Full wwPDB X-ray Structure Validation Report ⓘ

Feb 17, 2024 – 10:23 PM EST

PDB ID	:	3V3C
Title	:	Crystal Structure of Chloroplast ATP synthase c-ring from Pisum sativum
Authors	:	Saroussi, S.; Nelson, N.
Deposited on	:	2011-12-13
Resolution	:	3.40 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

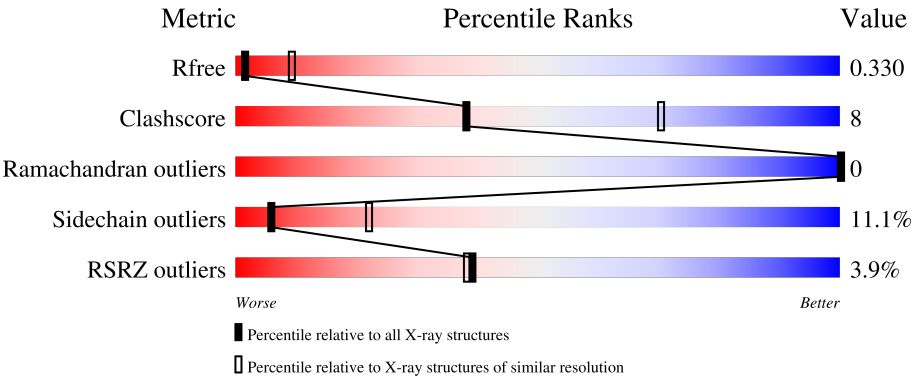
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber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

1 Overall quality at a glance

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

The reported resolution of this entry is 3.40 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	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)
RSRZ outliers	127900	2173 (3.50-3.30)

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	79	8% 82% 15% ·
1	B	79	% 77% 16% 5% ·
1	C	79	10% 78% 18% ·
1	D	79	% 76% 19% 5%
1	E	79	% 71% 24% 5%

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Mol	Chain	Length	Quality of chain
1	F	79	5% 68% 25%
1	G	79	4% 73% 24%
1	H	79	% 78% 18%
1	I	79	3% 80% 18%
1	J	79	6% 80% 19%
1	K	79	3% 78% 20%
1	L	79	5% 77% 20%
1	M	79	4% 77% 20%
1	N	79	3% 76% 22%

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
2	DGD	A	82	-	-	-	X
3	YT3	A	103	-	-	-	X

2 Entry composition (i)

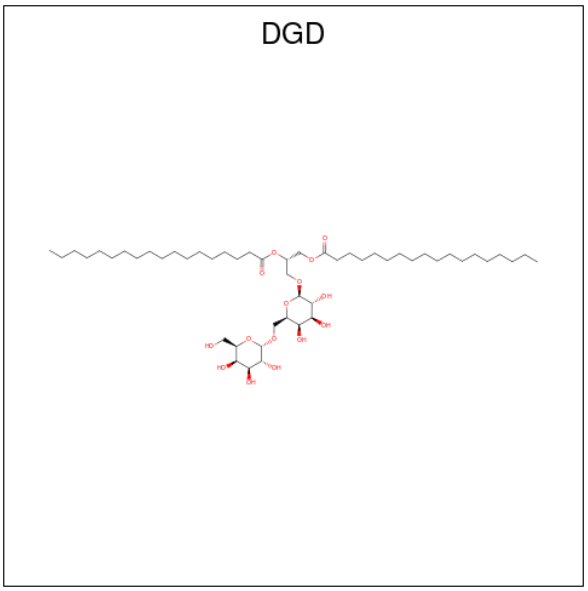
There are 4 unique types of molecules in this entry. The entry contains 7578 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ATP synthase subunit c, chloroplastic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	79	Total	C	N	O	S	0	0	0
			534	350	88	95	1			
1	B	79	Total	C	N	O	S	0	0	0
			535	350	86	98	1			
1	C	79	Total	C	N	O	S	0	0	0
			520	342	82	95	1			
1	D	79	Total	C	N	O	S	0	0	0
			541	354	90	96	1			
1	E	79	Total	C	N	O	S	0	0	0
			533	349	88	95	1			
1	F	77	Total	C	N	O	S	0	0	0
			517	337	87	92	1			
1	G	79	Total	C	N	O	S	0	0	0
			537	352	89	95	1			
1	H	79	Total	C	N	O	S	0	0	0
			538	352	86	99	1			
1	I	79	Total	C	N	O	S	0	0	0
			534	350	86	97	1			
1	J	79	Total	C	N	O	S	0	0	0
			536	350	88	97	1			
1	K	79	Total	C	N	O	S	0	0	0
			545	356	90	98	1			
1	L	79	Total	C	N	O	S	0	0	0
			538	352	88	97	1			
1	M	79	Total	C	N	O	S	0	0	0
			548	357	90	100	1			
1	N	79	Total	C	N	O	S	0	0	0
			536	350	88	97	1			

- Molecule 2 is DIGALACTOSYL DIACYL GLYCEROL (DGDG) (three-letter code: DGD) (formula: $C_{51}H_{96}O_{15}$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 62 47 15	3	0

- Molecule 3 is YTTRIUM (III) ION (three-letter code: YT3) (formula: Y).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Y 1 1	0	0
3	C	1	Total Y 1 1	0	0
3	D	1	Total Y 1 1	0	0
3	E	1	Total Y 1 1	0	0
3	F	1	Total Y 1 1	0	0
3	G	1	Total Y 1 1	0	0
3	H	1	Total Y 1 1	0	0
3	K	1	Total Y 1 1	0	0
3	L	1	Total Y 1 1	0	0
3	N	1	Total Y 1 1	0	0

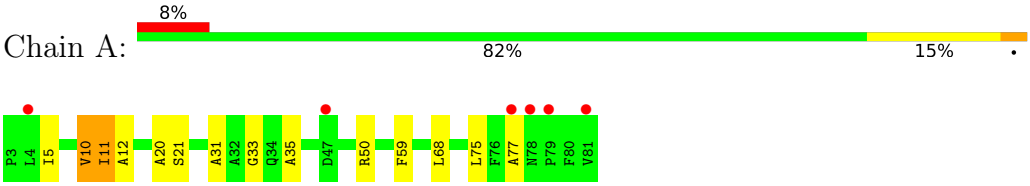
- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	2	Total Na 2 2	0	0
4	B	1	Total Na 1 1	0	0
4	D	1	Total Na 1 1	0	0
4	E	2	Total Na 2 2	0	0
4	F	1	Total Na 1 1	0	0
4	G	1	Total Na 1 1	0	0
4	H	1	Total Na 1 1	0	0
4	I	1	Total Na 1 1	0	0
4	J	1	Total Na 1 1	0	0
4	K	1	Total Na 1 1	0	0
4	L	1	Total Na 1 1	0	0
4	M	1	Total Na 1 1	0	0

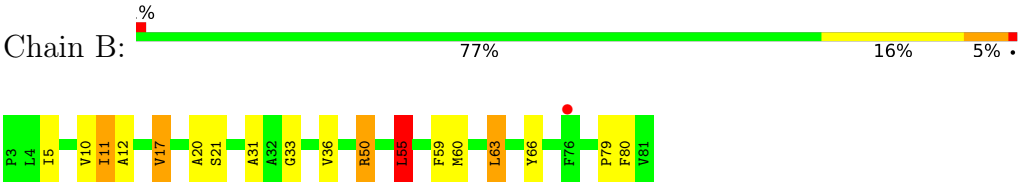
3 Residue-property plots (i)

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.

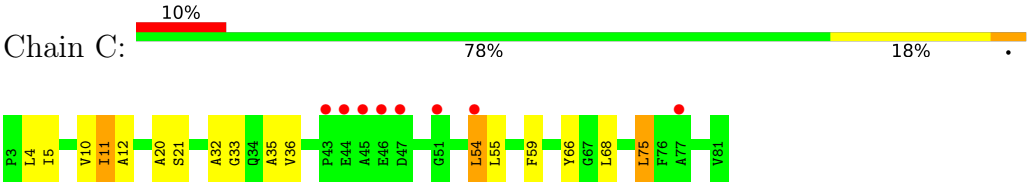
• Molecule 1: ATP synthase subunit c, chloroplastic



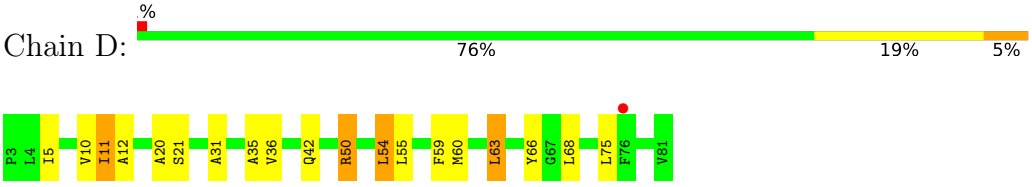
• Molecule 1: ATP synthase subunit c, chloroplastic



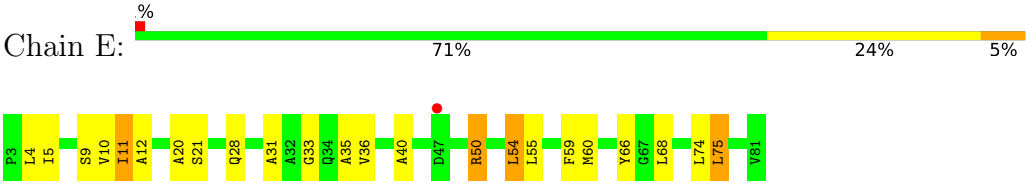
• Molecule 1: ATP synthase subunit c, chloroplastic



• Molecule 1: ATP synthase subunit c, chloroplastic

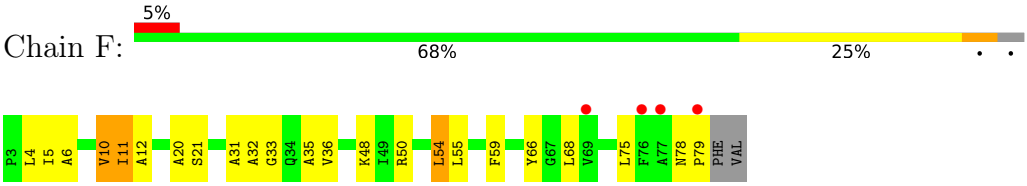


• Molecule 1: ATP synthase subunit c, chloroplastic



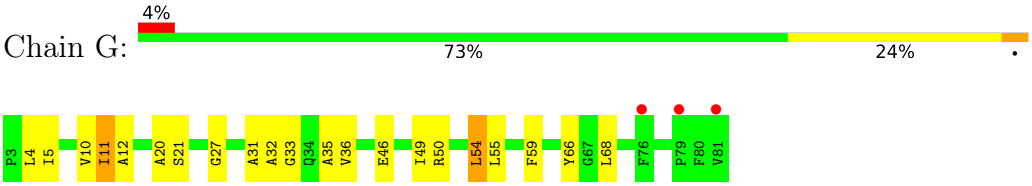
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain F:



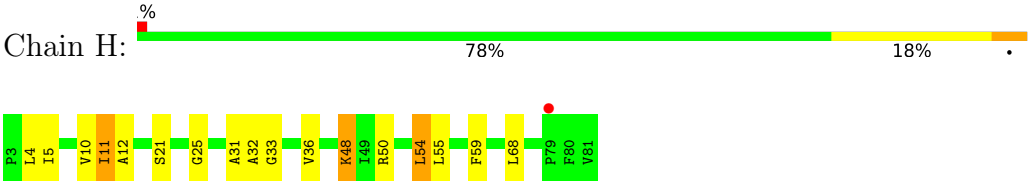
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain G:



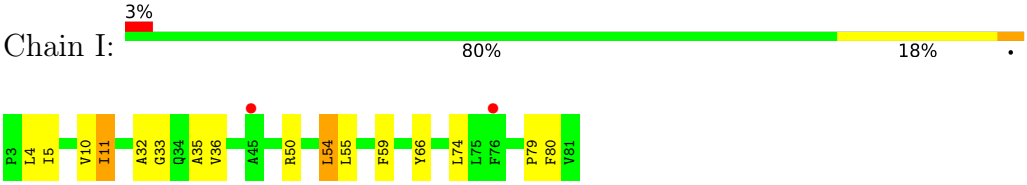
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain H:



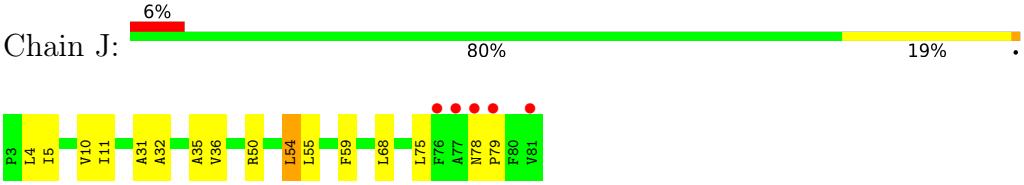
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain I:



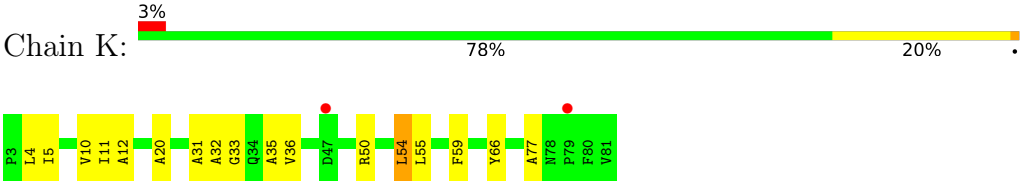
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain J:



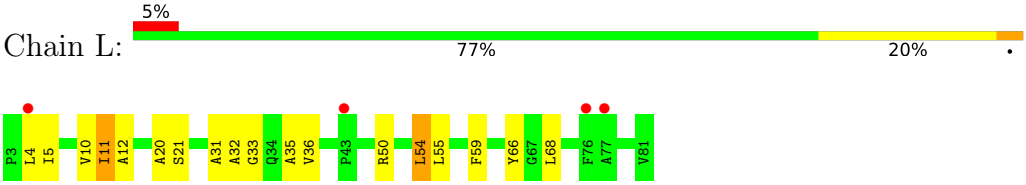
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain K:



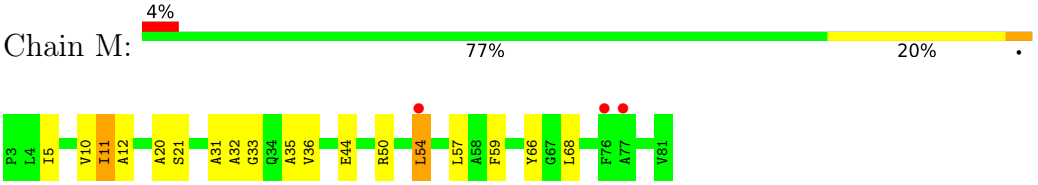
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain L:



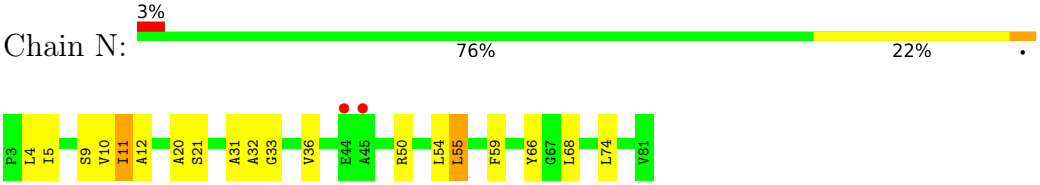
• Molecule 1: ATP synthase subunit c, chloroplastic

Chain M:



• Molecule 1: ATP synthase subunit c, chloroplastic

Chain N:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	139.13Å 102.38Å 122.43Å 90.00° 101.22° 90.00°	Depositor
Resolution (Å)	28.89 – 3.40 28.89 – 3.40	Depositor EDS
% Data completeness (in resolution range)	86.6 (28.89-3.40) 86.9 (28.89-3.40)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.94 (at 3.39Å)	Xtriage
Refinement program	PHENIX 1.7.2_869	Depositor
R, R_{free}	0.299 , 0.322 0.305 , 0.330	Depositor DCC
R_{free} test set	1047 reflections (5.18%)	wwPDB-VP
Wilson B-factor (Å^2)	75.6	Xtriage
Anisotropy	0.037	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.23 , 64.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.43$, $< L^2 > = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.83	EDS
Total number of atoms	7578	wwPDB-VP
Average B, all atoms (Å^2)	92.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.55% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NA, YT3, DGD

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	0.28	0/541	0.64	2/739 (0.3%)
1	B	0.30	0/542	1.32	7/741 (0.9%)
1	C	0.26	0/527	0.52	0/722
1	D	0.32	0/548	1.22	3/747 (0.4%)
1	E	0.32	0/540	1.21	3/738 (0.4%)
1	F	0.26	0/523	0.55	2/713 (0.3%)
1	G	0.25	0/544	0.56	2/742 (0.3%)
1	H	0.26	0/545	0.55	2/744 (0.3%)
1	I	0.26	0/541	0.54	2/739 (0.3%)
1	J	0.25	0/543	0.55	2/742 (0.3%)
1	K	0.29	0/552	0.60	2/752 (0.3%)
1	L	0.26	0/545	0.55	2/744 (0.3%)
1	M	0.25	0/555	0.56	2/756 (0.3%)
1	N	0.26	0/543	0.72	5/742 (0.7%)
All	All	0.27	0/7589	0.77	36/10361 (0.3%)

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	A	0	1
1	K	0	1
All	All	0	2

There are no bond length outliers.

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	50	ARG	NE-CZ-NH1	-19.81	110.40	120.30
1	E	50	ARG	NE-CZ-NH1	-19.44	110.58	120.30
1	D	50	ARG	NE-CZ-NH1	-19.30	110.65	120.30
1	B	50	ARG	NE-CZ-NH2	19.08	129.84	120.30
1	E	50	ARG	NE-CZ-NH2	18.91	129.75	120.30
1	D	50	ARG	NE-CZ-NH2	18.86	129.73	120.30
1	D	50	ARG	CD-NE-CZ	9.34	136.67	123.60
1	B	50	ARG	CD-NE-CZ	9.30	136.62	123.60
1	E	50	ARG	CD-NE-CZ	9.30	136.62	123.60
1	B	17	VAL	CB-CA-C	-7.30	97.54	111.40
1	N	54	LEU	CA-CB-CG	-7.24	98.66	115.30
1	B	17	VAL	CG1-CB-CG2	6.91	121.96	110.90
1	J	50	ARG	NE-CZ-NH2	-6.15	117.22	120.30
1	G	50	ARG	NE-CZ-NH2	-6.14	117.23	120.30
1	H	50	ARG	NE-CZ-NH2	-5.96	117.32	120.30
1	N	50	ARG	NE-CZ-NH2	-5.90	117.35	120.30
1	F	50	ARG	NE-CZ-NH2	-5.88	117.36	120.30
1	L	50	ARG	NE-CZ-NH2	-5.87	117.36	120.30
1	A	50	ARG	NE-CZ-NH2	-5.83	117.39	120.30
1	K	50	ARG	NE-CZ-NH2	-5.78	117.41	120.30
1	M	50	ARG	NE-CZ-NH2	-5.77	117.42	120.30
1	I	50	ARG	NE-CZ-NH2	-5.72	117.44	120.30
1	G	50	ARG	NE-CZ-NH1	5.68	123.14	120.30
1	L	50	ARG	NE-CZ-NH1	5.66	123.13	120.30
1	B	55	LEU	CB-CG-CD2	5.64	120.59	111.00
1	F	50	ARG	NE-CZ-NH1	5.62	123.11	120.30
1	N	50	ARG	NE-CZ-NH1	5.62	123.11	120.30
1	N	55	LEU	CB-CG-CD2	5.61	120.54	111.00
1	K	50	ARG	NE-CZ-NH1	5.61	123.11	120.30
1	M	50	ARG	NE-CZ-NH1	5.58	123.09	120.30
1	J	50	ARG	NE-CZ-NH1	5.57	123.08	120.30
1	H	50	ARG	NE-CZ-NH1	5.39	123.00	120.30
1	I	50	ARG	NE-CZ-NH1	5.31	122.96	120.30
1	N	55	LEU	CA-CB-CG	5.20	127.25	115.30
1	A	50	ARG	NE-CZ-NH1	5.19	122.90	120.30
1	B	55	LEU	CA-CB-CG	5.14	127.12	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	77	ALA	Mainchain
1	K	77	ALA	Mainchain

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	534	0	561	12	0
1	B	535	0	558	13	0
1	C	520	0	533	13	0
1	D	541	0	576	16	0
1	E	533	0	559	22	0
1	F	517	0	551	19	0
1	G	537	0	570	17	0
1	H	538	0	565	14	0
1	I	534	0	561	10	0
1	J	536	0	561	10	0
1	K	545	0	580	11	0
1	L	538	0	565	14	0
1	M	548	0	582	15	0
1	N	536	0	561	13	0
2	A	62	0	82	0	0
3	A	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
3	K	1	0	0	0	0
3	L	1	0	0	0	0
3	N	1	0	0	0	0
4	A	2	0	0	0	0
4	B	1	0	0	0	0
4	D	1	0	0	0	0
4	E	2	0	0	0	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
4	I	1	0	0	0	0
4	J	1	0	0	0	0
4	K	1	0	0	0	0
4	L	1	0	0	0	0
4	M	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	7578	0	7965	118	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 (118) 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:55:LEU:HD21	1:E:54:LEU:HD23	1.74	0.68
1:B:55:LEU:HD11	1:C:54:LEU:HD23	1.76	0.67
1:D:42:GLN:NE2	1:E:40:ALA:O	2.30	0.65
1:F:55:LEU:HD21	1:G:54:LEU:HD23	1.79	0.63
1:L:55:LEU:HD21	1:M:54:LEU:HD23	1.80	0.61
1:I:55:LEU:HD21	1:J:54:LEU:HD23	1.83	0.59
1:C:55:LEU:HD21	1:D:54:LEU:HD23	1.84	0.59
1:G:55:LEU:HD21	1:H:54:LEU:HD23	1.85	0.59
1:K:55:LEU:HD21	1:L:54:LEU:HD23	1.85	0.58
1:E:55:LEU:HD21	1:F:54:LEU:HD23	1.86	0.57
1:J:55:LEU:HD21	1:K:54:LEU:HD23	1.88	0.54
1:M:35:ALA:HA	1:N:36:VAL:HG11	1.90	0.53
1:A:31:ALA:HA	1:B:33:GLY:HA3	1.90	0.53
1:D:31:ALA:HA	1:E:33:GLY:HA3	1.89	0.53
1:D:35:ALA:HA	1:E:36:VAL:CG2	2.40	0.51
1:E:12:ALA:HB2	1:F:11:ILE:HA	1.91	0.51
1:K:31:ALA:HA	1:L:33:GLY:HA3	1.94	0.50
1:H:55:LEU:HD21	1:I:54:LEU:HD23	1.93	0.50
1:F:35:ALA:HA	1:G:36:VAL:HG11	1.94	0.50
1:G:31:ALA:HA	1:H:33:GLY:HA3	1.92	0.50
1:F:31:ALA:HA	1:G:33:GLY:HA3	1.93	0.49
1:A:11:ILE:HA	1:N:12:ALA:HB2	1.94	0.49
1:A:33:GLY:HA3	1:N:31:ALA:HA	1.95	0.49
1:B:5:ILE:H	1:B:5:ILE:HD12	1.78	0.49
1:H:5:ILE:H	1:H:5:ILE:HD12	1.78	0.48
1:D:12:ALA:HB2	1:E:11:ILE:HA	1.95	0.48
1:F:5:ILE:HD12	1:F:5:ILE:H	1.78	0.48
1:G:5:ILE:HD12	1:G:5:ILE:H	1.78	0.48
1:K:12:ALA:HB2	1:L:11:ILE:HA	1.94	0.48
1:A:21:SER:OG	1:N:20:ALA:HA	2.14	0.48
1:M:5:ILE:H	1:M:5:ILE:HD12	1.79	0.48
1:A:12:ALA:HB2	1:B:11:ILE:HA	1.96	0.48
1:D:5:ILE:HD12	1:D:5:ILE:H	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:5:ILE:H	1:L:5:ILE:HD12	1.79	0.48
1:L:35:ALA:HA	1:M:36:VAL:HG11	1.95	0.48
1:E:5:ILE:H	1:E:5:ILE:HD12	1.79	0.48
1:J:5:ILE:HD12	1:J:5:ILE:H	1.79	0.47
1:C:5:ILE:HD12	1:C:5:ILE:H	1.79	0.47
1:K:20:ALA:HA	1:L:21:SER:OG	2.14	0.47
1:K:5:ILE:HD12	1:K:5:ILE:H	1.79	0.47
1:E:35:ALA:HA	1:F:36:VAL:HG11	1.96	0.47
1:A:5:ILE:H	1:A:5:ILE:HD12	1.79	0.47
1:I:5:ILE:H	1:I:5:ILE:HD12	1.79	0.47
1:G:12:ALA:HB2	1:H:11:ILE:HA	1.97	0.47
1:N:5:ILE:HD12	1:N:5:ILE:H	1.79	0.47
1:D:20:ALA:HA	1:E:21:SER:OG	2.14	0.47
1:H:48:LYS:H	1:H:48:LYS:HG2	1.52	0.46
1:L:31:ALA:HA	1:M:33:GLY:HA3	1.97	0.46
1:D:35:ALA:HA	1:E:36:VAL:HG22	1.97	0.46
1:E:20:ALA:HA	1:F:21:SER:OG	2.16	0.46
1:E:31:ALA:HA	1:F:33:GLY:HA3	1.97	0.46
1:K:35:ALA:HA	1:L:36:VAL:HG11	1.98	0.46
1:M:66:TYR:HB3	1:N:68:LEU:HD23	1.97	0.46
1:A:20:ALA:HA	1:B:21:SER:OG	2.16	0.46
1:G:66:TYR:HB3	1:H:68:LEU:HD23	1.98	0.46
1:D:66:TYR:HB3	1:E:68:LEU:HD23	1.98	0.46
1:J:32:ALA:O	1:J:36:VAL:HG23	2.15	0.46
1:J:31:ALA:HA	1:K:33:GLY:HA3	1.99	0.45
1:I:32:ALA:O	1:I:36:VAL:HG23	2.17	0.45
1:C:66:TYR:HB3	1:D:68:LEU:HD23	1.99	0.45
1:G:20:ALA:HA	1:H:21:SER:OG	2.17	0.45
1:E:66:TYR:HB3	1:F:68:LEU:HD23	1.98	0.45
1:H:31:ALA:HA	1:I:33:GLY:HA3	1.98	0.45
1:I:35:ALA:HA	1:J:36:VAL:HG11	1.98	0.45
1:B:12:ALA:HB2	1:C:11:ILE:HA	1.99	0.45
1:F:32:ALA:O	1:F:36:VAL:HG23	2.17	0.44
1:J:35:ALA:HA	1:K:36:VAL:HG11	2.00	0.44
1:C:75:LEU:HD12	1:C:75:LEU:HA	1.82	0.44
1:E:75:LEU:HD12	1:E:75:LEU:HA	1.82	0.44
1:M:32:ALA:O	1:M:36:VAL:HG23	2.18	0.44
1:F:20:ALA:HA	1:G:21:SER:OG	2.18	0.43
1:K:66:TYR:HB3	1:L:68:LEU:HD23	2.00	0.43
1:C:32:ALA:O	1:C:36:VAL:HG23	2.19	0.43
1:F:66:TYR:HB3	1:G:68:LEU:HD23	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:66:TYR:HB3	1:M:68:LEU:HD23	2.00	0.43
1:D:60:MET:O	1:D:63:LEU:HB2	2.19	0.43
1:H:32:ALA:O	1:H:36:VAL:HG23	2.18	0.43
1:K:32:ALA:O	1:K:36:VAL:HG23	2.18	0.43
1:B:31:ALA:HA	1:C:33:GLY:HA3	2.01	0.43
1:C:12:ALA:HB2	1:D:11:ILE:HA	2.01	0.43
1:B:66:TYR:HB3	1:C:68:LEU:HD23	2.00	0.43
1:H:12:ALA:HB2	1:I:11:ILE:HA	2.00	0.43
1:N:32:ALA:O	1:N:36:VAL:HG23	2.18	0.43
1:L:32:ALA:O	1:L:36:VAL:HG23	2.18	0.43
1:I:66:TYR:HB3	1:J:68:LEU:HD23	2.01	0.43
1:A:35:ALA:HA	1:B:36:VAL:HG22	2.01	0.42
1:B:20:ALA:HA	1:C:21:SER:OG	2.20	0.42
1:J:78:ASN:HA	1:J:79:PRO:HD2	1.91	0.42
1:M:12:ALA:HB2	1:N:11:ILE:HA	2.01	0.42
1:M:20:ALA:HA	1:N:21:SER:OG	2.20	0.42
1:F:48:LYS:HB3	1:G:46:GLU:OE1	2.20	0.42
1:M:31:ALA:HA	1:N:33:GLY:HA3	2.01	0.42
1:G:32:ALA:O	1:G:36:VAL:HG23	2.20	0.42
1:B:60:MET:O	1:B:63:LEU:HB2	2.19	0.42
1:F:12:ALA:HB2	1:G:11:ILE:HA	2.02	0.42
1:E:5:ILE:HG12	1:F:6:ALA:HB3	2.02	0.41
1:E:28:GLN:HG2	1:E:60:MET:HE3	2.03	0.41
1:G:35:ALA:HA	1:H:36:VAL:HG11	2.02	0.41
1:C:20:ALA:HA	1:D:21:SER:OG	2.20	0.41
1:I:74:LEU:HD21	1:J:75:LEU:HD21	2.02	0.41
1:L:20:ALA:HA	1:M:21:SER:OG	2.19	0.41
1:M:57:LEU:HD23	1:M:57:LEU:HA	1.90	0.41
1:A:35:ALA:HA	1:B:36:VAL:CG2	2.50	0.41
1:A:68:LEU:HD23	1:N:66:TYR:HB3	2.01	0.41
1:E:9:SER:HB3	1:F:10:VAL:HG21	2.02	0.41
1:M:54:LEU:HD22	1:M:54:LEU:HA	1.94	0.41
1:A:10:VAL:HG21	1:N:9:SER:HB3	2.03	0.41
1:D:31:ALA:HA	1:E:33:GLY:CA	2.50	0.41
1:G:27:GLY:HA3	1:H:25:GLY:O	2.21	0.41
1:F:78:ASN:HA	1:F:79:PRO:HD2	1.91	0.40
1:G:49:ILE:HG23	1:H:36:VAL:HG13	2.03	0.40
1:B:79:PRO:HG2	1:B:80:PHE:CD2	2.57	0.40
1:A:75:LEU:HD21	1:N:74:LEU:HD21	2.04	0.40
1:E:54:LEU:HD22	1:E:54:LEU:HA	1.93	0.40
1:E:74:LEU:HD21	1:F:75:LEU:HD21	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:35:ALA:HA	1:D:36:VAL:CG2	2.51	0.40
1:I:79:PRO:HG2	1:I:80:PHE:CD2	2.57	0.40
1:L:12:ALA:HB2	1:M:11:ILE:HA	2.04	0.40

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	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	B	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	C	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	D	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	E	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	F	75/79 (95%)	72 (96%)	3 (4%)	0	100	100
1	G	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	H	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	I	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	J	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	K	77/79 (98%)	73 (95%)	4 (5%)	0	100	100
1	L	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	M	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
1	N	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
All	All	1076/1106 (97%)	1033 (96%)	43 (4%)	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	48/52 (92%)	45 (94%)	3 (6%)	18 47
1	B	49/52 (94%)	42 (86%)	7 (14%)	3 13
1	C	45/52 (86%)	39 (87%)	6 (13%)	4 15
1	D	50/52 (96%)	43 (86%)	7 (14%)	3 13
1	E	48/52 (92%)	41 (85%)	7 (15%)	3 12
1	F	47/52 (90%)	42 (89%)	5 (11%)	6 24
1	G	49/52 (94%)	44 (90%)	5 (10%)	7 26
1	H	50/52 (96%)	44 (88%)	6 (12%)	5 19
1	I	49/52 (94%)	44 (90%)	5 (10%)	7 26
1	J	49/52 (94%)	44 (90%)	5 (10%)	7 26
1	K	51/52 (98%)	46 (90%)	5 (10%)	8 28
1	L	49/52 (94%)	44 (90%)	5 (10%)	7 26
1	M	52/52 (100%)	47 (90%)	5 (10%)	8 29
1	N	49/52 (94%)	44 (90%)	5 (10%)	7 26
All	All	685/728 (94%)	609 (89%)	76 (11%)	6 22

All (76) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	VAL
1	A	11	ILE
1	A	59	PHE
1	B	10	VAL
1	B	11	ILE
1	B	17	VAL
1	B	50	ARG
1	B	55	LEU
1	B	59	PHE
1	B	63	LEU
1	C	4	LEU

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Mol	Chain	Res	Type
1	C	10	VAL
1	C	11	ILE
1	C	54	LEU
1	C	59	PHE
1	C	75	LEU
1	D	10	VAL
1	D	11	ILE
1	D	50	ARG
1	D	54	LEU
1	D	59	PHE
1	D	63	LEU
1	D	75	LEU
1	E	4	LEU
1	E	10	VAL
1	E	11	ILE
1	E	50	ARG
1	E	54	LEU
1	E	59	PHE
1	E	75	LEU
1	F	4	LEU
1	F	10	VAL
1	F	11	ILE
1	F	54	LEU
1	F	59	PHE
1	G	4	LEU
1	G	10	VAL
1	G	11	ILE
1	G	54	LEU
1	G	59	PHE
1	H	4	LEU
1	H	10	VAL
1	H	11	ILE
1	H	48	LYS
1	H	54	LEU
1	H	59	PHE
1	I	4	LEU
1	I	10	VAL
1	I	11	ILE
1	I	54	LEU
1	I	59	PHE
1	J	4	LEU
1	J	10	VAL

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Mol	Chain	Res	Type
1	J	11	ILE
1	J	54	LEU
1	J	59	PHE
1	K	4	LEU
1	K	10	VAL
1	K	11	ILE
1	K	54	LEU
1	K	59	PHE
1	L	4	LEU
1	L	10	VAL
1	L	11	ILE
1	L	54	LEU
1	L	59	PHE
1	M	10	VAL
1	M	11	ILE
1	M	44	GLU
1	M	54	LEU
1	M	59	PHE
1	N	4	LEU
1	N	10	VAL
1	N	11	ILE
1	N	55	LEU
1	N	59	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	42	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 25 ligands modelled in this entry, 24 are monoatomic - leaving 1 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	$\#\|Z\| > 2$
2	DGD	A	82	-	63,63,67	1.32	10 (15%)	77,77,81	1.68	14 (18%)

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	DGD	A	82	-	-	33/51/91/95	0/2/2/2

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	82	DGD	C3D-C2D	-4.14	1.41	1.52
2	A	82	DGD	C3E-C2E	-3.46	1.43	1.52
2	A	82	DGD	O6D-C1D	2.93	1.49	1.41
2	A	82	DGD	C3G-C2G	2.77	1.59	1.50
2	A	82	DGD	O6E-C1E	2.68	1.48	1.41
2	A	82	DGD	O2G-C2G	-2.59	1.40	1.46
2	A	82	DGD	C4E-C3E	-2.46	1.46	1.52
2	A	82	DGD	O2G-C1B	2.37	1.41	1.34
2	A	82	DGD	O1G-C1A	2.20	1.39	1.33
2	A	82	DGD	C4D-C3D	-2.07	1.47	1.52

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	82	DGD	O5D-C6D-C5D	4.95	118.20	109.05
2	A	82	DGD	O1G-C1G-C2G	3.91	119.82	108.43
2	A	82	DGD	C6D-O5D-C1E	3.74	121.05	113.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	82	DGD	O2G-C1B-C2B	3.59	119.25	111.50
2	A	82	DGD	C3G-O3G-C1D	3.49	120.56	113.74
2	A	82	DGD	O3G-C3G-C2G	3.45	119.23	110.90
2	A	82	DGD	O3G-C1D-C2D	3.23	113.34	108.30
2	A	82	DGD	O1G-C1A-C2A	3.18	121.87	111.91
2	A	82	DGD	O5D-C1E-C2E	2.95	112.91	108.30
2	A	82	DGD	C1E-C2E-C3E	2.59	115.39	110.00
2	A	82	DGD	O6D-C5D-C4D	2.55	114.33	109.69
2	A	82	DGD	C4A-C3A-C2A	2.38	121.75	113.19
2	A	82	DGD	O2E-C2E-C3E	-2.31	105.01	110.35
2	A	82	DGD	O5E-C6E-C5E	2.01	118.20	111.29

There are no chirality outliers.

All (33) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	82	DGD	C2B-C1B-O2G-C2G
2	A	82	DGD	C2D-C1D-O3G-C3G
2	A	82	DGD	O6D-C1D-O3G-C3G
2	A	82	DGD	C4D-C5D-C6D-O5D
2	A	82	DGD	O1B-C1B-O2G-C2G
2	A	82	DGD	O6E-C5E-C6E-O5E
2	A	82	DGD	C4E-C5E-C6E-O5E
2	A	82	DGD	O6D-C5D-C6D-O5D
2	A	82	DGD	C5A-C6A-C7A-C8A
2	A	82	DGD	C1G-C2G-O2G-C1B
2	A	82	DGD	C4A-C5A-C6A-C7A
2	A	82	DGD	CBA-CCA-CDA-CEA
2	A	82	DGD	CAA-CBA-CCA-CDA
2	A	82	DGD	C6B-C7B-C8B-C9B
2	A	82	DGD	C2A-C3A-C4A-C5A
2	A	82	DGD	C4B-C5B-C6B-C7B
2	A	82	DGD	CCB-CDB-CEB-CFB
2	A	82	DGD	C1B-C2B-C3B-C4B
2	A	82	DGD	CBB-CCB-CDB-CEB
2	A	82	DGD	O1G-C1G-C2G-C3G
2	A	82	DGD	C2B-C3B-C4B-C5B
2	A	82	DGD	C1G-C2G-C3G-O3G
2	A	82	DGD	C1A-C2A-C3A-C4A
2	A	82	DGD	C8A-C9A-CAA-CBA
2	A	82	DGD	O1G-C1G-C2G-O2G
2	A	82	DGD	C3B-C4B-C5B-C6B

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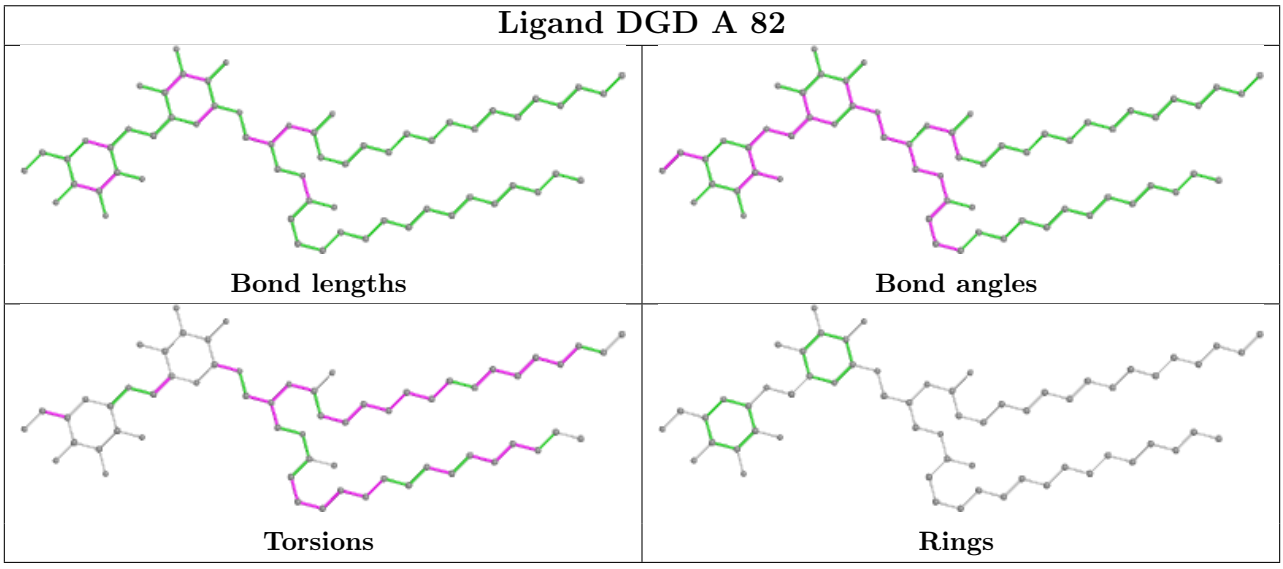
Mol	Chain	Res	Type	Atoms
2	A	82	DGD	C5B-C6B-C7B-C8B
2	A	82	DGD	CCA-CDA-CEA-CFA
2	A	82	DGD	O2G-C2G-C3G-O3G
2	A	82	DGD	C8B-C9B-CAB-CBB
2	A	82	DGD	C9B-CAB-CBB-CCB
2	A	82	DGD	C3A-C4A-C5A-C6A
2	A	82	DGD	CAB-CBB-CCB-CDB

There are no ring outliers.

No monomer is involved in short contacts.

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.



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, 95^{th} 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	79/79 (100%)	0.08	6 (7%)	13	15	42, 90, 139, 157	0
1	B	79/79 (100%)	-0.12	1 (1%)	77	76	44, 89, 141, 156	0
1	C	79/79 (100%)	0.30	8 (10%)	7	8	46, 85, 137, 153	0
1	D	79/79 (100%)	0.02	1 (1%)	77	76	48, 88, 136, 153	0
1	E	79/79 (100%)	0.03	1 (1%)	77	76	40, 87, 135, 152	0
1	F	77/79 (97%)	0.12	4 (5%)	27	27	46, 89, 131, 156	0
1	G	79/79 (100%)	-0.07	3 (3%)	40	39	41, 88, 144, 154	0
1	H	79/79 (100%)	-0.25	1 (1%)	77	76	44, 88, 138, 156	0
1	I	79/79 (100%)	-0.16	2 (2%)	57	55	51, 88, 138, 155	0
1	J	79/79 (100%)	0.04	5 (6%)	20	21	51, 91, 136, 156	0
1	K	79/79 (100%)	0.04	2 (2%)	57	55	48, 88, 138, 153	0
1	L	79/79 (100%)	0.11	4 (5%)	28	28	51, 87, 136, 154	0
1	M	79/79 (100%)	0.10	3 (3%)	40	39	52, 88, 137, 153	0
1	N	79/79 (100%)	-0.15	2 (2%)	57	55	45, 86, 133, 150	0
All	All	1104/1106 (99%)	0.01	43 (3%)	39	38	40, 88, 138, 157	0

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	79	PRO	6.0
1	F	79	PRO	4.7
1	J	79	PRO	4.5
1	C	45	ALA	4.4
1	C	47	ASP	4.1
1	K	79	PRO	4.1
1	L	77	ALA	3.9
1	C	44	GLU	3.7

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Mol	Chain	Res	Type	RSRZ
1	A	78	ASN	3.5
1	A	77	ALA	3.2
1	C	54	LEU	3.1
1	H	79	PRO	3.1
1	G	76	PHE	3.0
1	M	77	ALA	2.9
1	D	76	PHE	2.9
1	A	81	VAL	2.8
1	C	43	PRO	2.8
1	K	47	ASP	2.8
1	C	46	GLU	2.8
1	E	47	ASP	2.7
1	N	44	GLU	2.7
1	N	45	ALA	2.6
1	A	4	LEU	2.6
1	A	47	ASP	2.5
1	L	43	PRO	2.5
1	F	77	ALA	2.5
1	J	77	ALA	2.5
1	L	76	PHE	2.4
1	L	4	LEU	2.3
1	J	76	PHE	2.3
1	M	54	LEU	2.3
1	I	76	PHE	2.3
1	C	51	GLY	2.3
1	C	77	ALA	2.3
1	J	78	ASN	2.2
1	G	79	PRO	2.2
1	B	76	PHE	2.1
1	F	76	PHE	2.1
1	G	81	VAL	2.1
1	M	76	PHE	2.1
1	J	81	VAL	2.1
1	F	69	VAL	2.1
1	I	45	ALA	2.1

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

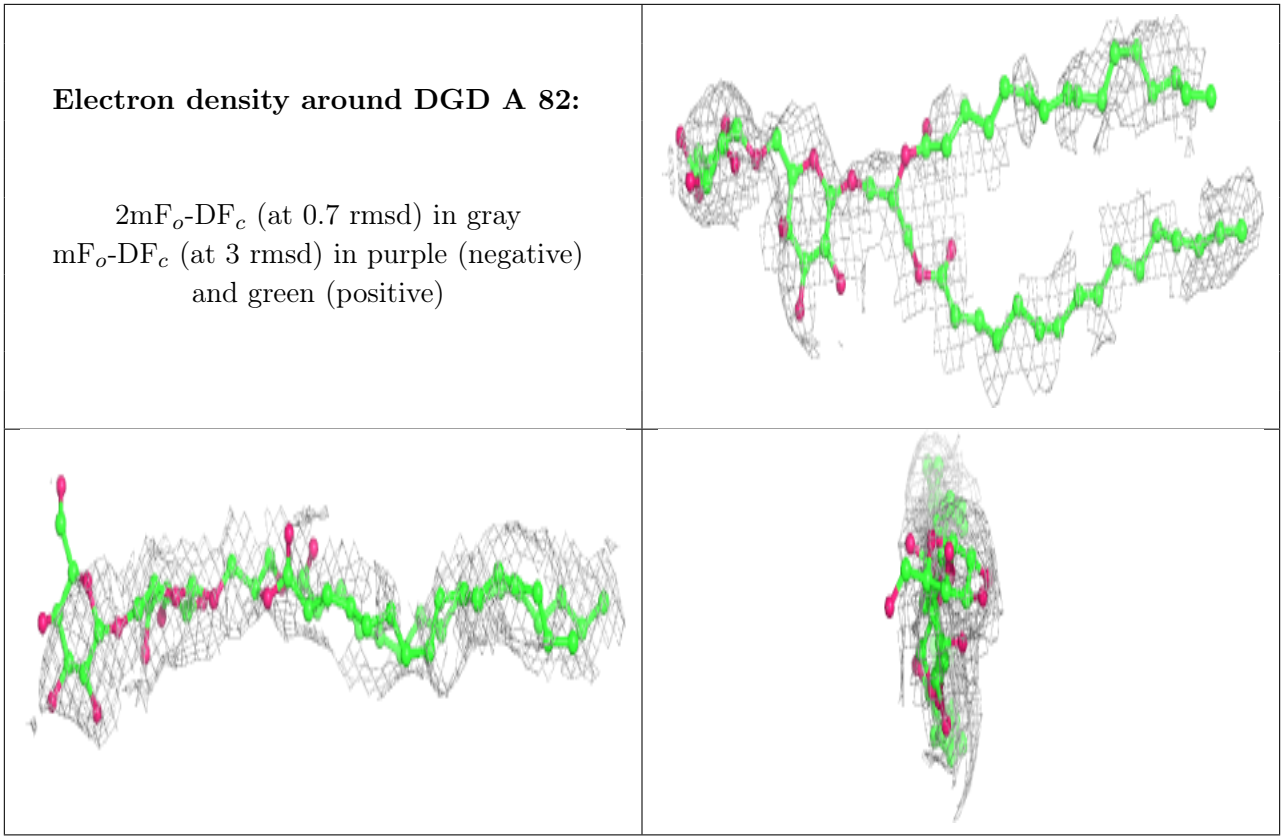
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	DGD	A	82	62/66	0.59	0.41	42,134,161,182	3
4	NA	L	116	1/1	0.70	0.18	26,26,26,26	0
4	NA	K	117	1/1	0.74	0.20	39,39,39,39	0
3	YT3	A	103	1/1	0.75	1.25	402,402,402,402	0
4	NA	I	119	1/1	0.75	0.17	46,46,46,46	0
4	NA	J	118	1/1	0.78	0.35	49,49,49,49	0
4	NA	A	114	1/1	0.81	0.17	36,36,36,36	0
4	NA	D	125	1/1	0.84	0.19	42,42,42,42	0
4	NA	E	124	1/1	0.85	0.21	33,33,33,33	0
3	YT3	H	108	1/1	0.86	0.11	73,73,73,73	0
4	NA	A	115	1/1	0.86	0.14	40,40,40,40	0
4	NA	B	126	1/1	0.87	0.20	33,33,33,33	0
4	NA	F	122	1/1	0.89	0.16	7,7,7,7	0
4	NA	G	121	1/1	0.90	0.24	25,25,25,25	0
4	NA	E	123	1/1	0.91	0.18	18,18,18,18	0
3	YT3	F	106	1/1	0.92	0.47	180,180,180,180	0
3	YT3	K	111	1/1	0.92	0.08	89,89,89,89	0
4	NA	M	127	1/1	0.92	0.11	39,39,39,39	0
3	YT3	C	112	1/1	0.93	0.09	142,142,142,142	0
4	NA	H	120	1/1	0.94	0.26	89,89,89,89	0
3	YT3	D	113	1/1	0.94	0.13	118,118,118,118	0
3	YT3	N	104	1/1	0.96	0.10	80,80,80,80	0
3	YT3	G	107	1/1	0.97	0.11	72,72,72,72	0
3	YT3	L	110	1/1	0.98	0.04	87,87,87,87	1
3	YT3	E	105	1/1	0.98	0.07	66,66,66,66	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 DGD A 82:

$2mF_o$-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.