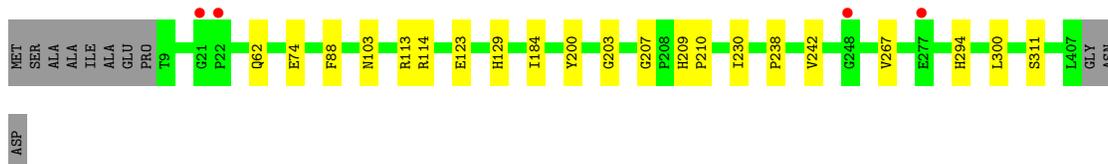
Chain B:

● Molecule 2: Tryptophan synthase beta chain

Chain D:

● Molecule 2: Tryptophan synthase beta chain

Chain F:

● Molecule 2: Tryptophan synthase beta chain

Chain H:
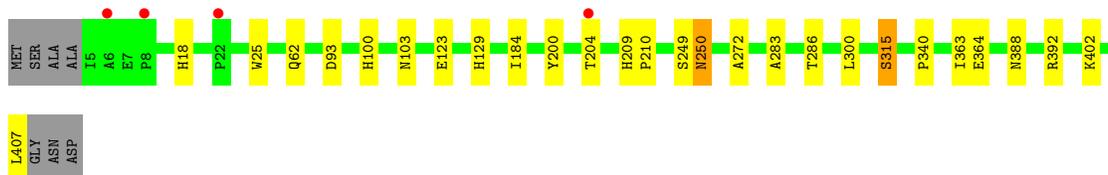
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	135.37Å 159.62Å 164.93Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.89 – 2.78 29.89 – 2.78	Depositor EDS
% Data completeness (in resolution range)	93.6 (29.89-2.78) 93.7 (29.89-2.78)	Depositor EDS
R_{merge}	0.20	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.29 (at 2.80Å)	Xtriage
Refinement program	PHENIX 1.15.2_3472	Depositor
R, R_{free}	0.169 , 0.210 0.169 , 0.210	Depositor DCC
R_{free} test set	1676 reflections (1.99%)	wwPDB-VP
Wilson B-factor (Å^2)	45.5	Xtriage
Anisotropy	0.373	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 25.9	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.003 for -h,l,k	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	19666	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 2.77% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: FMT, ACT, EDO, MLA, CS, H9V, PGE, P1T

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	0.25	0/1832	0.43	0/2500
1	C	0.25	0/1828	0.43	0/2495
1	E	0.24	0/1807	0.42	0/2468
1	G	0.25	0/1834	0.43	0/2502
2	B	0.26	0/3076	0.45	0/4169
2	D	0.26	0/3052	0.44	0/4135
2	F	0.26	0/3056	0.45	0/4141
2	H	0.26	0/3079	0.44	0/4173
All	All	0.26	0/19564	0.44	0/26583

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1803	0	1822	6	0
1	C	1799	0	1819	7	0
1	E	1778	0	1791	12	0
1	G	1805	0	1828	8	0
2	B	3015	0	2929	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	2992	0	2914	10	0
2	F	2996	0	2912	9	0
2	H	3018	0	2939	13	0
3	A	6	0	2	0	0
3	B	15	0	4	0	0
3	C	3	0	1	0	0
3	E	3	0	1	0	0
3	F	6	0	2	0	0
3	H	12	0	4	0	0
4	A	7	0	2	0	0
4	C	7	0	2	0	0
4	E	7	0	2	2	0
4	F	7	0	2	0	0
4	G	7	0	2	0	0
5	B	21	0	11	1	0
5	D	21	0	11	0	0
5	F	21	0	11	1	0
5	H	21	0	11	0	0
6	B	23	0	0	0	0
6	D	23	0	0	0	0
6	F	23	0	0	0	0
6	H	23	0	0	0	0
7	B	1	0	0	0	0
7	D	1	0	0	0	0
7	F	1	0	0	0	0
7	H	1	0	0	0	0
8	B	4	0	3	0	0
9	D	10	0	14	0	0
9	F	10	0	14	0	0
10	H	4	0	6	0	0
11	A	8	0	0	0	0
11	B	40	0	0	1	0
11	C	6	0	0	0	0
11	D	40	0	0	1	0
11	E	2	0	0	0	0
11	F	25	0	0	1	0
11	G	11	0	0	0	0
11	H	40	0	0	0	0
All	All	19666	0	19059	86	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 2.

The worst 5 of 86 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)
2:B:123:GLU:HG3	2:B:184:ILE:HG12	1.62	0.81
2:H:62[B]:GLN:HE22	2:H:103:ASN:HA	1.51	0.74
2:B:62[B]:GLN:HE21	2:B:68:ARG:HG3	1.59	0.66
2:B:402:LYS:HG2	2:B:407:LEU:HD12	1.80	0.64
2:D:62[B]:GLN:HE22	2:D:103:ASN:HA	1.61	0.64

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	245/276 (89%)	242 (99%)	2 (1%)	1 (0%)	34	64
1	C	244/276 (88%)	238 (98%)	5 (2%)	1 (0%)	34	64
1	E	243/276 (88%)	234 (96%)	7 (3%)	2 (1%)	19	47
1	G	245/276 (89%)	240 (98%)	5 (2%)	0	100	100
2	B	404/410 (98%)	395 (98%)	9 (2%)	0	100	100
2	D	399/410 (97%)	388 (97%)	11 (3%)	0	100	100
2	F	400/410 (98%)	386 (96%)	14 (4%)	0	100	100
2	H	403/410 (98%)	391 (97%)	12 (3%)	0	100	100
All	All	2583/2744 (94%)	2514 (97%)	65 (2%)	4 (0%)	47	76

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	129	GLY
1	C	239	GLY
1	E	239	GLY

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Mol	Chain	Res	Type
1	A	239	GLY

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	179/200 (90%)	176 (98%)	3 (2%)	60	85
1	C	179/200 (90%)	176 (98%)	3 (2%)	60	85
1	E	175/200 (88%)	173 (99%)	2 (1%)	73	90
1	G	179/200 (90%)	177 (99%)	2 (1%)	73	90
2	B	298/302 (99%)	294 (99%)	4 (1%)	69	89
2	D	297/302 (98%)	294 (99%)	3 (1%)	76	91
2	F	297/302 (98%)	292 (98%)	5 (2%)	60	85
2	H	300/302 (99%)	295 (98%)	5 (2%)	60	85
All	All	1904/2008 (95%)	1877 (99%)	27 (1%)	67	87

5 of 27 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	181	TYR
2	F	300	LEU
2	H	300	LEU
2	F	250	ASN
2	F	315	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 36 ligands modelled in this entry, 4 are monoatomic - leaving 32 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	$\#|Z| > 2$
9	PGE	F	507	-	9,9,9	0.30	0	8,8,8	0.28	0
3	FMT	H	501	-	2,2,2	0.67	0	1,1,1	0.63	0
8	ACT	B	507	-	3,3,3	0.74	0	3,3,3	0.80	0
10	EDO	H	506	-	3,3,3	0.49	0	2,2,2	0.26	0
3	FMT	C	502	-	2,2,2	0.71	0	1,1,1	0.62	0
3	FMT	B	505	-	2,2,2	0.67	0	1,1,1	0.62	0
3	FMT	B	504	-	2,2,2	0.70	0	1,1,1	0.62	0
3	FMT	B	506	-	2,2,2	0.72	0	1,1,1	0.59	0
5	P1T	F	501	-	20,21,21	2.62	4 (20%)	28,30,30	2.23	9 (32%)
3	FMT	H	505	-	2,2,2	0.69	0	1,1,1	0.62	0
3	FMT	E	501	-	2,2,2	0.71	0	1,1,1	0.59	0
3	FMT	A	501	-	2,2,2	0.73	0	1,1,1	0.55	0
3	FMT	H	507	-	2,2,2	0.71	0	1,1,1	0.58	0
3	FMT	F	505	-	2,2,2	0.71	0	1,1,1	0.57	0
5	P1T	D	501	-	20,21,21	2.75	4 (20%)	28,30,30	2.01	5 (17%)
3	FMT	F	504	-	2,2,2	0.72	0	1,1,1	0.57	0
6	H9V	B	502	-	23,25,25	2.05	5 (21%)	25,36,36	1.88	9 (36%)
9	PGE	D	504	-	9,9,9	0.31	0	8,8,8	0.36	0
3	FMT	B	508	-	2,2,2	0.78	0	1,1,1	0.80	0
5	P1T	H	502	-	20,21,21	2.68	4 (20%)	28,30,30	1.97	7 (25%)
3	FMT	H	508	-	2,2,2	0.74	0	1,1,1	0.56	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
5	P1T	B	501	-	20,21,21	2.71	4 (20%)	28,30,30	2.02	9 (32%)
3	FMT	A	503	-	2,2,2	0.68	0	1,1,1	0.66	0
3	FMT	B	509	-	2,2,2	0.63	0	1,1,1	0.65	0
6	H9V	F	502	-	23,25,25	1.88	4 (17%)	25,36,36	1.87	4 (16%)
4	MLA	G	501	-	6,6,6	1.06	0	7,7,7	1.03	0
4	MLA	E	502	-	6,6,6	1.06	0	7,7,7	1.05	0
6	H9V	H	503	-	23,25,25	1.91	3 (13%)	25,36,36	1.97	7 (28%)
6	H9V	D	502	-	23,25,25	1.96	5 (21%)	25,36,36	1.97	6 (24%)
4	MLA	F	506	-	6,6,6	1.10	0	7,7,7	0.99	0
4	MLA	C	501	-	6,6,6	1.14	0	7,7,7	0.97	0
4	MLA	A	502	-	6,6,6	1.07	0	7,7,7	1.01	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
5	P1T	B	501	-	-	5/14/15/15	0/1/1/1
9	PGE	F	507	-	-	3/7/7/7	-
6	H9V	F	502	-	-	1/8/24/24	0/3/3/3
6	H9V	H	503	-	-	1/8/24/24	0/3/3/3
10	EDO	H	506	-	-	0/1/1/1	-
5	P1T	D	501	-	-	5/14/15/15	0/1/1/1
4	MLA	G	501	-	-	0/4/4/4	-
4	MLA	F	506	-	-	2/4/4/4	-
4	MLA	C	501	-	-	0/4/4/4	-
6	H9V	B	502	-	-	1/8/24/24	0/3/3/3
6	H9V	D	502	-	-	3/8/24/24	0/3/3/3
9	PGE	D	504	-	-	2/7/7/7	-
4	MLA	A	502	-	-	0/4/4/4	-
4	MLA	E	502	-	-	0/4/4/4	-
5	P1T	F	501	-	-	8/14/15/15	0/1/1/1
5	P1T	H	502	-	-	3/14/15/15	0/1/1/1

The worst 5 of 33 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	501	P1T	C3-C2	7.96	1.48	1.40
5	D	501	P1T	C3-C2	7.90	1.48	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	H	502	P1T	C3-C2	7.71	1.48	1.40
5	F	501	P1T	C3-C2	7.59	1.48	1.40
5	D	501	P1T	C5-C4	5.90	1.48	1.40

The worst 5 of 56 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	F	501	P1T	CB-CA-N	-6.20	110.87	125.91
5	D	501	P1T	CB-CA-N	-5.84	111.75	125.91
5	H	502	P1T	CB-CA-N	-5.50	112.56	125.91
5	B	501	P1T	CB-CA-N	-5.42	112.78	125.91
6	D	502	H9V	C10-C11-C12	4.97	121.14	117.48

There are no chirality outliers.

5 of 34 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	501	P1T	C5-C4-C4A-N
5	B	501	P1T	C-CA-N-C4A
5	B	501	P1T	O-C-CA-CB
5	B	501	P1T	OXT-C-CA-CB
5	D	501	P1T	C5-C4-C4A-N

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	F	501	P1T	1	0
5	B	501	P1T	1	0
4	E	502	MLA	2	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 then 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

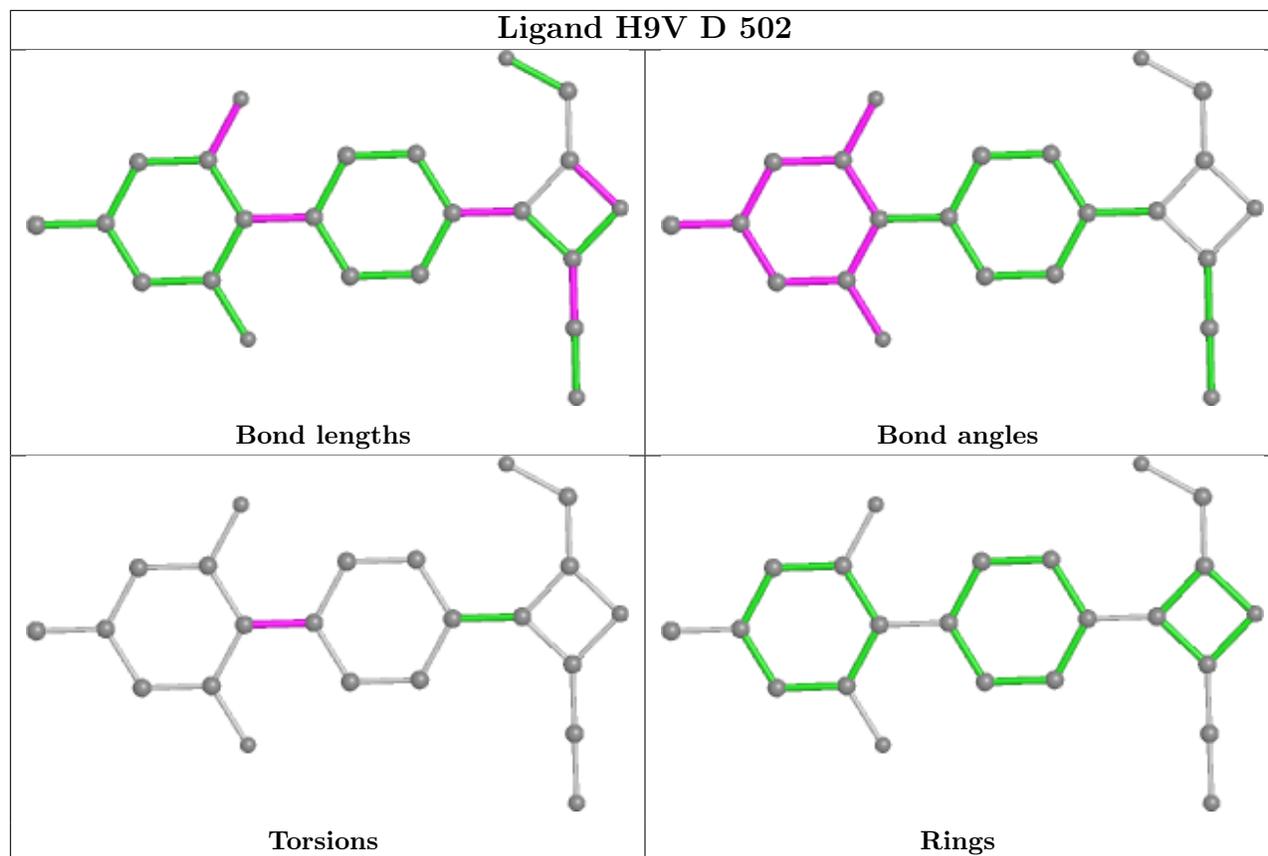equivalents in the CSD to analyse the geometry.

Ligand P1T F 501

Bond lengths

Bond angles

Torsions

Rings

Ligand P1T D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand H9V B 502

Bond lengths

Bond angles

Torsions

Rings

Ligand P1T H 502

Bond lengths

Bond angles

Torsions

Rings

Ligand P1T B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand H9V F 502

Bond lengths

Bond angles

Torsions

Rings

Ligand H9V H 503

Bond lengths

Bond angles

Torsions

Rings

Ligand H9V D 502

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	249/276 (90%)	-0.21	4 (1%)	72	69	30, 47, 74, 115	0
1	C	248/276 (89%)	-0.15	4 (1%)	72	69	28, 51, 86, 121	0
1	E	247/276 (89%)	0.12	9 (3%)	42	37	39, 71, 105, 124	0
1	G	248/276 (89%)	-0.36	3 (1%)	79	76	26, 44, 64, 96	0
2	B	404/410 (98%)	-0.43	4 (0%)	82	80	22, 32, 54, 128	0
2	D	399/410 (97%)	-0.41	4 (1%)	82	80	22, 32, 52, 100	0
2	F	400/410 (97%)	-0.53	1 (0%)	94	94	20, 34, 56, 100	0
2	H	403/410 (98%)	-0.41	4 (0%)	82	80	21, 31, 53, 133	0
All	All	2598/2744 (94%)	-0.33	33 (1%)	77	75	20, 38, 80, 133	0

The worst 5 of 33 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	8	GLU	6.8
1	A	267	GLY	4.5
1	E	266	LEU	4.5
2	D	22	PRO	3.7
1	A	197	GLN	3.4

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

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	FMT	B	508	3/3	0.50	0.37	53,53,53,55	0
4	MLA	F	506	7/7	0.78	0.36	82,84,90,90	0
8	ACT	B	507	4/4	0.79	0.54	72,73,73,74	0
6	H9V	D	502	23/23	0.81	0.38	58,60,60,61	23
10	EDO	H	506	4/4	0.81	0.26	55,56,56,57	0
9	PGE	D	504	10/10	0.83	0.42	64,68,72,72	0
4	MLA	G	501	7/7	0.84	0.23	66,67,73,73	0
3	FMT	A	501	3/3	0.85	0.36	61,61,62,62	0
3	FMT	F	504	3/3	0.85	0.28	57,57,57,58	0
9	PGE	F	507	10/10	0.87	0.44	67,71,75,75	0
3	FMT	H	508	3/3	0.88	0.34	59,59,59,60	0
3	FMT	B	506	3/3	0.88	0.21	52,52,53,53	0
3	FMT	F	505	3/3	0.89	0.15	44,44,45,45	0
4	MLA	C	501	7/7	0.90	0.18	69,69,71,71	0
3	FMT	H	507	3/3	0.90	0.34	59,59,59,60	0
4	MLA	A	502	7/7	0.91	0.18	65,66,68,69	0
4	MLA	E	502	7/7	0.92	0.16	83,83,84,84	0
3	FMT	E	501	3/3	0.93	0.14	60,60,60,61	0
3	FMT	H	501	3/3	0.94	0.15	46,46,46,46	0
3	FMT	C	502	3/3	0.94	0.10	41,41,42,42	0
6	H9V	B	502	23/23	0.94	0.21	37,44,59,70	0
3	FMT	B	509	3/3	0.94	0.09	23,23,25,26	0
6	H9V	H	503	23/23	0.95	0.19	40,42,56,62	0
3	FMT	B	505	3/3	0.95	0.13	38,38,39,39	0
3	FMT	A	503	3/3	0.95	0.15	46,46,46,46	0
3	FMT	B	504	3/3	0.95	0.23	54,54,54,55	0
6	H9V	F	502	23/23	0.95	0.17	43,49,59,68	0
3	FMT	H	505	3/3	0.96	0.11	43,43,44,44	0
7	CS	F	503	1/1	0.97	0.14	138,138,138,138	0
5	P1T	B	501	21/21	0.98	0.24	24,25,38,40	0
5	P1T	D	501	21/21	0.98	0.19	23,27,33,34	0
5	P1T	F	501	21/21	0.98	0.21	26,30,38,38	0
5	P1T	H	502	21/21	0.98	0.23	20,23,38,39	0
7	CS	B	503	1/1	0.98	0.08	120,120,120,120	0
7	CS	D	503	1/1	0.99	0.10	47,47,47,47	1
7	CS	H	504	1/1	0.99	0.10	72,72,72,72	1

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.
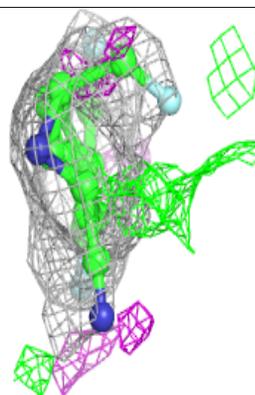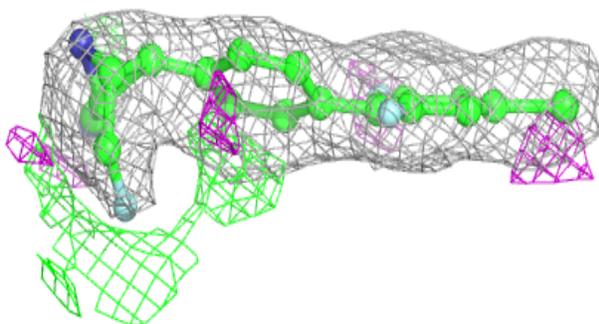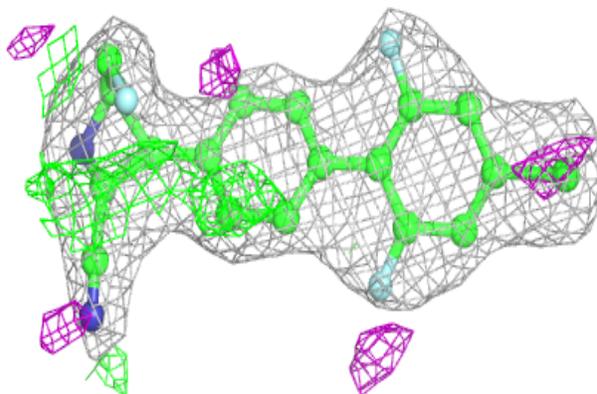
Electron density around H9V D 502:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
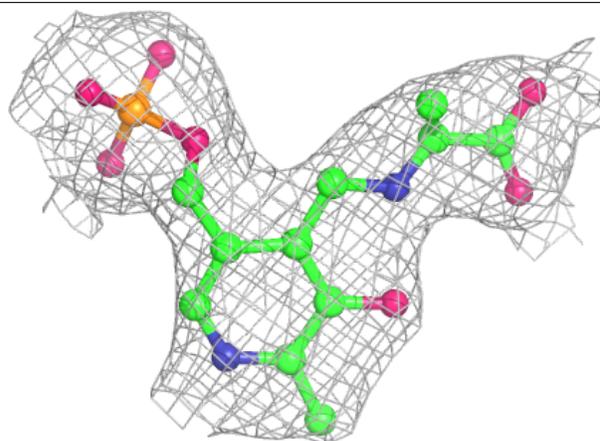and green (positive)
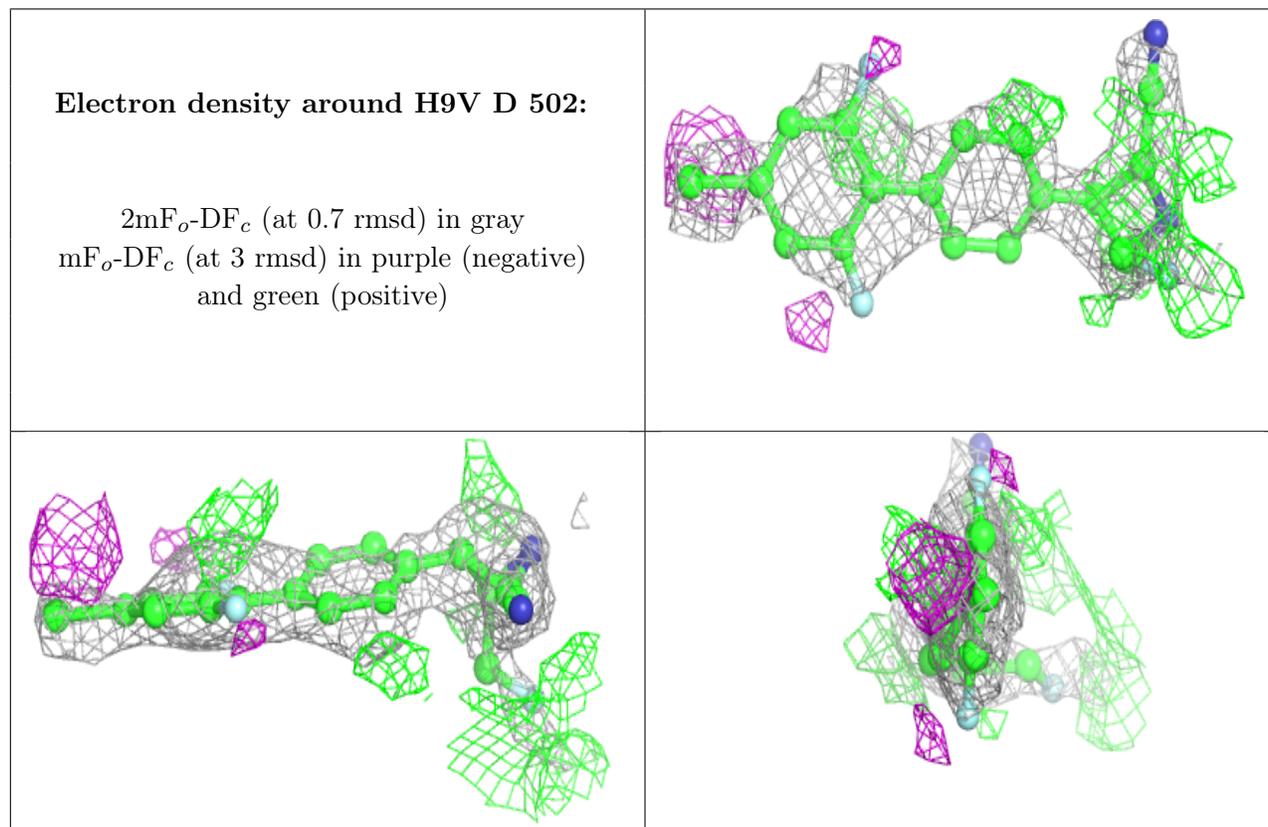
Electron density around H9V B 502:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
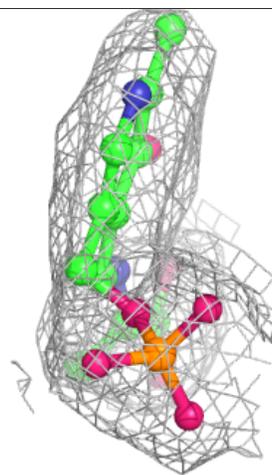mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
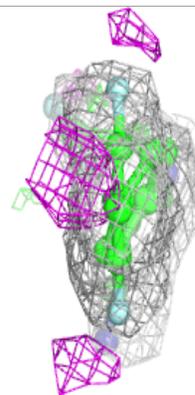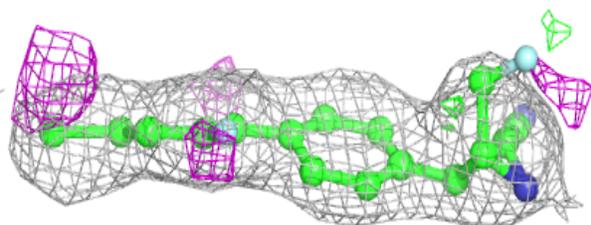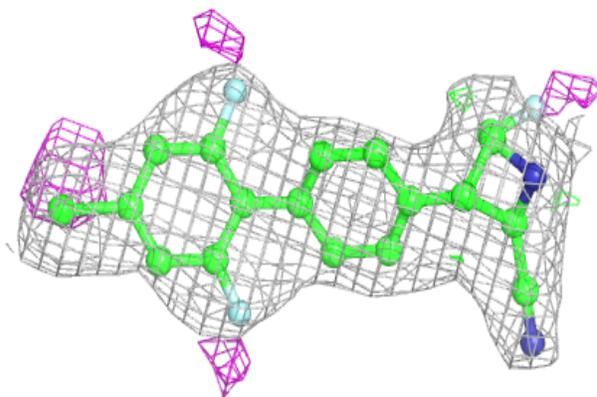
Electron density around H9V H 503:

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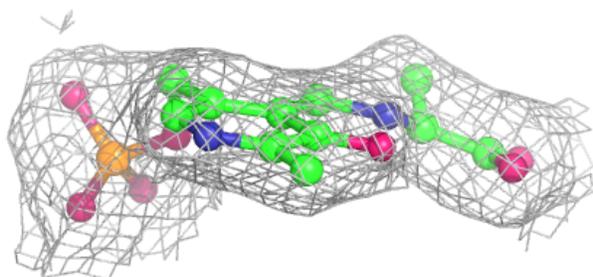and green (positive)

Electron density around H9V F 502:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
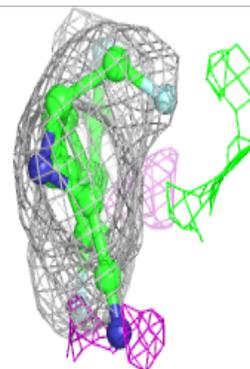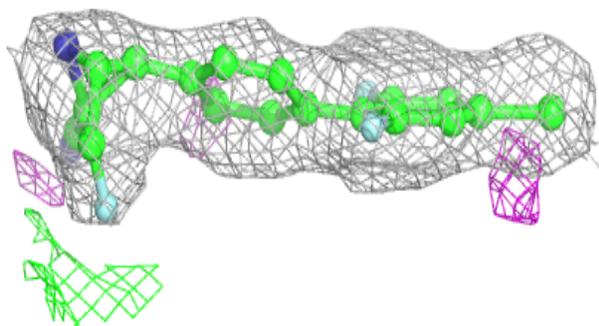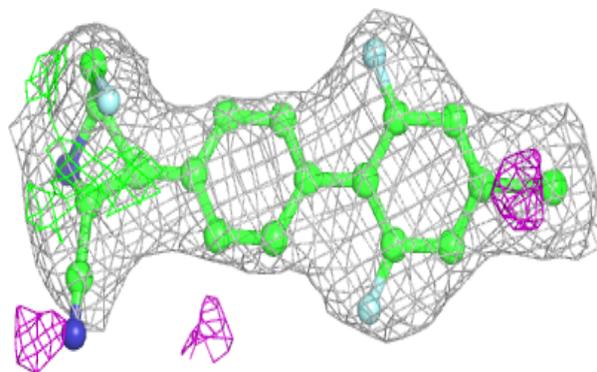
Electron density around P1T B 501:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
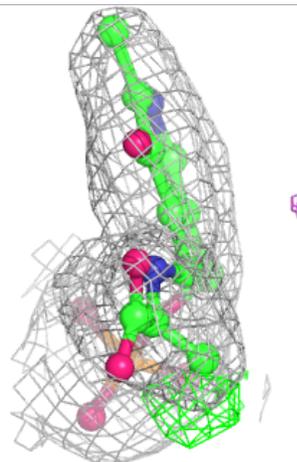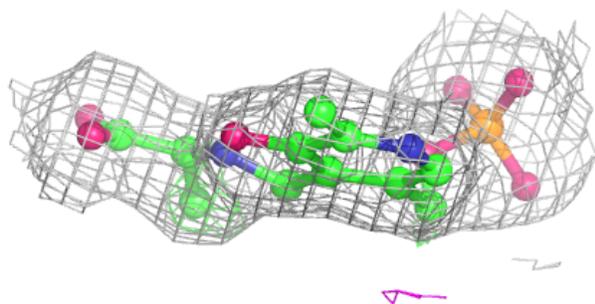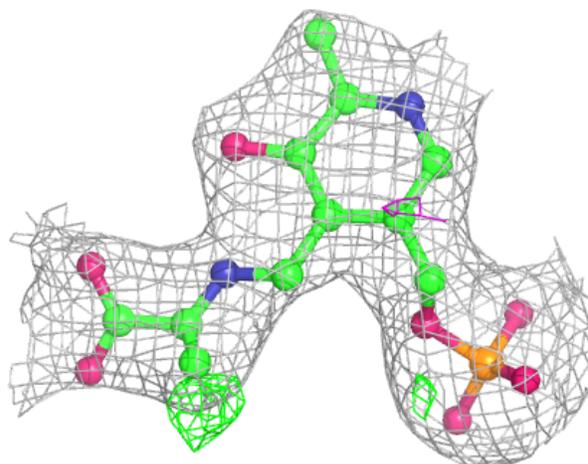
Electron density around P1T D 501:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
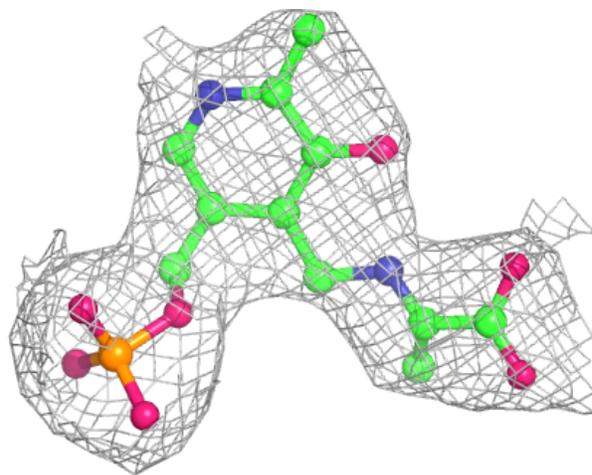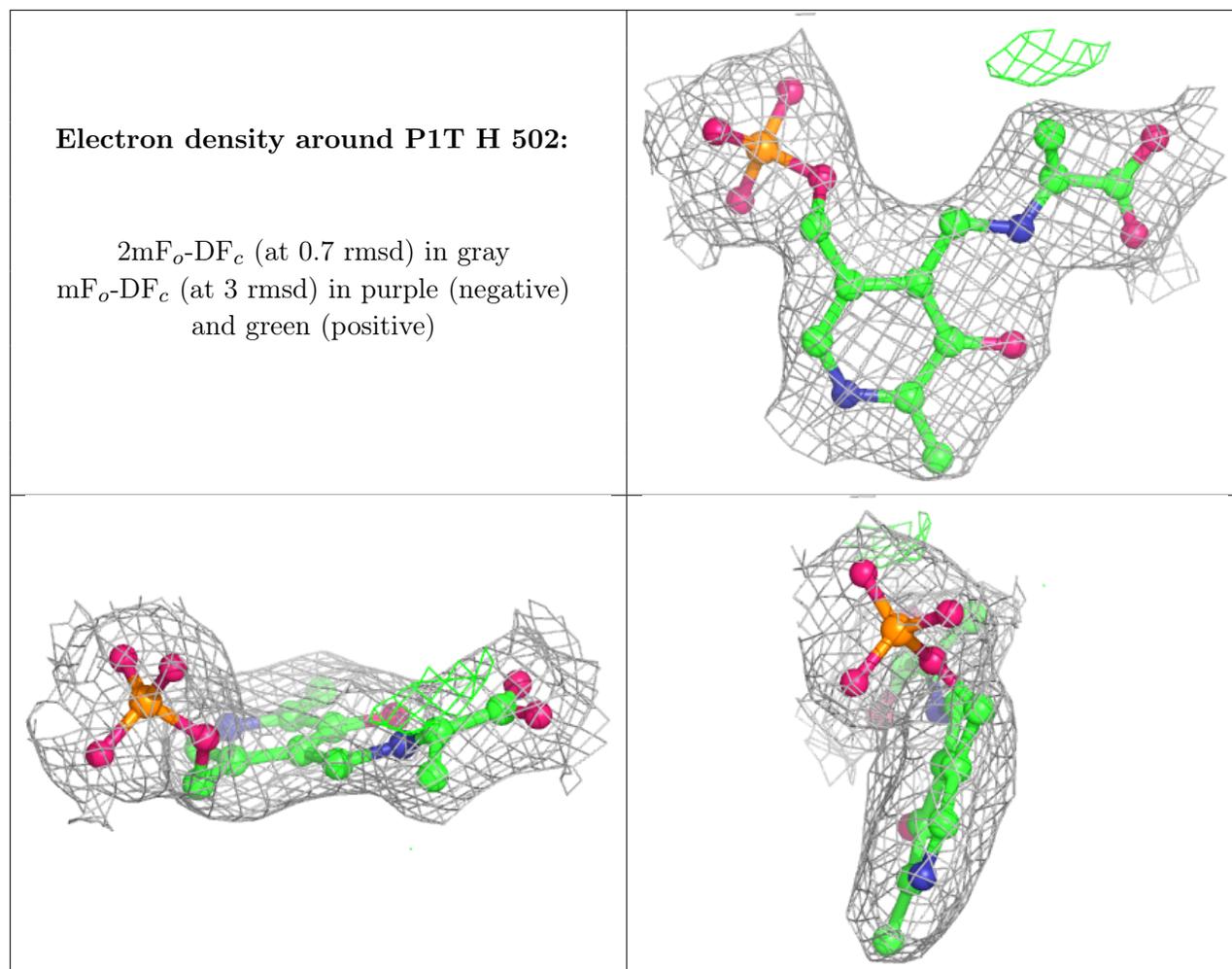mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
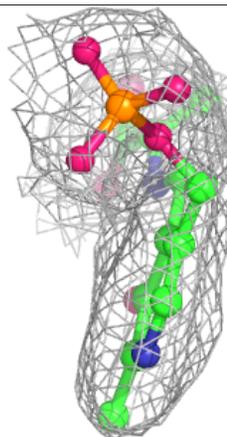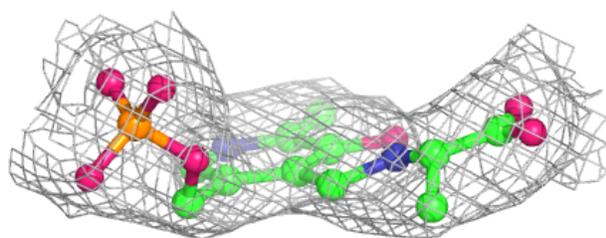
Electron density around P1T F 501:

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

Electron density around P1T H 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 ⓘ

There are no such residues in this entry.