



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 08:04 AM UTC

PDB ID : 7TCS / pdb_00007tcs
Title : M379A mutant tyrosine phenol-lyase complexed with L-methionine
Authors : Phillips, R.S.
Deposited on : 2021-12-28
Resolution : 1.37 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

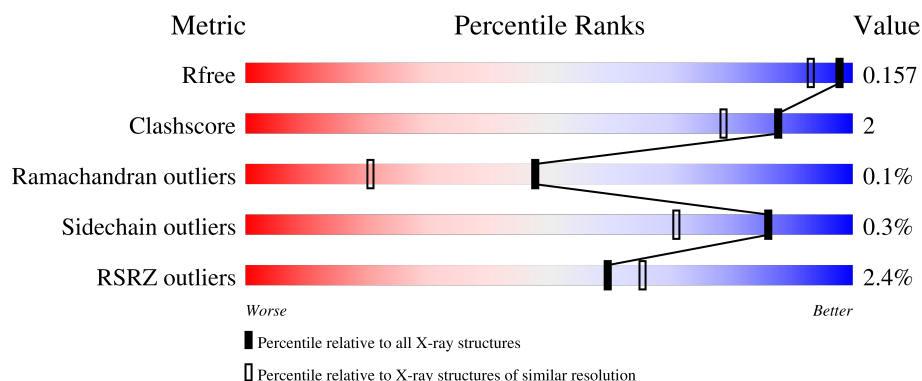
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.37 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4403 (1.40-1.36)
Clashscore	190562	4528 (1.40-1.36)
Ramachandran outliers	187476	4459 (1.40-1.36)
Sidechain outliers	187428	4458 (1.40-1.36)
RSRZ outliers	180081	4399 (1.40-1.36)

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	456	97% .
1	B	456	4% 96% .
1	C	456	% 96% .
1	D	456	5% 91% 9%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 33603 atoms, of which 15942 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 Tyrosine phenol-lyase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	456	Total	C	H	N	O	S	0	20	0
			7444	2367	3724	641	683	29			
1	B	456	Total	C	H	N	O	S	0	11	0
			7303	2323	3636	636	680	28			
1	C	456	Total	C	H	N	O	S	0	24	0
			7506	2379	3766	648	683	30			
1	D	456	Total	C	H	N	O	S	0	141	0
			9449	3002	4718	827	871	31			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	205	ALA	GLU	conflict	UNP P31013
A	379	ALA	MET	engineered mutation	UNP P31013
B	205	ALA	GLU	conflict	UNP P31013
B	379	ALA	MET	engineered mutation	UNP P31013
C	205	ALA	GLU	conflict	UNP P31013
C	379	ALA	MET	engineered mutation	UNP P31013
D	205	ALA	GLU	conflict	UNP P31013
D	379	ALA	MET	engineered mutation	UNP P31013

- Molecule 2 is POTASSIUM ION (CCD ID: K) (formula: K).

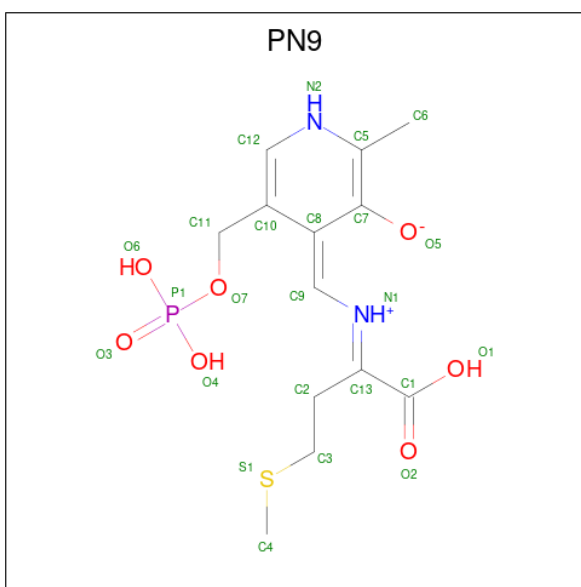
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	K	0	0
			2	2		
2	B	2	Total	K	0	0
			2	2		

- Molecule 3 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C₂H₆OS).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	H	O	S	0	0
			10	2	6	1	1		
3	B	1	Total	C	H	O	S	0	0
			10	2	6	1	1		
3	B	1	Total	C	H	O	S	0	0
			10	2	6	1	1		
3	C	1	Total	C	H	O	S	0	0
			10	2	6	1	1		
3	C	1	Total	C	H	O	S	0	0
			10	2	6	1	1		
3	C	1	Total	C	H	O	S	0	0
			10	2	6	1	1		
3	D	1	Total	C	H	O	S	0	0
			10	2	6	1	1		

- Molecule 4 is (4Z)-4-({[(1E)-1-carboxy-3-(methylsulfanyl)propylidene]azaniumyl}methy-
lidene)-2-methyl-5-[(phosphonoxy)methyl]-1,4-dihydropyridin-3-olate (CCD ID: PN9)
(formula: C₁₃H₁₉N₂O₇PS) (labeled as "Ligand of Interest" by depositor).

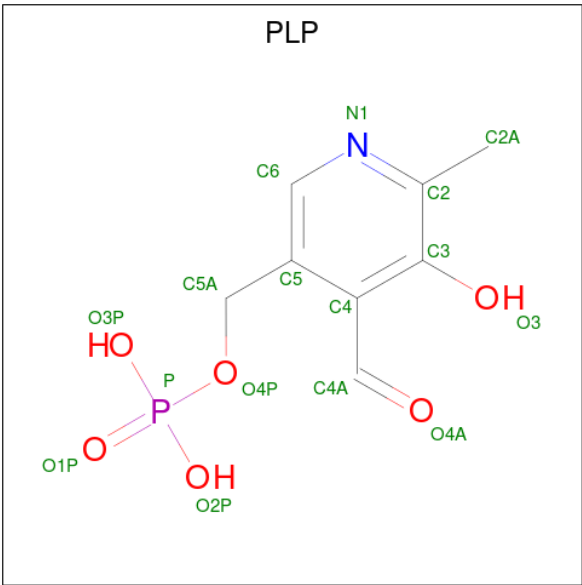


Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
4	A	1	Total	C	H	N	O	P	S	0	0
			40	13	16	2	7	1	1		
4	B	1	Total	C	H	N	O	P	S	0	0
			40	13	16	2	7	1	1		
4	C	1	Total	C	H	N	O	P	S	0	0
			40	13	16	2	7	1	1		

- Molecule 5 is CESIUM ION (CCD ID: CS) (formula: Cs).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Cs	0	0
			1	1		
5	C	1	Total	Cs	0	0
			1	1		
5	D	1	Total	Cs	0	0
			1	1		

- Molecule 6 is PYRIDOXAL-5'-PHOSPHATE (CCD ID: PLP) (formula: C₈H₁₀NO₆P).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
6	D	1	Total	C	H	N	O	P	0	0
			23	8	8	1	5	1		

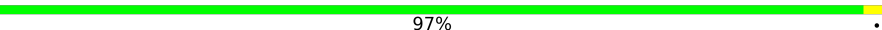
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	469	Total	O	0	43
			469	469		
7	B	367	Total	O	0	14
			367	367		
7	C	476	Total	O	0	33
			476	476		
7	D	369	Total	O	0	71
			369	369		

3 Residue-property plots

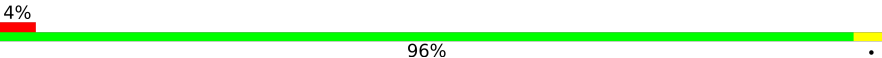
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

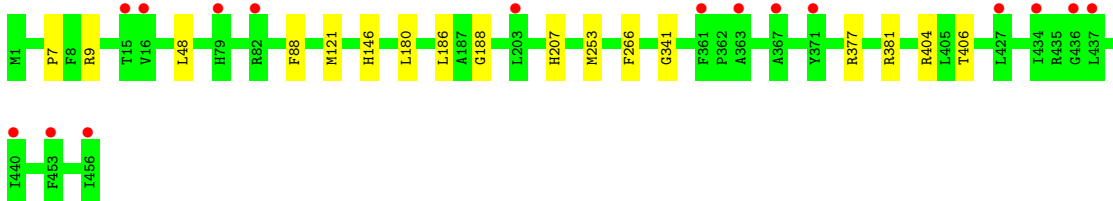
• Molecule 1: Tyrosine phenol-lyase

Chain A:  97%

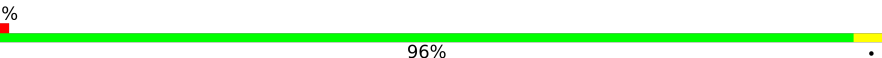


• Molecule 1: Tyrosine phenol-lyase

Chain B:  96%

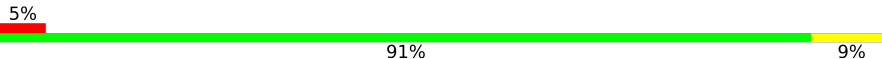


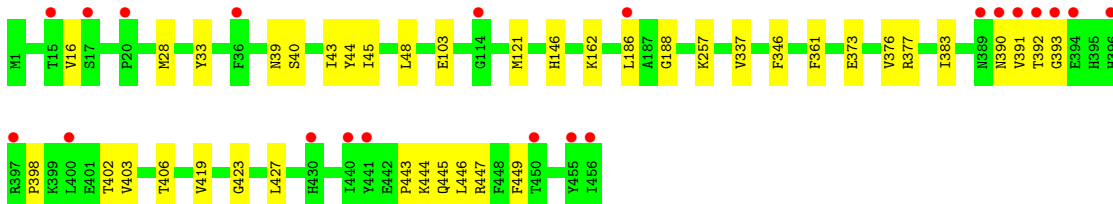
• Molecule 1: Tyrosine phenol-lyase

Chain C:  96%



• Molecule 1: Tyrosine phenol-lyase

Chain D:  91% 9%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	63.55Å 82.99Å 96.58Å 93.73° 105.71° 114.24°	Depositor
Resolution (Å)	45.27 – 1.37 45.27 – 1.37	Depositor EDS
% Data completeness (in resolution range)	94.0 (45.27-1.37) 94.0 (45.27-1.37)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 1.37Å)	Xtriage
Refinement program	PHENIX 1.20_4444	Depositor
R, R_{free}	0.141 , 0.155 0.141 , 0.157	Depositor DCC
R_{free} test set	2001 reflections (0.56%)	wwPDB-VP
Wilson B-factor (Å ²)	20.0	Xtriage
Anisotropy	0.173	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 47.1	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	0.98	EDS
Total number of atoms	33603	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.03% 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: DMS, K, CS, PLP, PN9

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	0.29	0/3854	0.55	0/5186
1	B	0.27	0/3774	0.51	0/5079
1	C	0.29	0/3881	0.54	0/5216
1	D	0.24	0/4880	0.44	0/6564
All	All	0.27	0/16389	0.51	0/22045

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 [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	3720	3724	3717	16	0
1	B	3667	3636	3623	11	0
1	C	3740	3766	3767	14	0
1	D	4731	4718	4684	32	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	4	6	6	0	0
3	B	8	12	12	0	0
3	C	12	18	18	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	4	6	6	0	0
4	A	24	16	0	0	0
4	B	24	16	0	0	0
4	C	24	16	0	0	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	D	15	8	7	1	0
7	A	469	0	0	1	0
7	B	367	0	0	1	0
7	C	476	0	0	2	0
7	D	369	0	0	1	0
All	All	17661	15942	15840	63	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.

All (63) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:373[B]:GLU:HB2	1:D:427[B]:LEU:HD21	1.62	0.81
1:D:361[B]:PHE:HD1	1:D:383[B]:ILE:HD11	1.59	0.67
1:C:177:TYR:HE2	1:C:179[B]:CYS:HG	1.44	0.66
1:D:443[B]:PRO:O	1:D:445[B]:GLN:N	2.30	0.63
1:C:178:ILE:HB	1:C:211[B]:VAL:HG12	1.83	0.61
1:A:9[B]:ARG:HG3	1:C:16:VAL:HG11	1.82	0.60
1:A:12:SER:OG	3:C:503:DMS:H13	2.04	0.57
1:C:381:ARG:HG3	1:C:404:ARG:HB2	1.86	0.57
1:C:12:SER:OG	3:C:503:DMS:H21	2.06	0.56
1:D:383[B]:ILE:HG22	1:D:398[B]:PRO:HD2	1.87	0.56
1:D:423:GLY:O	1:D:427[B]:LEU:HD13	2.05	0.55
1:A:280:GLU:OE1	7:A:601:HOH:O	2.18	0.55
1:A:283[B]:VAL:HG11	1:D:449[B]:PHE:CD2	2.41	0.55
1:A:381:ARG:HG3	1:A:404:ARG:HB2	1.89	0.54
1:B:9:ARG:HG3	1:D:16[B]:VAL:CG1	2.38	0.53
1:D:121[A]:MET:HE2	1:D:186:LEU:HB3	1.91	0.52
1:A:283[B]:VAL:HG12	1:D:446[B]:LEU:HD13	1.90	0.52
1:C:258:ASP:N	7:C:606:HOH:O	2.42	0.51
1:D:337:VAL:HG21	1:D:402[B]:THR:HG21	1.91	0.51
1:B:7:PRO:C	1:D:16[B]:VAL:HG22	2.36	0.50
1:A:9[B]:ARG:HG3	1:C:16:VAL:CG1	2.40	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:48[B]:LEU:HB2	1:D:377[B]:ARG:HG2	1.93	0.49
1:B:121[A]:MET:HE2	1:B:146:HIS:CE1	2.47	0.49
1:D:121[B]:MET:HE2	1:D:146:HIS:CE1	2.48	0.49
1:A:73:GLY:HA3	1:D:39[B]:ASN:HA	1.96	0.47
1:D:373[B]:GLU:HB3	1:D:427[B]:LEU:HD11	1.97	0.47
1:D:361[B]:PHE:CD1	1:D:383[B]:ILE:HD11	2.46	0.46
1:D:392[B]:THR:OG1	1:D:393[B]:GLY:N	2.46	0.46
1:D:346[B]:PHE:HA	1:D:403[B]:VAL:O	2.15	0.46
1:B:188:GLY:O	1:B:341:GLY:HA3	2.16	0.46
1:C:85:GLN:HG3	7:C:981:HOH:O	2.16	0.46
1:B:121[B]:MET:HE1	1:B:186:LEU:C	2.41	0.45
1:A:180:LEU:C	1:A:180:LEU:HD23	2.42	0.45
1:B:381:ARG:HG3	1:B:404:ARG:HB2	1.97	0.45
1:A:9[B]:ARG:HG2	1:C:412:TYR:CE1	2.51	0.45
1:A:43[A]:ILE:HD13	1:A:377:ARG:CZ	2.47	0.44
1:B:180:LEU:C	1:B:180:LEU:HD23	2.42	0.44
1:A:283[B]:VAL:HG12	1:D:446[B]:LEU:CD1	2.47	0.44
1:C:177:TYR:HE2	1:C:179[B]:CYS:SG	2.39	0.43
1:B:48:LEU:HB2	1:B:377:ARG:HG2	2.01	0.43
1:D:45[A]:ILE:HB	1:D:376[A]:VAL:HG22	2.00	0.43
1:B:207:HIS:HE1	7:B:617:HOH:O	2.00	0.43
1:D:337:VAL:HB	1:D:346[B]:PHE:HB2	2.01	0.43
1:D:390[B]:ASN:OD1	1:D:391[B]:VAL:N	2.50	0.42
1:D:103:GLU:OE2	6:D:502:PLP:H6	2.19	0.42
1:C:198[B]:ARG:HG2	1:C:247:TYR:CZ	2.54	0.42
1:D:162[A]:LYS:NZ	7:D:609:HOH:O	2.53	0.42
1:D:392[B]:THR:HG23	1:D:393[B]:GLY:N	2.35	0.42
1:B:253[A]:MET:HG2	1:B:266:PHE:CZ	2.55	0.42
1:D:443[A]:PRO:HG2	1:D:447[A]:ARG:HA	2.02	0.41
1:D:28[A]:MET:HE2	1:D:33[A]:TYR:HA	2.01	0.41
1:A:73:GLY:HA3	1:D:40[B]:SER:H	1.85	0.41
1:D:43[B]:ILE:HD13	1:D:377[B]:ARG:NE	2.36	0.41
1:D:44[B]:TYR:HE2	1:D:419:VAL:HG11	1.84	0.41
1:D:188:GLY:HA2	1:D:346[B]:PHE:CE1	2.55	0.41
1:C:204:THR:HG21	1:C:211[B]:VAL:CG1	2.51	0.40
1:A:43[A]:ILE:CD1	1:A:377:ARG:CZ	2.99	0.40
1:B:88:PHE:CZ	1:B:253[A]:MET:HE2	2.56	0.40
1:D:28[B]:MET:HA	1:D:28[B]:MET:HE3	2.03	0.40
1:C:188:GLY:HA2	1:C:346:PHE:CE1	2.57	0.40
1:C:388:ARG:HD3	1:C:393:GLY:O	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	474/456 (104%)	465 (98%)	9 (2%)	0	100	100
1	B	465/456 (102%)	455 (98%)	10 (2%)	0	100	100
1	C	478/456 (105%)	469 (98%)	9 (2%)	0	100	100
1	D	594/456 (130%)	568 (96%)	24 (4%)	2 (0%)	36	16
All	All	2011/1824 (110%)	1957 (97%)	52 (3%)	2 (0%)	48	20

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	444[A]	LYS
1	D	444[B]	LYS

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	396/377 (105%)	395 (100%)	1 (0%)	86	71
1	B	387/377 (103%)	386 (100%)	1 (0%)	86	71
1	C	399/377 (106%)	398 (100%)	1 (0%)	86	71
1	D	504/377 (134%)	502 (100%)	2 (0%)	84	68
All	All	1686/1508 (112%)	1681 (100%)	5 (0%)	86	71

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	406	THR
1	B	406	THR
1	C	406	THR
1	D	257	LYS
1	D	406	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	321	GLN
1	B	146	HIS
1	C	164	GLN
1	C	429	GLN
1	D	321	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 7 are monoatomic - leaving 11 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	DMS	D	501	-	3,3,3	0.67	0	3,3,3	0.55	0
3	DMS	A	502	-	3,3,3	0.69	0	3,3,3	0.65	0
3	DMS	B	503	-	3,3,3	0.63	0	3,3,3	0.72	0
6	PLP	D	502	1	15,15,16	2.25	4 (26%)	21,22,23	2.10	5 (23%)
3	DMS	B	502	-	3,3,3	0.68	0	3,3,3	0.75	0
4	PN9	B	504	-	22,24,24	1.40	4 (18%)	24,33,33	1.09	1 (4%)
3	DMS	C	501	-	3,3,3	0.67	0	3,3,3	0.51	0
3	DMS	C	503	-	3,3,3	0.71	0	3,3,3	0.65	0
4	PN9	C	504	-	22,24,24	1.31	4 (18%)	24,33,33	1.04	1 (4%)
4	PN9	A	503	-	22,24,24	1.33	4 (18%)	24,33,33	1.13	1 (4%)
3	DMS	C	502	-	3,3,3	0.66	0	3,3,3	0.56	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
6	PLP	D	502	1	-	0/6/6/8	0/1/1/1
4	PN9	A	503	-	-	0/17/19/19	0/1/1/1
4	PN9	B	504	-	-	1/17/19/19	0/1/1/1
4	PN9	C	504	-	-	0/17/19/19	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	502	PLP	C4A-C4	5.42	1.62	1.51
4	B	504	PN9	O7-C11	3.62	1.47	1.43
6	D	502	PLP	C5-C4	-3.50	1.36	1.40
4	A	503	PN9	O7-C11	3.42	1.46	1.43
4	A	503	PN9	C5-N2	3.21	1.37	1.34
6	D	502	PLP	C2A-C2	3.08	1.55	1.50
4	C	504	PN9	O7-C11	3.06	1.46	1.43
4	B	504	PN9	C5-N2	3.05	1.37	1.34
4	C	504	PN9	C5-N2	3.00	1.37	1.34
6	D	502	PLP	C6-N1	2.90	1.40	1.34
4	B	504	PN9	O5-C7	-2.66	1.24	1.33
4	B	504	PN9	O1-C1	-2.61	1.23	1.30
4	A	503	PN9	O5-C7	-2.44	1.25	1.33
4	C	504	PN9	O5-C7	-2.31	1.25	1.33
4	A	503	PN9	O1-C1	-2.06	1.25	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	504	PN9	O1-C1	-2.03	1.25	1.30

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	502	PLP	C4A-C4-C5	6.75	127.90	120.94
6	D	502	PLP	C4A-C4-C3	-4.23	113.48	120.52
4	B	504	PN9	C12-N2-C5	-2.89	121.80	124.20
6	D	502	PLP	C6-C5-C4	2.71	120.32	118.10
4	A	503	PN9	C12-N2-C5	-2.37	122.23	124.20
6	D	502	PLP	C5-C6-N1	-2.37	119.98	123.83
4	C	504	PN9	C12-N2-C5	-2.33	122.27	124.20
6	D	502	PLP	C5A-C5-C6	-2.18	115.80	119.36

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	504	PN9	C10-C8-C9-N1

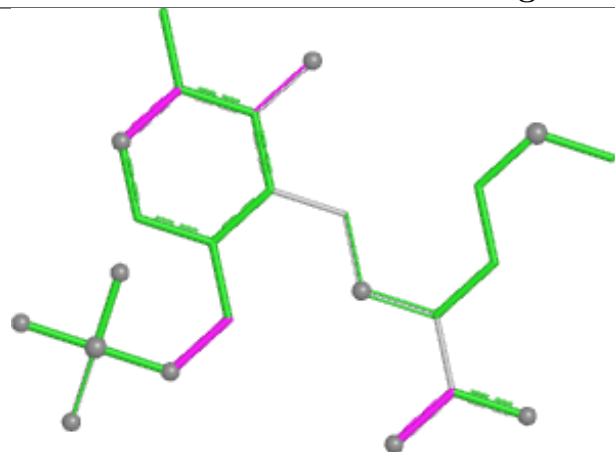
There are no ring outliers.

2 monomers are involved in 3 short contacts:

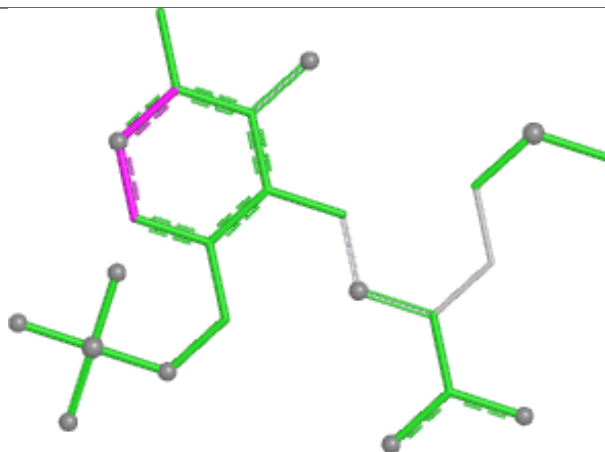
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	502	PLP	1	0
3	C	503	DMS	2	0

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 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.

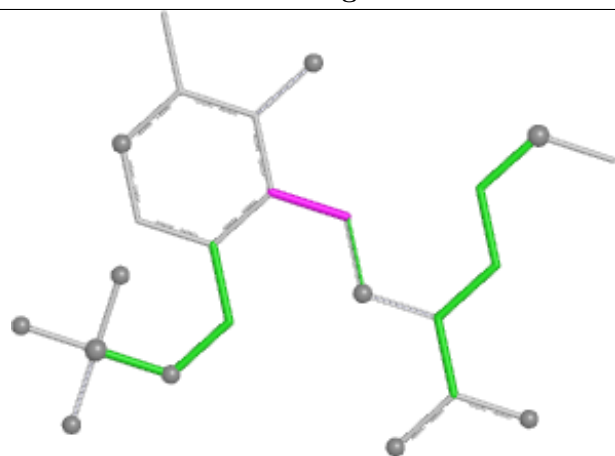
Ligand PN9 B 504



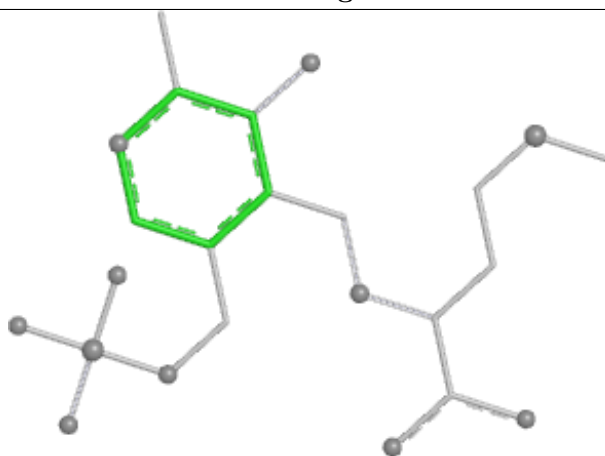
Bond lengths



Bond angles

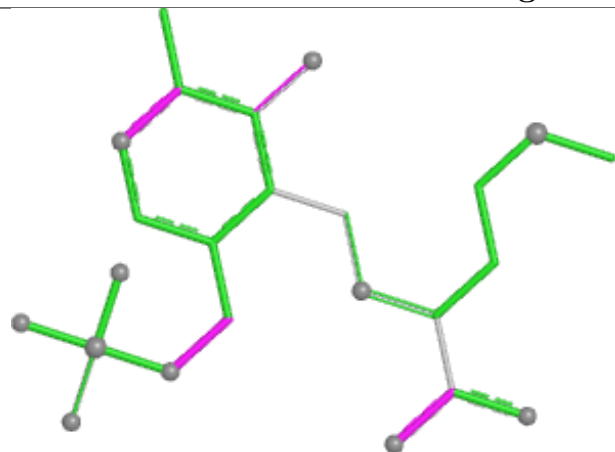


Torsions

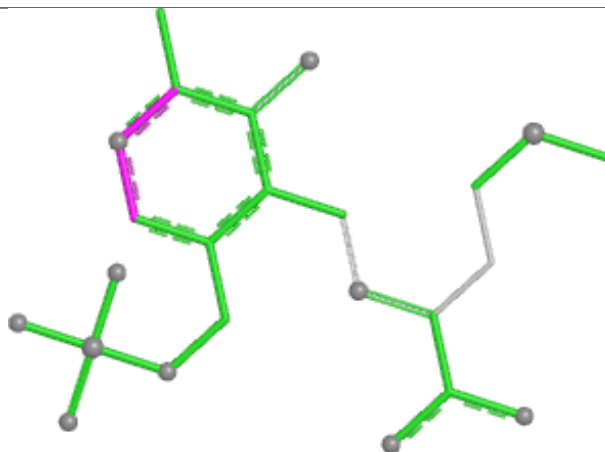


Rings

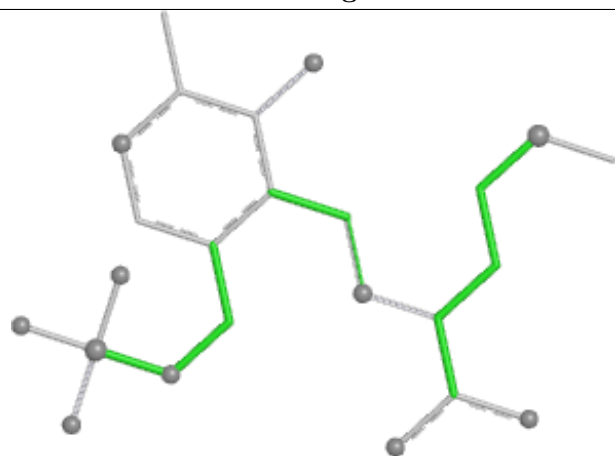
Ligand PN9 C 504



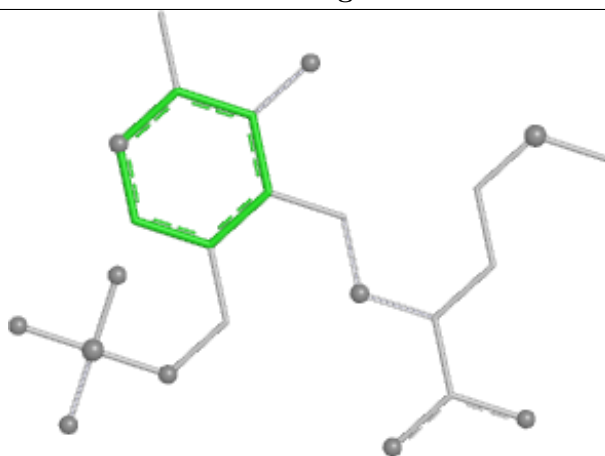
Bond lengths



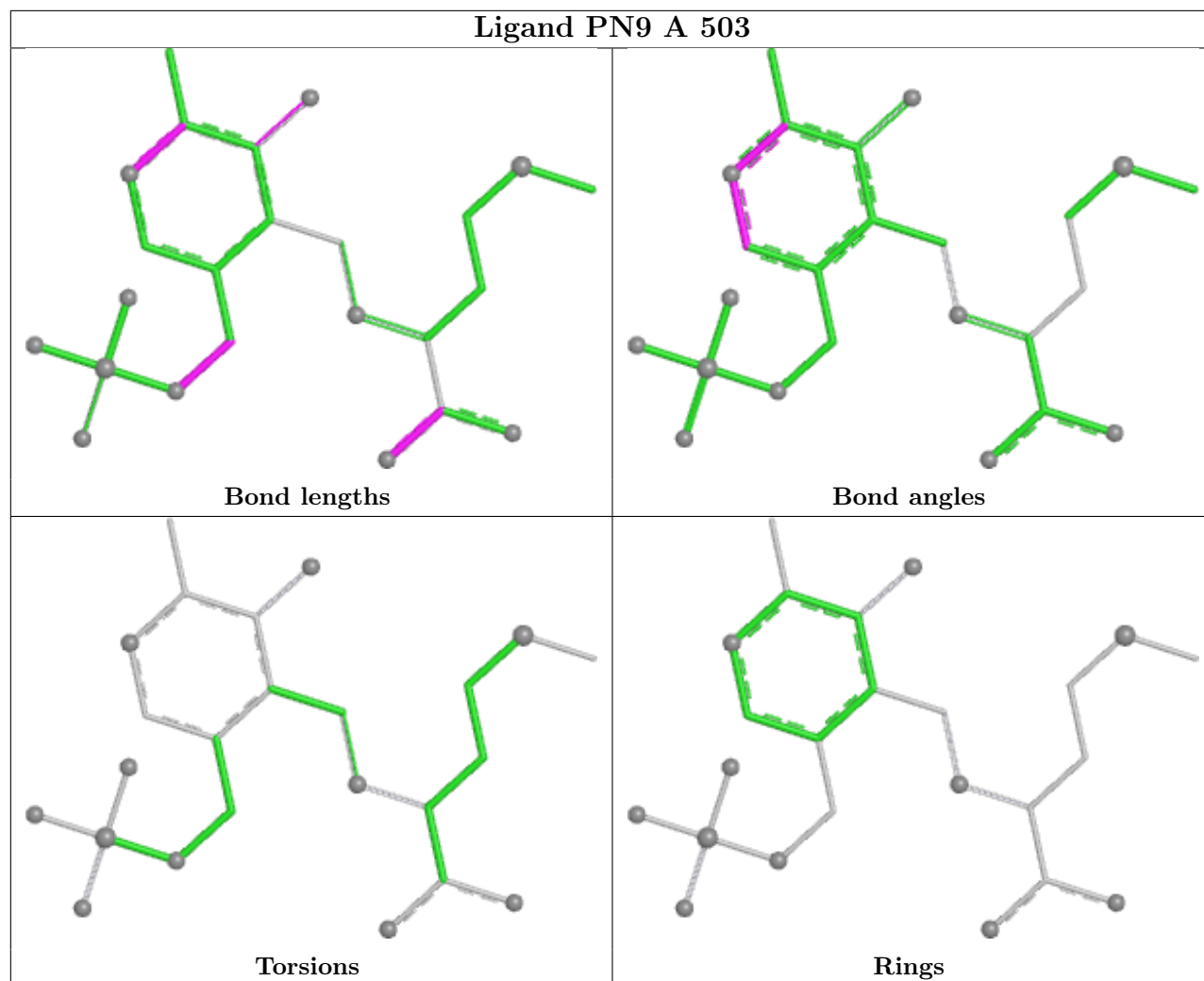
Bond angles



Torsions



Rings



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

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	456/456 (100%)	-0.31	2 (0%) 88 92	11, 23, 44, 69	18 (3%)
1	B	456/456 (100%)	0.14	16 (3%) 47 53	11, 29, 60, 78	9 (1%)
1	C	456/456 (100%)	-0.26	4 (0%) 81 86	10, 24, 50, 99	22 (4%)
1	D	456/456 (100%)	0.05	21 (4%) 37 42	10, 22, 45, 81	138 (30%)
All	All	1824/1824 (100%)	-0.10	43 (2%) 59 65	10, 24, 52, 99	187 (10%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	391[A]	VAL	5.4
1	D	392[A]	THR	4.6
1	D	390[A]	ASN	3.6
1	D	114	GLY	3.5
1	D	441[A]	TYR	3.5
1	D	430[A]	HIS	3.2
1	B	371	TYR	3.1
1	B	440	ILE	2.9
1	D	455[A]	TYR	2.9
1	D	393[A]	GLY	2.9
1	B	363	ALA	2.9
1	D	440[A]	ILE	2.8
1	C	1	MET	2.8
1	C	16	VAL	2.8
1	B	79[A]	HIS	2.7
1	C	44	TYR	2.7
1	B	16	VAL	2.7
1	D	36[A]	PHE	2.6
1	C	456	ILE	2.6
1	D	186	LEU	2.6
1	B	15	THR	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	456[A]	ILE	2.6
1	D	394[A]	GLU	2.5
1	D	397[A]	ARG	2.4
1	D	396[A]	HIS	2.4
1	B	361	PHE	2.4
1	B	434	ILE	2.4
1	B	203	LEU	2.4
1	D	450[A]	THR	2.3
1	B	456	ILE	2.3
1	A	16	VAL	2.3
1	D	20[A]	PRO	2.3
1	D	15[A]	THR	2.2
1	B	436	GLY	2.2
1	A	391	VAL	2.2
1	D	389[A]	ASN	2.1
1	B	82	ARG	2.1
1	D	400[A]	LEU	2.1
1	B	427	LEU	2.1
1	B	437	LEU	2.0
1	B	367	ALA	2.0
1	B	453	PHE	2.0
1	D	17[A]	SER	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	CS	A	505	1/1	0.64	0.19	196,196,196,196	0

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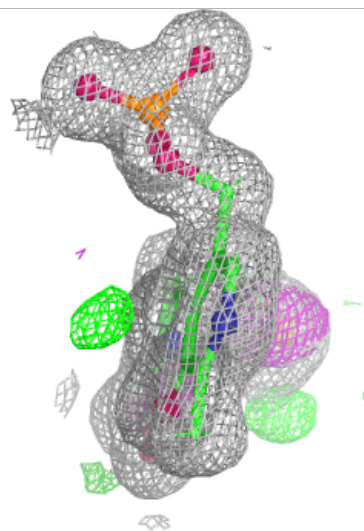
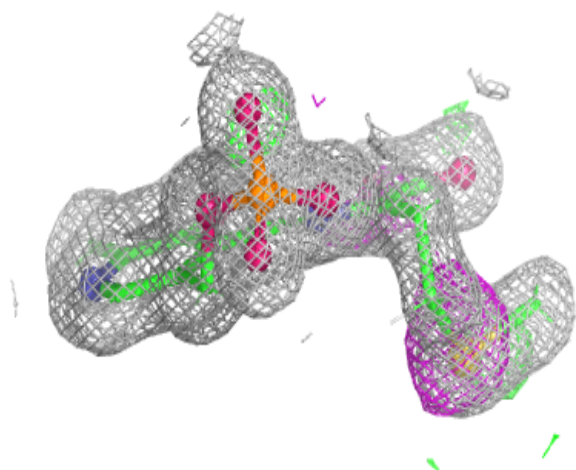
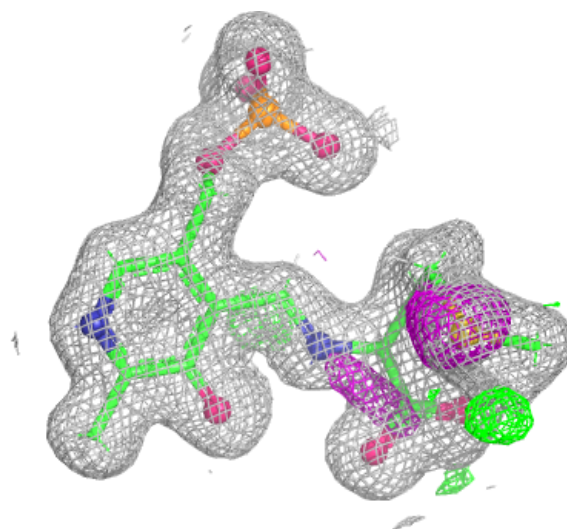
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	DMS	B	502	4/4	0.67	0.18	89,107,107,107	0
5	CS	C	505	1/1	0.68	0.17	187,187,187,187	0
3	DMS	A	502	4/4	0.69	0.20	81,98,98,98	0
3	DMS	D	501	4/4	0.76	0.20	53,68,84,103	0
5	CS	D	503	1/1	0.77	0.17	193,193,193,193	0
3	DMS	C	501	4/4	0.82	0.21	57,71,86,87	0
3	DMS	C	502	4/4	0.86	0.15	52,68,84,103	0
3	DMS	B	503	4/4	0.87	0.21	47,56,57,57	0
3	DMS	C	503	4/4	0.87	0.22	45,54,57,64	0
4	PN9	B	504	24/24	0.97	0.07	17,26,36,36	0
4	PN9	C	504	24/24	0.98	0.05	15,20,26,26	0
4	PN9	A	503	24/24	0.98	0.05	17,21,30,30	0
6	PLP	D	502	15/16	0.98	0.06	18,22,32,52	0
2	K	A	504	1/1	0.99	0.04	17,17,17,17	0
2	K	B	505	1/1	1.00	0.02	16,16,16,16	0
2	K	A	501	1/1	1.00	0.02	16,16,16,16	0
2	K	B	501	1/1	1.00	0.02	16,16,16,16	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.

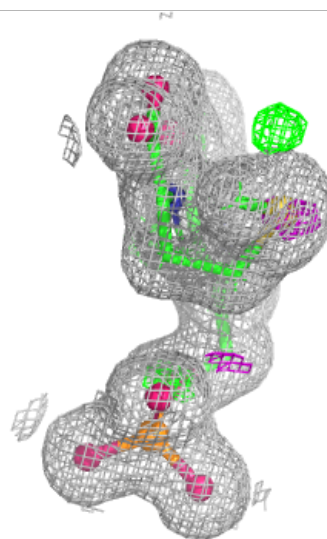
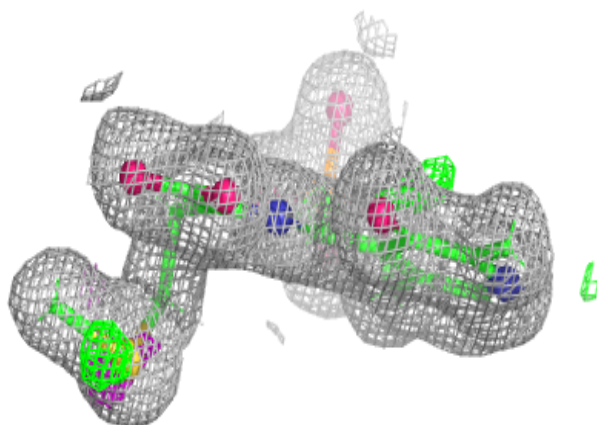
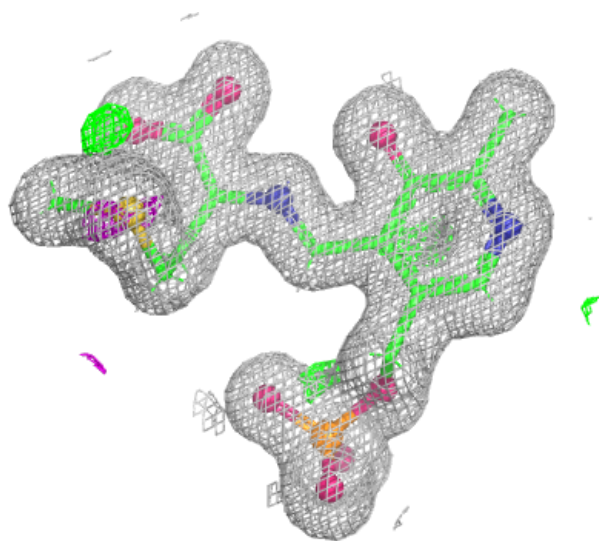
Electron density around PN9 B 504:

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



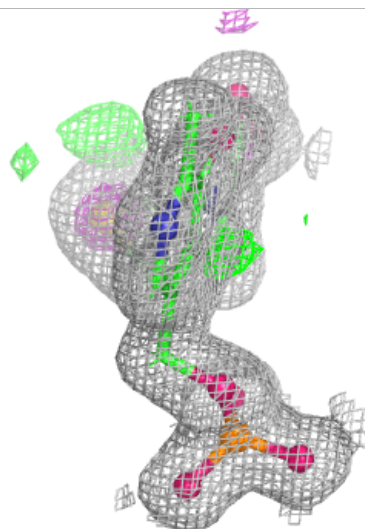
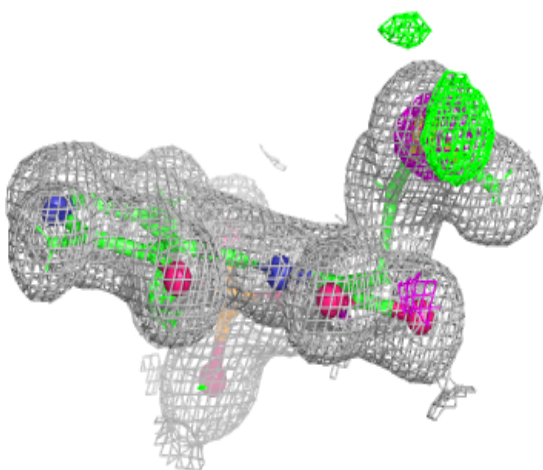
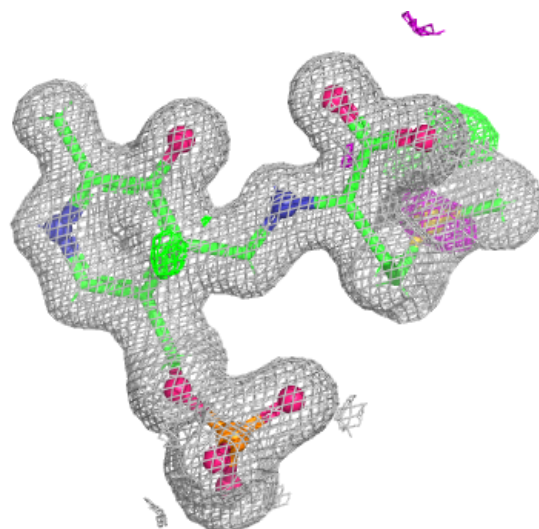
Electron density around PN9 C 504:

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



Electron density around PN9 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)



6.5 Other polymers ⓘ

There are no such residues in this entry.