wwPDB X-ray Structure Validation Summary Report (i)

Nov 22, 2023 – 11:09 PM JST

PDB ID	:	7Y3V
Title	:	Crystal structure of CdpNPT in complex with harmane
Authors	:	Nakashima, Y.; Morita, H.
Deposited on	:	2022-06-13
Resolution	:	2.43 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

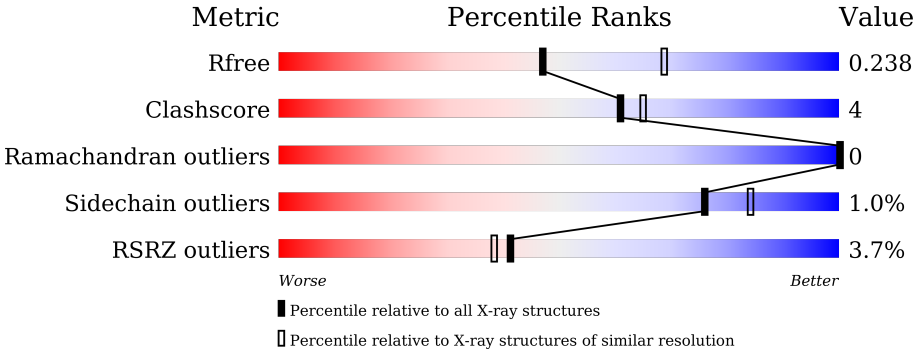
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber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

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.43 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	1564 (2.46-2.42)
Clashscore	141614	1631 (2.46-2.42)
Ramachandran outliers	138981	1617 (2.46-2.42)
Sidechain outliers	138945	1617 (2.46-2.42)
RSRZ outliers	127900	1547 (2.46-2.42)

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	404	5% 80% 13% 7%
1	B	404	.% 86% 12% •
1	C	404	3% 90% 8% •
1	D	404	6% 85% 15%

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	PO4	B	501	-	-	X	-
2	PO4	D	501	-	-	X	-

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 12965 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.

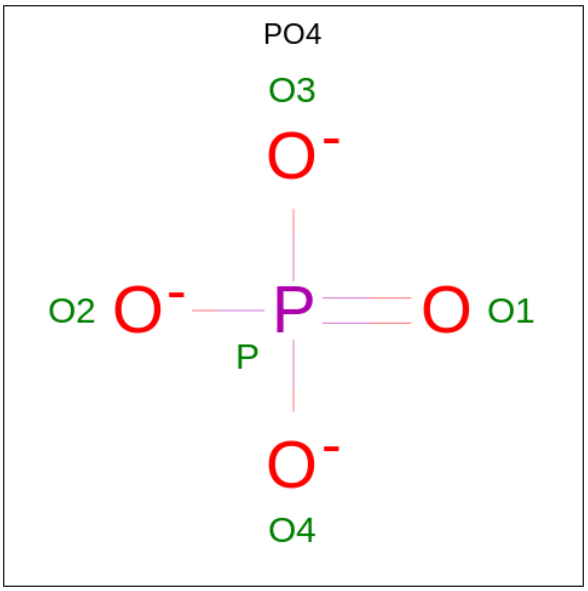
- Molecule 1 is a protein called Cyclic dipeptide N-prenyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	377	3014	1945	513	539	17	0	0	0
1	B	399	3150	2030	530	573	17	0	0	0
1	C	399	3140	2025	528	569	18	0	0	0
1	D	404	3195	2060	537	581	17	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

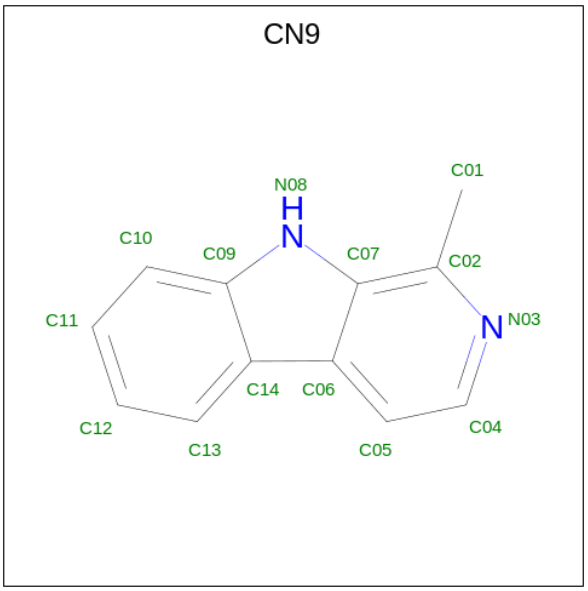
Chain	Residue	Modelled	Actual	Comment	Reference
A	37	MET	-	initiating methionine	UNP D1D8L6
B	37	MET	-	initiating methionine	UNP D1D8L6
C	37	MET	-	initiating methionine	UNP D1D8L6
D	37	MET	-	initiating methionine	UNP D1D8L6

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O P 5 4 1	0	0
2	A	1	Total O P 5 4 1	0	0
2	B	1	Total O P 5 4 1	0	0
2	B	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0
2	D	1	Total O P 5 4 1	0	0
2	D	1	Total O P 5 4 1	0	0

- Molecule 3 is 1-methyl-9H-pyrido[3,4-b]indole (three-letter code: CN9) (formula: $C_{12}H_{10}N_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	N		
3	A	1	14	12	2	0	0

- Molecule 4 is water.

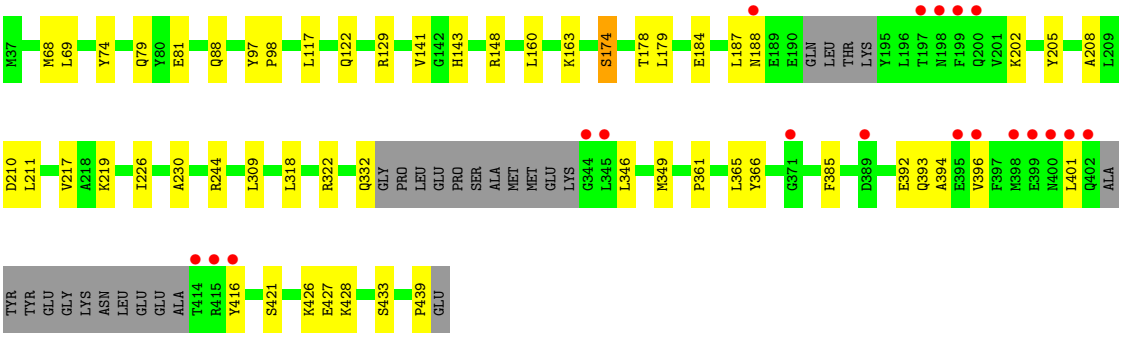
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	78	78	78	0	0
			Total	O		
4	B	120	120	120	0	0
			Total	O		
4	C	118	118	118	0	0
			Total	O		
4	D	96	96	96	0	0

3 Residue-property plots (i)

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

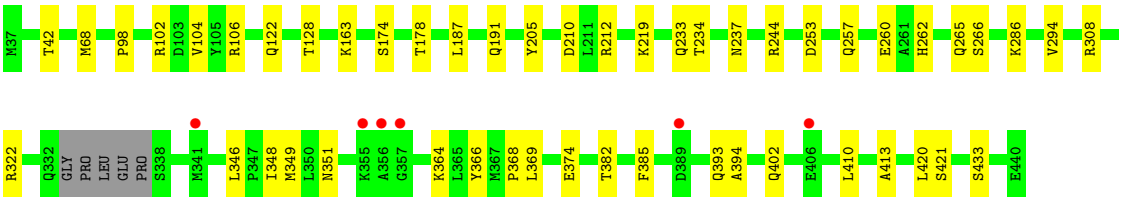
• Molecule 1: Cyclic dipeptide N-prenyltransferase

Chain A:



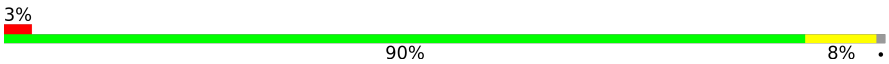
• Molecule 1: Cyclic dipeptide N-prenyltransferase

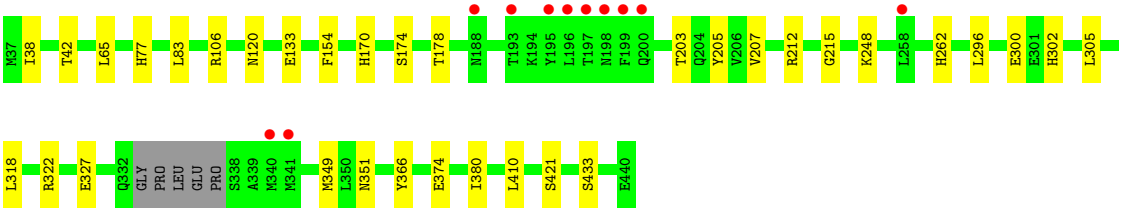
Chain B:



• Molecule 1: Cyclic dipeptide N-prenyltransferase

Chain C:

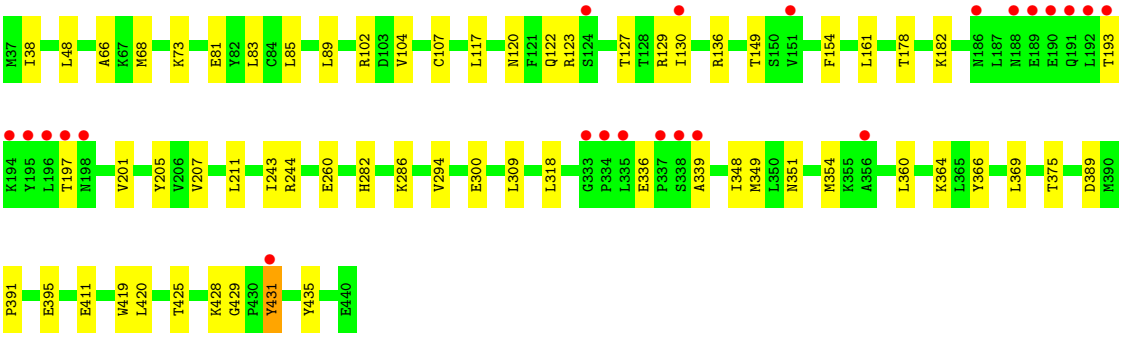




• Molecule 1: Cyclic dipeptide N-prenyltransferase

Chain D:

6%
85%
15%


M37 I38 L48 A66 K67 M68 K73 E81 Y82 L83 C84 L85 L89 R102 D103 V104 C107 L117 N120 F121 Q122 R123 S124 T127 T128 R129 I130 R136 T149 S150 V151 F154 L161 T178 K182 N186 L187 N188 E189 E190 Q191 L192 T193
K194 Y195 L196 T197 N198 V201 Y205 V206 V207 L211 I243 R244 E260 H282 K286 V294 E300 L309 L318 G333 P334 L335 E336 P337 S338 A339 I348 M349 L350 N351 M354 K355 A356 L360 K364 L365 Y366 L369 T375 D389 M390
P391 E395 E411 W419 L420 T425 K428 G429 P430 Y431 Y435 E440

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	84.66Å 157.24Å 161.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.94 – 2.43 46.94 – 2.43	Depositor EDS
% Data completeness (in resolution range)	100.0 (46.94-2.43) 99.9 (46.94-2.43)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.83 (at 2.42Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.217 , 0.236 0.218 , 0.238	Depositor DCC
R_{free} test set	4247 reflections (5.18%)	wwPDB-VP
Wilson B-factor (Å^2)	36.8	Xtriage
Anisotropy	0.557	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 43.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.005 for -h,l,k	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	12965	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.84% of the height of the origin peak. No significant pseudotranslation is detected.*

[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: PO4, CN9

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	0/3090	0.42	0/4192
1	B	0.25	0/3230	0.43	0/4392
1	C	0.24	0/3219	0.41	0/4376
1	D	0.25	0/3278	0.43	0/4457
All	All	0.25	0/12817	0.42	0/17417

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	3014	0	2973	30	0
1	B	3150	0	3054	31	0
1	C	3140	0	3045	18	0
1	D	3195	0	3112	35	0
2	A	10	0	0	1	0
2	B	10	0	0	3	0
2	C	10	0	0	0	0
2	D	10	0	0	2	0
3	A	14	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	78	0	0	2	0
4	B	120	0	0	2	0
4	C	118	0	0	0	0
4	D	96	0	0	0	0
All	All	12965	0	12184	111	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 4.

The worst 5 of 111 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:300:GLU:HG2	1:D:318:LEU:HD11	1.59	0.84
1:A:174:SER:OG	1:A:205:TYR:OH	2.09	0.70
1:A:219:LYS:NZ	2:A:501:PO4:O1	2.23	0.70
1:B:234:THR:HG23	1:B:237:ASN:H	1.58	0.68
1:D:123:ARG:NH1	1:D:389:ASP:O	2.27	0.67

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	369/404 (91%)	358 (97%)	11 (3%)	0	100	100
1	B	395/404 (98%)	382 (97%)	13 (3%)	0	100	100
1	C	395/404 (98%)	378 (96%)	17 (4%)	0	100	100
1	D	402/404 (100%)	392 (98%)	10 (2%)	0	100	100
All	All	1561/1616 (97%)	1510 (97%)	51 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	319/346 (92%)	315 (99%)	4 (1%)	69	80
1	B	326/346 (94%)	325 (100%)	1 (0%)	92	95
1	C	323/346 (93%)	320 (99%)	3 (1%)	78	87
1	D	332/346 (96%)	327 (98%)	5 (2%)	65	76
All	All	1300/1384 (94%)	1287 (99%)	13 (1%)	76	84

5 of 13 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	351	ASN
1	D	73	LYS
1	D	431	TYR
1	D	182	LYS
1	D	282	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	358	GLN
1	D	351	ASN
1	D	358	GLN
1	B	57	HIS
1	A	120	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)

9 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	PO4	D	502	-	4,4,4	0.91	0	6,6,6	0.43	0
3	CN9	A	503	-	16,16,16	1.33	2 (12%)	18,23,23	1.10	2 (11%)
2	PO4	A	501	-	4,4,4	0.90	0	6,6,6	0.47	0
2	PO4	B	502	-	4,4,4	0.91	0	6,6,6	0.45	0
2	PO4	C	502	-	4,4,4	0.91	0	6,6,6	0.44	0
2	PO4	B	501	-	4,4,4	0.91	0	6,6,6	0.42	0
2	PO4	D	501	-	4,4,4	0.91	0	6,6,6	0.45	0
2	PO4	A	502	-	4,4,4	0.91	0	6,6,6	0.42	0
2	PO4	C	501	-	4,4,4	0.91	0	6,6,6	0.43	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
3	CN9	A	503	-	-	-	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	503	CN9	C01-C02	3.03	1.52	1.50
3	A	503	CN9	C05-C04	2.35	1.39	1.36

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	503	CN9	C05-C04-N03	-2.98	120.88	123.81
3	A	503	CN9	C04-N03-C02	2.05	120.82	118.33

There are no chirality outliers.

There are no torsion outliers.

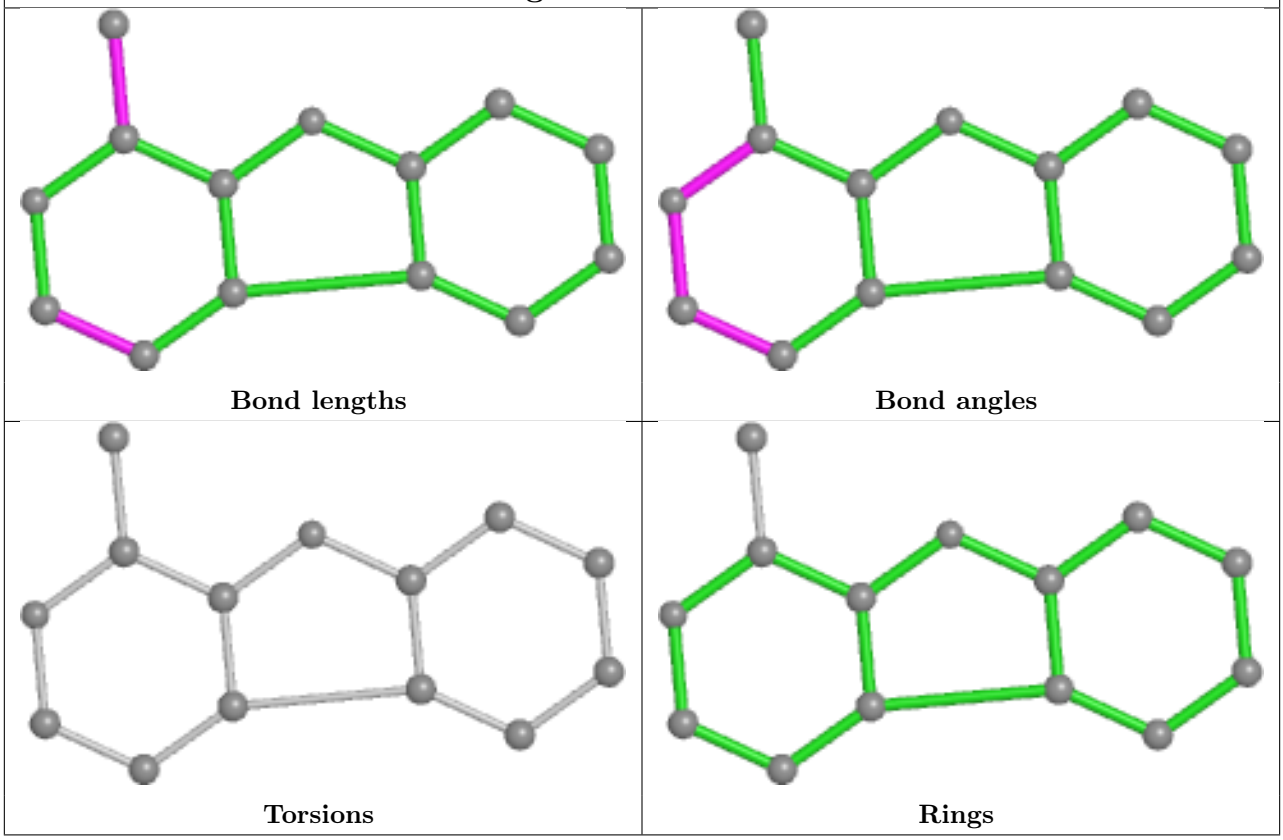
There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	PO4	1	0
2	B	501	PO4	3	0
2	D	501	PO4	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 CN9 A 503



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	377/404 (93%)	0.04	19 (5%)	28	26	21, 38, 70, 94	0
1	B	399/404 (98%)	-0.20	6 (1%)	73	71	21, 37, 62, 88	0
1	C	399/404 (98%)	0.04	11 (2%)	53	49	20, 40, 68, 102	0
1	D	404/404 (100%)	0.15	23 (5%)	23	20	20, 40, 68, 92	0
All	All	1579/1616 (97%)	0.01	59 (3%)	41	38	20, 39, 68, 102	0

The worst 5 of 59 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	431	TYR	5.0
1	C	197	THR	4.7
1	A	402	GLN	4.6
1	D	193	THR	4.5
1	A	198	ASN	4.4

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

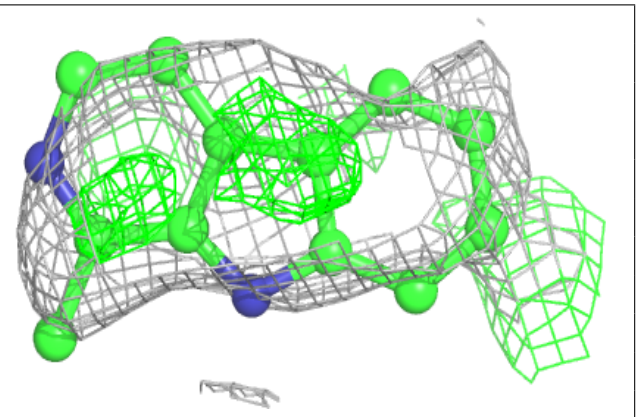
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

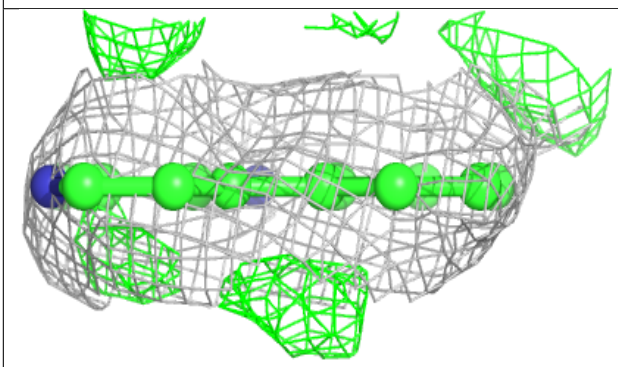
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	PO4	B	501	5/5	0.80	0.17	93,93,93,94	0
3	CN9	A	503	14/14	0.81	0.31	104,104,105,105	0
2	PO4	D	502	5/5	0.90	0.26	94,94,94,95	0
2	PO4	A	501	5/5	0.90	0.16	74,75,75,75	0
2	PO4	A	502	5/5	0.92	0.15	79,80,80,81	0
2	PO4	B	502	5/5	0.92	0.13	70,71,72,73	0
2	PO4	D	501	5/5	0.93	0.22	90,90,91,91	0
2	PO4	C	502	5/5	0.94	0.20	78,79,79,79	0
2	PO4	C	501	5/5	0.96	0.17	85,85,85,86	0

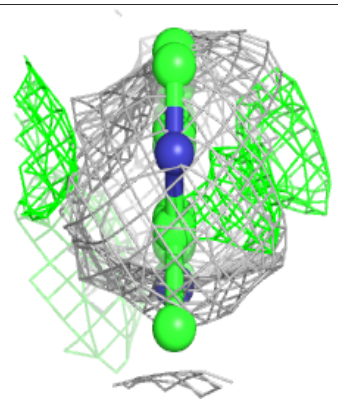
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around CN9 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 (i)

There are no such residues in this entry.