



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:37 AM UTC

PDB ID : 2Y6N / pdb_00002y6n
Title : STRUCTURE OF LINEAR GRAMICIDIN D OBTAINED USING TYPE I CRYSTALS GROWN IN A 8.8 MONOACYLGLYCEROL LIPID CUBIC PHASE.
Authors : Hoefler, N.; Aragao, D.; Caffrey, M.
Deposited on : 2011-01-25
Resolution : 1.26 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

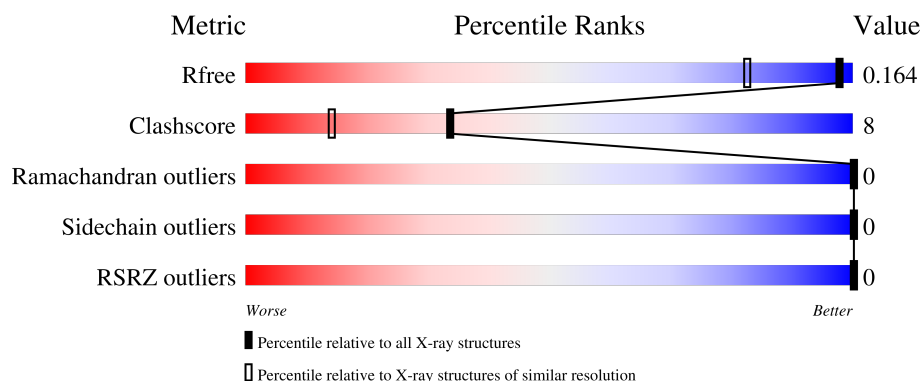
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.26 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	1693 (1.28-1.24)
Clashscore	190562	1730 (1.28-1.24)
Ramachandran outliers	187476	1695 (1.28-1.24)
Sidechain outliers	187428	1694 (1.28-1.24)
RSRZ outliers	180081	1693 (1.28-1.24)

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	16	 81% 19%
1	B	16	 88% 12%
1	C	16	 88% 12%
1	D	16	 75% 25%

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Mol	Chain	Length	Quality of chain
1	E	16	 81%19%
1	F	16	 75%25%

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
1	DLE	F	12	-	-	X	-

2 Entry composition [i](#)

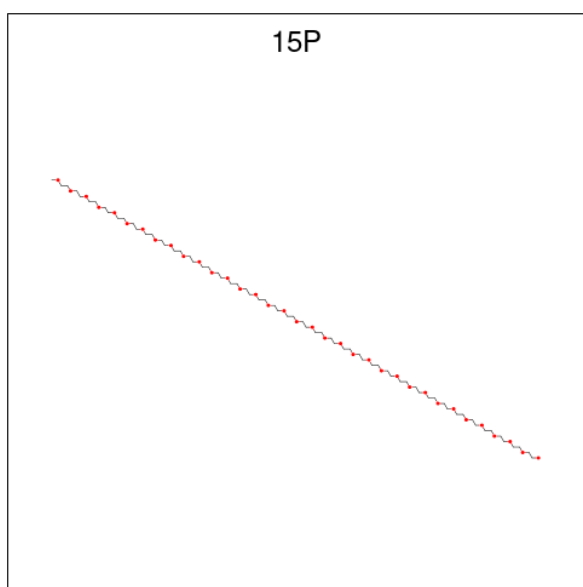
There are 4 unique types of molecules in this entry. The entry contains 974 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 VAL-GRAMICIDIN A.

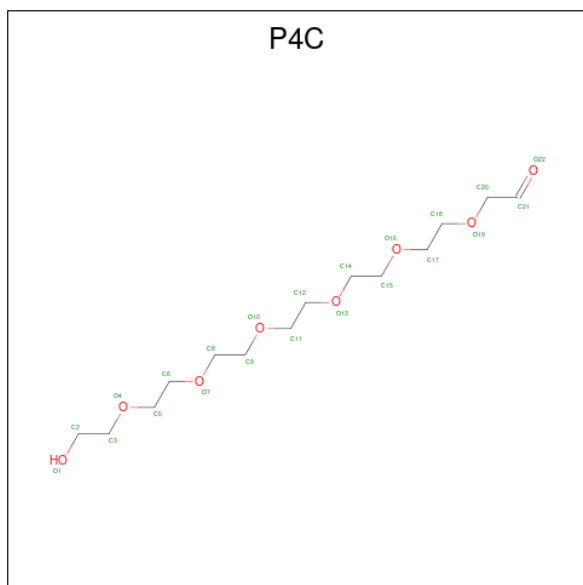
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	A	16	Total	C	N	O	0	2	0
			145	105	21	19			
1	B	16	Total	C	N	O	0	3	0
			148	108	21	19			
1	C	16	Total	C	N	O	0	3	0
			149	110	21	18			
1	D	16	Total	C	N	O	0	2	0
			142	102	21	19			
1	E	16	Total	C	N	O	0	3	0
			148	111	20	17			
1	F	16	Total	C	N	O	0	2	0
			142	102	21	19			

- Molecule 2 is POLYETHYLENE GLYCOL (N=34) (CCD ID: 15P) (formula: C₆₉H₁₄₀O₃₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			48	32	16		
2	A	1	Total	C	O	0	0
			21	14	7		
2	D	1	Total	C	O	0	0
			7	4	3		

- Molecule 3 is O-ACETALDEHYDYL-HEXAETHYLENE GLYCOL (CCD ID: P4C) (formula: $C_{14}H_{28}O_8$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			22	14	8		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	1	Total	O	0	0
			1	1		
4	E	1	Total	O	0	0
			1	1		

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.

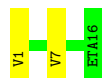
- Molecule 1: VAL-GRAMICIDIN A

Chain A: 



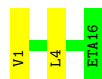
- Molecule 1: VAL-GRAMICIDIN A

Chain B: 



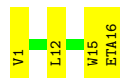
- Molecule 1: VAL-GRAMICIDIN A

Chain C: 



- Molecule 1: VAL-GRAMICIDIN A

Chain D: 



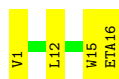
- Molecule 1: VAL-GRAMICIDIN A

Chain E: 



- Molecule 1: VAL-GRAMICIDIN A

Chain F: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	30.62Å 62.78Å 30.60Å 90.00° 100.02° 90.00°	Depositor
Resolution (Å)	30.15 – 1.26 30.15 – 1.26	Depositor EDS
% Data completeness (in resolution range)	96.4 (30.15-1.26) 96.7 (30.15-1.26)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 1.26Å)	Xtriage
Refinement program	REFMAC 5.5.0066	Depositor
R, R_{free}	0.148 , 0.170 0.141 , 0.164	Depositor DCC
R_{free} test set	1533 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å ²)	8.9	Xtriage
Anisotropy	1.015	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 52.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.480 for l,-k,h	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	974	wwPDB-VP
Average B, all atoms (Å ²)	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 20.32 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 8.9085e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: DVA, DLE, 15P, FVA, ETA, P4C

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	0.91	0/78	0.74	0/100
1	B	0.84	0/84	0.63	0/107
1	C	0.64	0/78	0.61	0/100
1	D	0.78	0/78	0.70	0/100
1	E	0.63	0/84	0.53	0/107
1	F	0.85	0/78	0.64	0/100
All	All	0.78	0/480	0.64	0/614

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1
1	F	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	15	TRP	Mainchain
1	F	15	TRP	Mainchain

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	145	0	138	4	0
1	B	148	0	143	3	0
1	C	149	0	150	5	0
1	D	142	0	123	5	0
1	E	148	0	155	6	0
1	F	142	0	123	6	0
2	A	69	0	86	1	0
2	D	7	0	9	0	0
3	A	22	0	28	0	0
4	C	1	0	0	0	0
4	E	1	0	0	0	0
All	All	974	0	955	15	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 8.

All (15) 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:E:4[B]:DLE:HD23	1:F:12:DLE:CD2	1.85	1.05
1:C:4[B]:DLE:HD23	1:D:12:DLE:CD1	1.87	1.04
1:A:13:TRP:CZ3	1:B:7[B]:VAL:HG13	2.00	0.96
1:E:4[B]:DLE:HD23	1:F:12:DLE:HD23	1.48	0.95
1:C:4[B]:DLE:HD23	1:D:12:DLE:HD13	1.48	0.94
1:E:4[B]:DLE:HD23	1:F:12:DLE:HD21	1.66	0.78
1:C:4[B]:DLE:HD23	1:D:12:DLE:HD11	1.65	0.77
1:E:4[B]:DLE:CD2	1:F:12:DLE:HD21	2.24	0.67
1:C:4[B]:DLE:CD2	1:D:12:DLE:HD11	2.25	0.66
1:A:16[B]:ETA:O	2:A:1017:15P:H17	1.97	0.64
1:A:13:TRP:CZ3	1:B:7[B]:VAL:CG1	2.85	0.55
1:A:13:TRP:CE3	1:B:7[B]:VAL:HG13	2.42	0.53
1:E:4[B]:DLE:CD2	1:F:12:DLE:CD2	2.70	0.49
1:C:4[B]:DLE:CD2	1:D:12:DLE:CD1	2.73	0.48
1:E:8[B]:DVA:HG22	1:F:12:DLE:O	2.20	0.42

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	8/16 (50%)	5 (62%)	3 (38%)	0	100	100
1	B	9/16 (56%)	4 (44%)	5 (56%)	0	100	100
1	C	8/16 (50%)	4 (50%)	4 (50%)	0	100	100
1	D	8/16 (50%)	6 (75%)	2 (25%)	0	100	100
1	E	9/16 (56%)	6 (67%)	3 (33%)	0	100	100
1	F	8/16 (50%)	6 (75%)	2 (25%)	0	100	100
All	All	50/96 (52%)	31 (62%)	19 (38%)	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	5/5 (100%)	5 (100%)	0	100	100
1	B	6/5 (120%)	6 (100%)	0	100	100
1	C	5/5 (100%)	5 (100%)	0	100	100
1	D	5/5 (100%)	5 (100%)	0	100	100
1	E	6/5 (120%)	6 (100%)	0	100	100
1	F	5/5 (100%)	5 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	32/30 (107%)	32 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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 ⓘ

61 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	FVA	D	1[B]	-	7,8,9	0.93	0	9,9,11	1.36	2 (22%)
1	ETA	B	16[B]	1	3,3,3	0.52	0	2,2,2	0.04	0
1	ETA	D	16[A]	1	3,3,3	1.00	0	2,2,2	0.25	0
1	ETA	A	16[B]	1	3,3,3	0.44	0	2,2,2	0.28	0
1	FVA	C	1	1	7,8,9	0.62	0	9,9,11	1.16	1 (11%)
1	FVA	D	1[A]	-	7,8,9	1.01	0	9,9,11	1.55	2 (22%)
1	ETA	A	16[A]	1	3,3,3	0.65	0	2,2,2	0.87	0
1	ETA	B	16[A]	1	3,3,3	0.65	0	2,2,2	0.73	0
1	ETA	E	16	1	3,3,3	0.79	0	2,2,2	0.83	0
1	FVA	F	1[B]	-	7,8,9	0.95	0	9,9,11	1.33	1 (11%)
1	ETA	F	16[B]	1	3,3,3	0.62	0	2,2,2	0.55	0
1	FVA	E	1	1	7,8,9	0.48	0	9,9,11	1.12	1 (11%)
1	FVA	B	1[B]	-	7,8,9	0.97	0	9,9,11	1.59	3 (33%)
1	ETA	C	16[B]	1	3,3,3	0.90	0	2,2,2	0.21	0
1	FVA	A	1[B]	-	7,8,9	1.00	0	9,9,11	1.79	3 (33%)
1	ETA	D	16[B]	1	3,3,3	0.44	0	2,2,2	2.84	1 (50%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	FVA	F	1[A]	-	7,8,9	1.01	0	9,9,11	1.51	2 (22%)
1	ETA	F	16[A]	1	3,3,3	0.41	0	2,2,2	2.80	1 (50%)
1	FVA	B	1[A]	-	7,8,9	0.79	0	9,9,11	1.93	3 (33%)
1	FVA	A	1[A]	-	7,8,9	0.98	0	9,9,11	1.58	2 (22%)
1	ETA	C	16[A]	1	3,3,3	1.00	0	2,2,2	0.96	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
1	FVA	D	1[B]	-	-	0/7/9/11	-
1	ETA	B	16[B]	1	-	0/1/1/1	-
1	ETA	D	16[A]	1	-	1/1/1/1	-
1	ETA	A	16[B]	1	-	0/1/1/1	-
1	FVA	C	1	1	-	0/7/9/11	-
1	FVA	D	1[A]	-	-	0/7/9/11	-
1	ETA	A	16[A]	1	-	0/1/1/1	-
1	ETA	B	16[A]	1	-	0/1/1/1	-
1	ETA	E	16	1	-	0/1/1/1	-
1	FVA	F	1[B]	-	-	0/7/9/11	-
1	ETA	F	16[B]	1	-	0/1/1/1	-
1	FVA	E	1	1	-	0/7/9/11	-
1	FVA	B	1[B]	-	-	1/7/9/11	-
1	ETA	C	16[B]	1	-	0/1/1/1	-
1	FVA	A	1[B]	-	-	1/7/9/11	-
1	ETA	D	16[B]	1	-	0/1/1/1	-
1	FVA	F	1[A]	-	-	0/7/9/11	-
1	ETA	F	16[A]	1	-	1/1/1/1	-
1	FVA	B	1[A]	-	-	0/7/9/11	-
1	FVA	A	1[A]	-	-	0/7/9/11	-
1	ETA	C	16[A]	1	-	1/1/1/1	-

There are no bond length outliers.

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	16[B]	ETA	O-C-CA	-3.96	96.75	111.41
1	F	16[A]	ETA	O-C-CA	-3.87	97.11	111.41
1	A	1[B]	FVA	CB-CA-C	-3.48	108.46	112.96

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	1[A]	FVA	CA-N-CN	3.24	127.91	122.42
1	B	1[A]	FVA	CA-N-CN	-3.22	116.97	122.42
1	B	1[A]	FVA	CB-CA-N	3.08	115.17	111.17
1	F	1[A]	FVA	CA-N-CN	3.04	127.57	122.42
1	F	1[A]	FVA	CB-CA-C	-2.73	109.44	112.96
1	F	1[B]	FVA	CB-CA-C	-2.73	109.44	112.96
1	A	1[A]	FVA	CA-N-CN	-2.70	117.85	122.42
1	B	1[B]	FVA	CA-N-CN	2.66	126.93	122.42
1	D	1[A]	FVA	CB-CA-C	-2.66	109.52	112.96
1	D	1[B]	FVA	CB-CA-C	-2.66	109.52	112.96
1	A	1[B]	FVA	CA-N-CN	2.60	126.83	122.42
1	B	1[A]	FVA	CB-CA-C	-2.55	109.66	112.96
1	A	1[A]	FVA	CB-CA-N	2.43	114.33	111.17
1	C	1	FVA	CB-CA-C	-2.34	109.94	112.96
1	A	1[B]	FVA	CB-CA-N	-2.26	108.22	111.17
1	B	1[B]	FVA	CB-CA-N	-2.19	108.32	111.17
1	E	1	FVA	CB-CA-C	-2.09	110.27	112.96
1	D	1[B]	FVA	O1-CN-N	-2.04	120.05	125.32
1	B	1[B]	FVA	CB-CA-C	-2.01	110.37	112.96

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	B	1[B]	FVA	O-C-CA-CB
1	D	16[A]	ETA	O-C-CA-N
1	F	16[A]	ETA	O-C-CA-N
1	C	16[A]	ETA	O-C-CA-N
1	A	1[B]	FVA	O-C-CA-CB

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	16[B]	ETA	1	0

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

4 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	15P	D	1016	-	6,6,103	0.58	0	5,5,102	0.37	0
2	15P	A	1017	-	20,20,103	0.70	0	19,19,102	0.86	1 (5%)
3	P4C	A	1018	-	21,21,21	1.04	1 (4%)	20,20,20	1.48	1 (5%)
2	15P	A	1016	-	47,47,103	0.49	0	46,46,102	0.84	2 (4%)

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	15P	D	1016	-	-	0/4/4/101	-
2	15P	A	1017	-	-	7/18/18/101	-
3	P4C	A	1018	-	-	1/18/19/19	-
2	15P	A	1016	-	-	4/45/45/101	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1018	P4C	O22-C21	4.02	1.42	1.20

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1018	P4C	O22-C21-C20	-5.27	110.50	126.10
2	A	1016	15P	O5-C11-C12	-2.83	97.44	110.35
2	A	1016	15P	O12-C24-C23	-2.76	97.78	110.35
2	A	1017	15P	C9-O4-C8	2.23	123.01	113.26

There are no chirality outliers.

All (12) torsion outliers are listed below:

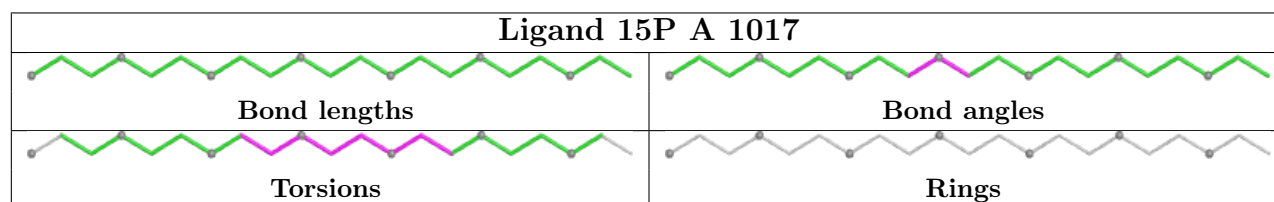
Mol	Chain	Res	Type	Atoms
2	A	1017	15P	C5-C6-O3-C7
2	A	1017	15P	O3-C7-C8-O4
2	A	1017	15P	O5-C10-C9-O4
3	A	1018	P4C	O10-C11-C12-O13
2	A	1017	15P	O2-C5-C6-O3
2	A	1016	15P	C10-C9-O4-C8
2	A	1016	15P	C25-C26-O13-C27
2	A	1016	15P	C17-C18-O9-C19
2	A	1016	15P	C18-C17-O8-C16
2	A	1017	15P	C10-C9-O4-C8
2	A	1017	15P	C7-C8-O4-C9
2	A	1017	15P	C8-C7-O3-C6

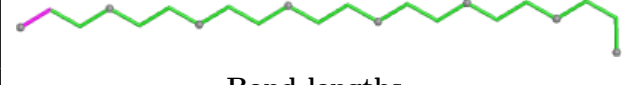
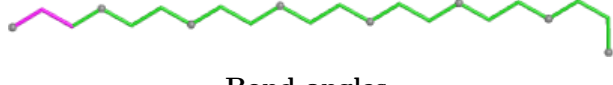
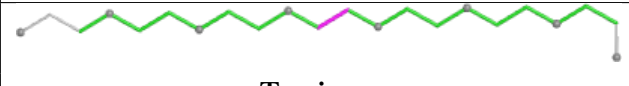
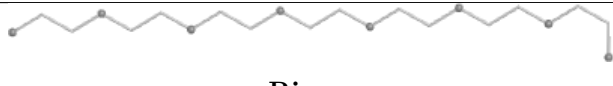
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1017	15P	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 P4C A 1018	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand 15P A 1016	
 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 [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	8/16 (50%)	-0.93	0 100 100	10, 11, 15, 17	0
1	B	8/16 (50%)	-0.83	0 100 100	10, 11, 14, 17	1 (12%)
1	C	8/16 (50%)	-1.03	0 100 100	10, 12, 17, 20	0
1	D	8/16 (50%)	-0.86	0 100 100	11, 12, 21, 23	0
1	E	8/16 (50%)	-1.10	0 100 100	9, 11, 17, 19	1 (12%)
1	F	8/16 (50%)	-0.83	0 100 100	11, 12, 21, 22	0
All	All	48/96 (50%)	-0.93	0 100 100	9, 12, 21, 23	2 (4%)

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	FVA	E	1	9/10	0.98	0.06	13,16,20,22	0
1	ETA	F	16[A]	4/4	0.98	0.05	11,12,16,20	4
1	ETA	F	16[B]	4/4	0.98	0.05	10,11,16,20	4
1	FVA	D	1[A]	9/10	0.99	0.04	11,12,17,20	2
1	FVA	D	1[B]	9/10	0.99	0.04	11,12,17,20	2
1	FVA	A	1[A]	9/10	0.99	0.03	9,11,15,16	5
1	DLE	A	4	8/9	0.99	0.03	8,11,14,17	0
1	DLE	B	4	8/9	0.99	0.03	8,11,14,17	0
1	DLE	C	4[A]	8/9	0.99	0.04	10,11,15,18	5
1	DLE	C	4[B]	8/9	0.99	0.04	10,12,21,30	5
1	DVA	A	6	7/8	0.99	0.03	9,9,14,15	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	DVA	B	6	7/8	0.99	0.03	9,9,14,15	0
1	DVA	C	6	7/8	0.99	0.03	11,11,15,16	0
1	DVA	E	6	7/8	0.99	0.03	10,11,14,15	0
1	DVA	F	6	7/8	0.99	0.03	10,10,15,16	0
1	DVA	C	8[A]	7/8	0.99	0.04	9,10,14,17	4
1	DVA	C	8[B]	7/8	0.99	0.04	9,10,12,12	4
1	DVA	D	8	7/8	0.99	0.04	10,12,24,25	0
1	DVA	E	8[A]	7/8	0.99	0.04	9,10,15,18	4
1	DVA	E	8[B]	7/8	0.99	0.04	9,10,12,19	4
1	DLE	C	10	8/9	0.99	0.02	8,9,11,11	0
1	DLE	E	10	8/9	0.99	0.03	8,9,11,12	0
1	DLE	F	12	8/9	0.99	0.03	11,13,23,24	0
1	DLE	D	14	8/9	0.99	0.04	11,14,25,26	0
1	DLE	F	14	8/9	0.99	0.04	12,14,26,26	0
1	ETA	A	16[A]	4/4	0.99	0.04	9,10,10,13	4
1	ETA	A	16[B]	4/4	0.99	0.04	8,10,10,13	4
1	ETA	B	16[A]	4/4	0.99	0.04	10,10,10,12	4
1	ETA	B	16[B]	4/4	0.99	0.04	10,10,11,11	4
1	ETA	C	16[A]	4/4	0.99	0.03	12,12,12,12	4
1	ETA	C	16[B]	4/4	0.99	0.03	10,10,11,11	4
1	ETA	D	16[A]	4/4	0.99	0.04	9,12,18,24	4
1	ETA	D	16[B]	4/4	0.99	0.04	11,12,16,16	4
1	FVA	A	1[B]	9/10	0.99	0.03	10,11,14,18	5
1	FVA	C	1	9/10	0.99	0.05	12,16,20,22	0
1	DLE	D	10	8/9	1.00	0.03	8,10,19,20	0
1	DVA	D	6	7/8	1.00	0.03	9,10,15,16	0
1	DLE	F	10	8/9	1.00	0.03	8,10,18,20	0
1	DLE	A	12	8/9	1.00	0.02	8,9,18,20	0
1	DLE	B	12	8/9	1.00	0.02	8,10,17,19	0
1	DLE	C	12	8/9	1.00	0.02	9,10,15,16	0
1	DLE	D	12	8/9	1.00	0.03	11,13,24,24	0
1	DLE	E	12	8/9	1.00	0.02	9,10,16,16	0
1	FVA	F	1[B]	9/10	1.00	0.03	11,12,17,21	2
1	DLE	A	14	8/9	1.00	0.02	9,10,17,24	0
1	DLE	B	14	8/9	1.00	0.02	9,11,17,24	0
1	DLE	C	14	8/9	1.00	0.02	9,11,15,21	0
1	DLE	D	4	8/9	1.00	0.03	11,12,27,28	0
1	DLE	E	14	8/9	1.00	0.02	9,11,16,21	0
1	DVA	A	8	7/8	1.00	0.02	9,10,17,17	0
1	DVA	B	8	7/8	1.00	0.02	9,10,17,17	0
1	DLE	E	4[A]	8/9	1.00	0.04	10,11,17,21	5
1	DLE	E	4[B]	8/9	1.00	0.04	10,12,16,23	5

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	DLE	F	4	8/9	1.00	0.03	11,12,27,28	0
1	FVA	B	1[A]	9/10	1.00	0.03	10,12,14,17	5
1	FVA	B	1[B]	9/10	1.00	0.03	10,12,14,17	5
1	DVA	F	8	7/8	1.00	0.03	10,12,19,23	0
1	DLE	A	10	8/9	1.00	0.03	7,8,12,14	0
1	ETA	E	16	4/4	1.00	0.02	12,13,13,15	0
1	DLE	B	10	8/9	1.00	0.03	7,8,12,14	0
1	FVA	F	1[A]	9/10	1.00	0.03	11,12,17,21	2

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

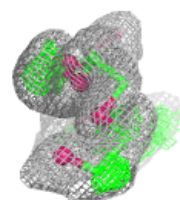
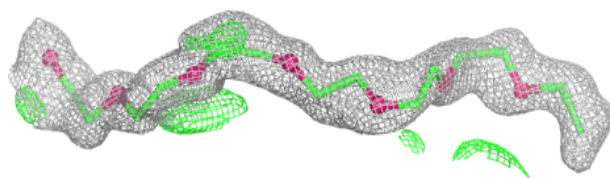
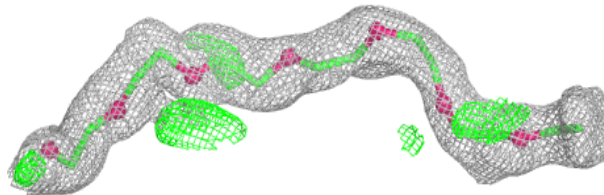
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	15P	A	1017	21/104	0.97	0.06	22,30,38,39	0
2	15P	D	1016	7/104	0.98	0.04	21,26,27,27	0
3	P4C	A	1018	22/22	0.98	0.06	22,30,35,41	0
2	15P	A	1016	48/104	0.99	0.04	14,17,26,32	0

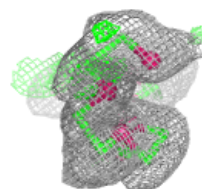
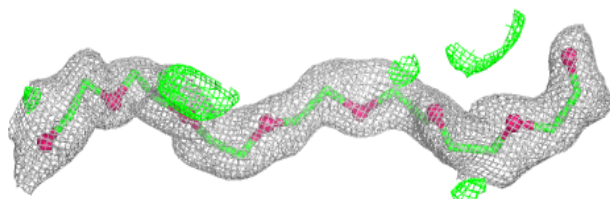
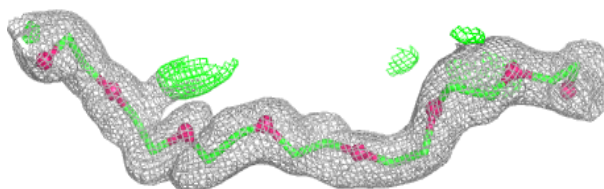
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

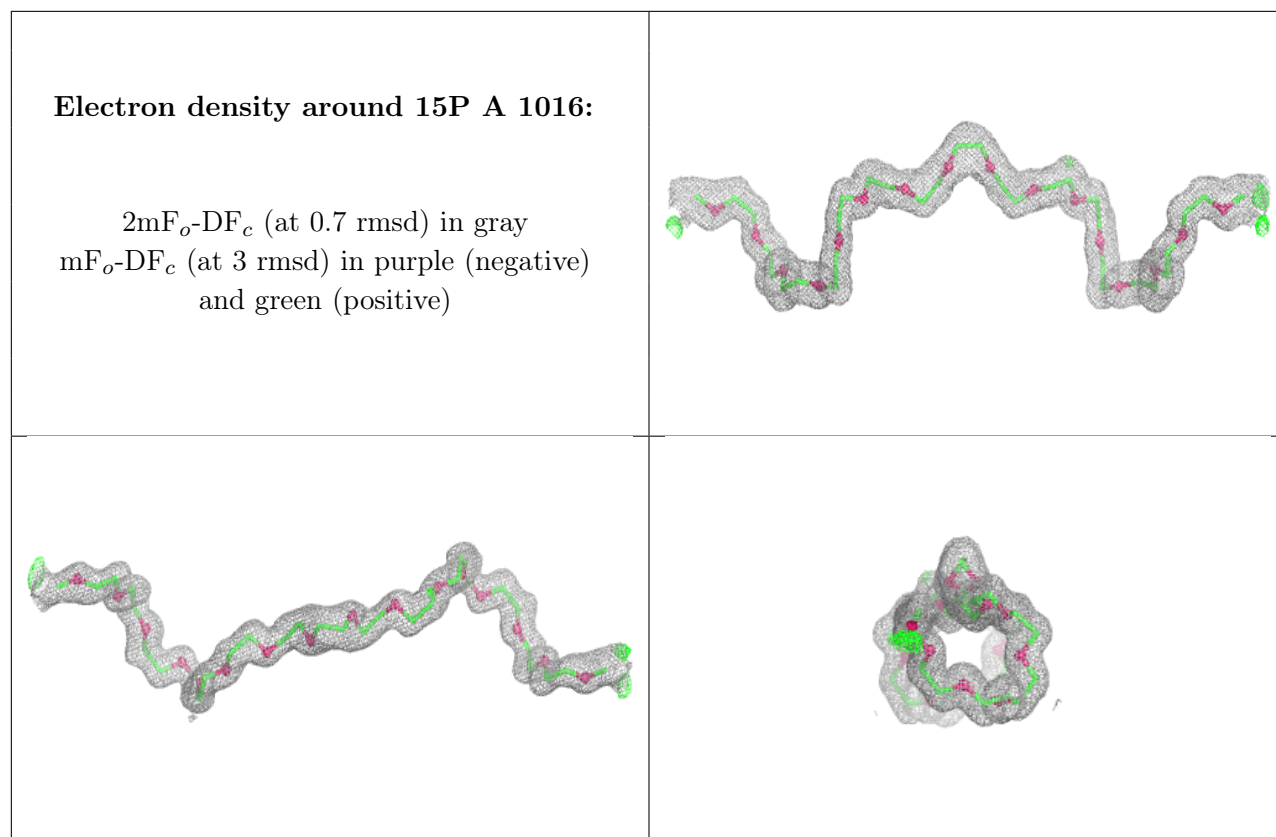
Electron density around 15P A 1017:

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

**Electron density around P4C A 1018:**

$2mF_o-DF_c$ (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.