Full wwPDB X-ray Structure Validation Report ⓘ

May 27, 2020 – 01:13 am BST

PDB ID	:	6H31
Title	:	Staphylopine dehydrogenase in the apo state
Authors	:	Hajjar, C.; Arnoux, P.
Deposited on	:	2018-07-17
Resolution	:	2.30 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 following versions of software and data (see references ⓘ) were used in the production of this report:

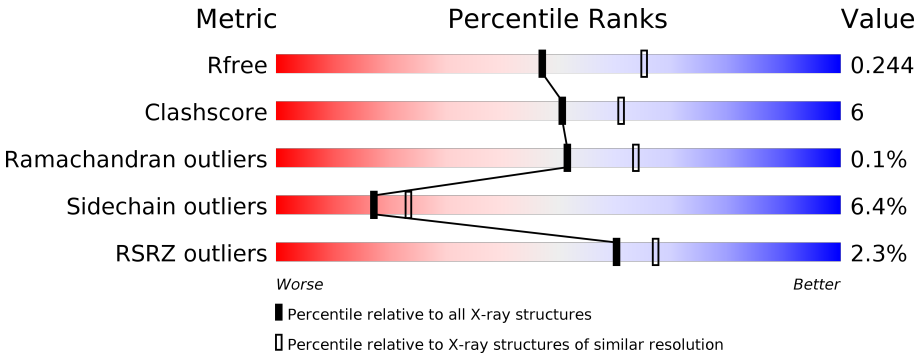
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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 on 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	441	2% 82% 13%
1	B	441	3% 80% 14%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7429 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.

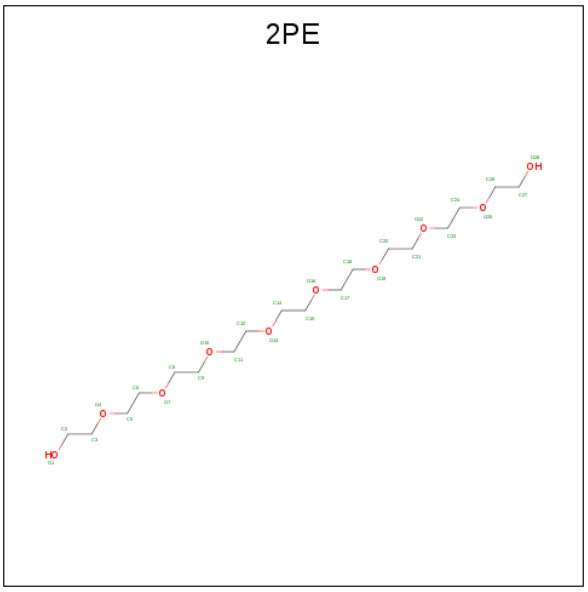
- Molecule 1 is a protein called DUF2338 domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	428	Total	C	N	O	S	0	0	0
			3476	2231	566	656	23			
1	B	428	Total	C	N	O	S	0	0	0
			3476	2231	566	656	23			

There are 16 discrepancies between the modelled and reference sequences:

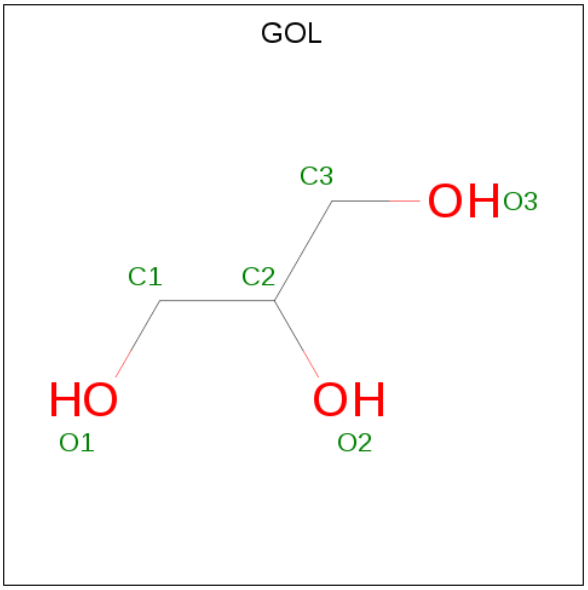
Chain	Residue	Modelled	Actual	Comment	Reference
A	434	LEU	-	expression tag	UNP A0A1K7Y513
A	435	GLU	-	expression tag	UNP A0A1K7Y513
A	436	HIS	-	expression tag	UNP A0A1K7Y513
A	437	HIS	-	expression tag	UNP A0A1K7Y513
A	438	HIS	-	expression tag	UNP A0A1K7Y513
A	439	HIS	-	expression tag	UNP A0A1K7Y513
A	440	HIS	-	expression tag	UNP A0A1K7Y513
A	441	HIS	-	expression tag	UNP A0A1K7Y513
B	434	LEU	-	expression tag	UNP A0A1K7Y513
B	435	GLU	-	expression tag	UNP A0A1K7Y513
B	436	HIS	-	expression tag	UNP A0A1K7Y513
B	437	HIS	-	expression tag	UNP A0A1K7Y513
B	438	HIS	-	expression tag	UNP A0A1K7Y513
B	439	HIS	-	expression tag	UNP A0A1K7Y513
B	440	HIS	-	expression tag	UNP A0A1K7Y513
B	441	HIS	-	expression tag	UNP A0A1K7Y513

- Molecule 2 is NONAETHYLENE GLYCOL (three-letter code: 2PE) (formula: $C_{18}H_{38}O_{10}$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 13 8 5	0	0
2	B	1	Total C O 13 8 5	0	0

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 6 3 3	0	0

- Molecule 4 is water.

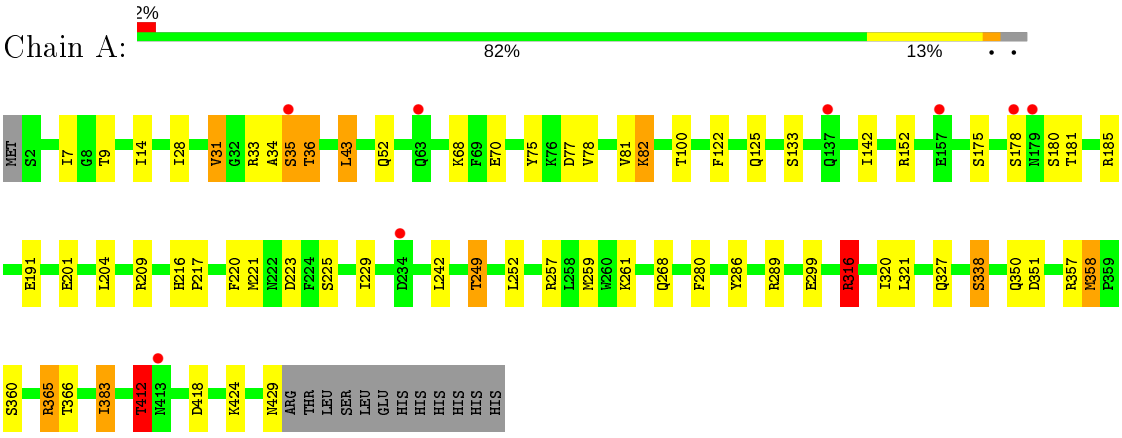
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	268	Total O 268 268	0	0
4	B	177	Total O 177 177	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA and DNA 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.

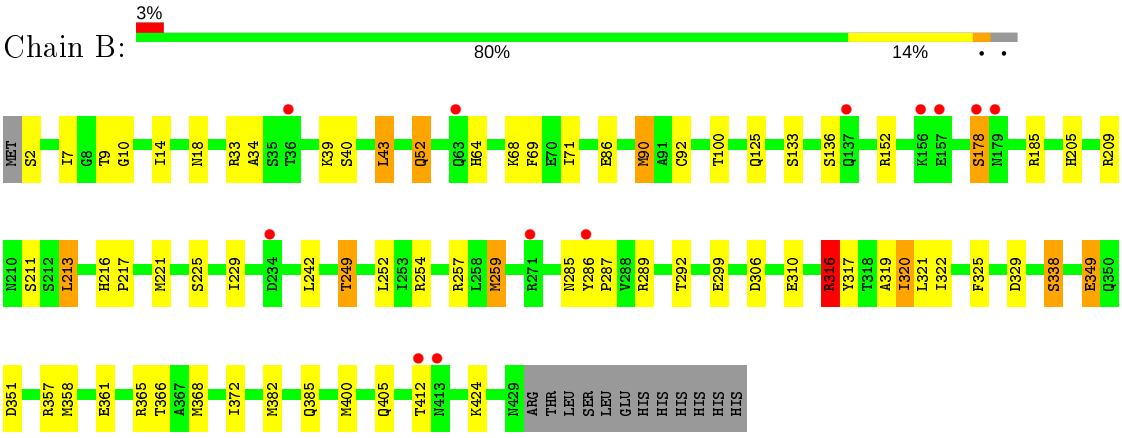
- Molecule 1: DUF2338 domain-containing protein

Chain A:



- Molecule 1: DUF2338 domain-containing protein

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	89.84Å 49.00Å 155.14Å 90.00° 94.59° 90.00°	Depositor
Resolution (Å)	19.98 – 2.30 19.98 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.8 (19.98-2.30) 98.0 (19.98-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.60 (at 2.30Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.190 , 0.244 0.194 , 0.244	Depositor DCC
R_{free} test set	3010 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	27.9	Xtriage
Anisotropy	0.047	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 38.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	7429	wwPDB-VP
Average B, all atoms (Å^2)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.09% 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: GOL, 2PE

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	0.87	3/3551 (0.1%)	1.00	10/4800 (0.2%)
1	B	0.80	1/3551 (0.0%)	0.99	13/4800 (0.3%)
All	All	0.84	4/7102 (0.1%)	0.99	23/9600 (0.2%)

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	2
1	B	0	2
All	All	0	4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	338	SER	CB-OG	-6.87	1.33	1.42
1	B	338	SER	CB-OG	-6.73	1.33	1.42
1	A	360	SER	CB-OG	-5.29	1.35	1.42
1	A	316	ARG	CZ-NH1	5.01	1.39	1.33

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	289	ARG	NE-CZ-NH2	-11.45	114.57	120.30
1	B	289	ARG	NE-CZ-NH1	11.27	125.93	120.30
1	A	289	ARG	NE-CZ-NH2	-10.97	114.81	120.30
1	A	289	ARG	NE-CZ-NH1	10.75	125.67	120.30
1	A	316	ARG	NE-CZ-NH2	-7.83	116.39	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	316	ARG	NE-CZ-NH2	-7.11	116.75	120.30
1	B	316	ARG	NE-CZ-NH1	6.57	123.59	120.30
1	B	213	LEU	CA-CB-CG	6.12	129.37	115.30
1	B	209	ARG	NE-CZ-NH1	6.09	123.34	120.30
1	B	306	ASP	CB-CG-OD1	5.88	123.59	118.30
1	B	329	ASP	CB-CG-OD1	5.82	123.54	118.30
1	A	365	ARG	NE-CZ-NH2	-5.78	117.41	120.30
1	B	357	ARG	NE-CZ-NH1	5.70	123.15	120.30
1	A	257	ARG	NE-CZ-NH2	-5.50	117.55	120.30
1	B	306	ASP	CB-CG-OD2	-5.48	113.37	118.30
1	A	357	ARG	NE-CZ-NH1	5.45	123.03	120.30
1	B	254	ARG	NE-CZ-NH2	-5.41	117.59	120.30
1	B	90	MET	CG-SD-CE	5.39	108.82	100.20
1	A	209	ARG	NE-CZ-NH1	5.38	122.99	120.30
1	B	259	MET	CA-CB-CG	-5.36	104.19	113.30
1	A	223	ASP	CB-CG-OD1	5.30	123.07	118.30
1	A	209	ARG	CG-CD-NE	5.10	122.51	111.80
1	A	82	LYS	CD-CE-NZ	5.07	123.37	111.70

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	35	SER	Peptide
1	A	412	THR	Peptide
1	B	412	THR	Peptide
1	B	52	GLN	Peptide

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	3476	0	3468	43	0
1	B	3476	0	3468	37	0
2	A	13	0	17	0	0
2	B	13	0	17	0	0
3	A	6	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	268	0	0	24	2
4	B	177	0	0	17	0
All	All	7429	0	6978	80	2

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 6.

All (80) 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:A:366:THR:HB	4:A:728:HOH:O	1.30	1.31
1:B:366:THR:HB	4:B:828:HOH:O	1.52	1.09
1:A:14:ILE:HG13	4:A:766:HOH:O	1.54	1.05
1:B:382:MET:SD	4:B:834:HOH:O	2.35	0.84
1:B:9:THR:HB	1:B:43:LEU:HD22	1.63	0.80
1:B:249:THR:HG22	1:B:252:LEU:H	1.47	0.80
1:A:28:ILE:HG13	4:A:805:HOH:O	1.82	0.78
1:A:9:THR:HB	1:A:43:LEU:HD22	1.68	0.76
1:B:92:CYS:SG	4:B:770:HOH:O	2.43	0.75
1:A:28:ILE:CG1	4:A:805:HOH:O	2.36	0.74
1:A:35:SER:HB2	4:A:886:HOH:O	1.89	0.72
1:A:249:THR:HG22	1:A:252:LEU:H	1.54	0.71
1:A:365:ARG:NE	4:A:702:HOH:O	2.24	0.69
1:B:178:SER:O	4:B:701:HOH:O	2.15	0.65
1:A:225:SER:O	1:A:229:ILE:HG12	1.97	0.64
1:A:366:THR:CB	4:A:728:HOH:O	2.11	0.63
1:A:216:HIS:HD2	4:A:705:HOH:O	1.86	0.58
1:A:365:ARG:CZ	4:A:702:HOH:O	2.52	0.58
1:B:185:ARG:HD3	4:B:870:HOH:O	2.03	0.58
1:B:400:MET:HG2	4:B:873:HOH:O	2.04	0.57
1:A:429:ASN:ND2	4:A:706:HOH:O	2.37	0.57
1:B:321:LEU:HA	1:B:338:SER:OG	2.05	0.56
1:A:52:GLN:HE21	1:A:68:LYS:HB3	1.70	0.56
1:A:142:ILE:HG12	1:A:175:SER:HB2	1.88	0.55
1:A:320:ILE:HG23	4:A:839:HOH:O	2.06	0.55
1:B:286:TYR:HB3	4:B:841:HOH:O	2.06	0.54
1:A:178:SER:HA	4:A:918:HOH:O	2.08	0.53
1:A:327:GLN:HB3	4:A:758:HOH:O	2.09	0.53
1:B:64:HIS:HB3	4:B:851:HOH:O	2.09	0.52
1:B:2:SER:N	1:B:86:GLU:OE1	2.43	0.52
1:B:316:ARG:NE	4:B:702:HOH:O	2.27	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:217:PRO:HB3	1:B:221:MET:CE	2.41	0.51
1:A:366:THR:HG23	1:A:383:ILE:HG12	1.91	0.51
1:B:92:CYS:HB2	4:B:867:HOH:O	2.12	0.50
1:A:229:ILE:HD12	4:A:749:HOH:O	2.11	0.50
1:B:320:ILE:HG23	4:B:811:HOH:O	2.11	0.50
1:A:286:TYR:HB3	4:A:887:HOH:O	2.12	0.49
1:B:34:ALA:HB2	4:B:802:HOH:O	2.12	0.49
1:B:349:GLU:H	1:B:349:GLU:CD	2.15	0.49
1:A:122:PHE:CE1	1:A:204:LEU:HD11	2.47	0.49
1:A:220:PHE:CE2	1:A:358:MET:HG2	2.48	0.49
1:A:220:PHE:CZ	1:A:358:MET:HG2	2.48	0.49
1:A:217:PRO:HB3	1:A:221:MET:CE	2.42	0.49
1:B:52:GLN:HE21	1:B:68:LYS:HB3	1.78	0.48
1:A:216:HIS:CD2	4:A:705:HOH:O	2.65	0.48
1:B:205:HIS:ND1	4:B:703:HOH:O	2.30	0.48
1:B:368:MET:O	1:B:372:ILE:HG12	2.13	0.48
1:B:292:THR:HG21	1:B:319:ALA:HB2	1.96	0.47
1:B:257:ARG:HD3	1:B:310:GLU:HG3	1.96	0.47
1:A:52:GLN:OE1	1:A:70:GLU:HG3	2.14	0.47
1:A:7:ILE:HG21	1:A:100:THR:HG21	1.97	0.47
1:B:225:SER:O	1:B:229:ILE:HG12	2.16	0.46
1:B:320:ILE:HG21	1:B:320:ILE:HD13	1.57	0.46
1:A:31:VAL:HG11	1:A:78:VAL:HA	1.98	0.46
1:A:321:LEU:HA	1:A:338:SER:OG	2.16	0.46
1:B:18:ASN:HB2	1:B:69:PHE:CE1	2.50	0.45
1:A:180:SER:HB2	4:A:716:HOH:O	2.16	0.45
1:A:316:ARG:NE	4:A:703:HOH:O	2.27	0.45
1:A:316:ARG:CD	1:A:316:ARG:C	2.85	0.45
1:A:316:ARG:NH2	4:A:703:HOH:O	2.46	0.45
1:B:211:SER:CB	1:B:285:ASN:HD21	2.30	0.45
1:B:7:ILE:HG21	1:B:100:THR:HG21	1.98	0.44
1:A:34:ALA:N	4:A:712:HOH:O	2.50	0.44
1:B:320:ILE:HG22	4:B:785:HOH:O	2.18	0.44
1:A:35:SER:C	1:A:36:THR:HG1	2.20	0.43
1:B:365:ARG:NE	4:B:705:HOH:O	2.51	0.43
1:B:10:GLY:O	1:B:14:ILE:HG12	2.19	0.43
1:A:366:THR:HG22	1:A:383:ILE:HG23	2.01	0.43
1:A:412:THR:HA	4:A:802:HOH:O	2.19	0.42
1:B:365:ARG:HG2	4:B:847:HOH:O	2.19	0.42
1:A:35:SER:OG	4:A:701:HOH:O	2.21	0.42
1:A:14:ILE:CG1	4:A:766:HOH:O	2.37	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:TYR:CE1	1:A:81:VAL:HA	2.56	0.41
1:A:77:ASP:HB2	4:A:712:HOH:O	2.19	0.41
1:B:361:GLU:O	1:B:365:ARG:HG3	2.20	0.41
1:B:320:ILE:O	1:B:320:ILE:HG23	2.20	0.41
1:B:287:PRO:HG2	1:B:325:PHE:CE2	2.55	0.41
1:B:320:ILE:CG2	4:B:785:HOH:O	2.68	0.41
1:A:181:THR:HG22	1:A:185:ARG:NH1	2.36	0.40
1:B:317:TYR:O	1:B:320:ILE:HG22	2.21	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:926:HOH:O	4:A:930:HOH:O[2_656]	1.99	0.21
4:A:709:HOH:O	4:A:877:HOH:O[2_656]	2.17	0.03

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	426/441 (97%)	416 (98%)	9 (2%)	1 (0%)	47 58
1	B	426/441 (97%)	410 (96%)	16 (4%)	0	100 100
All	All	852/882 (97%)	826 (97%)	25 (3%)	1 (0%)	51 64

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	36	THR

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	391/404 (97%)	367 (94%)	24 (6%)	18 25
1	B	391/404 (97%)	365 (93%)	26 (7%)	16 22
All	All	782/808 (97%)	732 (94%)	50 (6%)	17 23

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	VAL
1	A	33	ARG
1	A	43	LEU
1	A	82	LYS
1	A	125	GLN
1	A	133	SER
1	A	152	ARG
1	A	191	GLU
1	A	201	GLU
1	A	242	LEU
1	A	249	THR
1	A	259	MET
1	A	261	LYS
1	A	268	GLN
1	A	280	PHE
1	A	299	GLU
1	A	316	ARG
1	A	350	GLN
1	A	351	ASP
1	A	358	MET
1	A	383	ILE
1	A	412	THR
1	A	418	ASP
1	A	424	LYS
1	B	33	ARG
1	B	39	LYS
1	B	40	SER

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Mol	Chain	Res	Type
1	B	43	LEU
1	B	71	ILE
1	B	90	MET
1	B	125	GLN
1	B	133	SER
1	B	136	SER
1	B	152	ARG
1	B	178	SER
1	B	213	LEU
1	B	216	HIS
1	B	242	LEU
1	B	249	THR
1	B	259	MET
1	B	299	GLU
1	B	316	ARG
1	B	320	ILE
1	B	322	ILE
1	B	349	GLU
1	B	351	ASP
1	B	358	MET
1	B	385	GLN
1	B	405	GLN
1	B	424	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	GLN
1	A	45	GLN
1	A	58	GLN
1	A	63	GLN
1	A	114	HIS
1	A	125	GLN
1	A	177	HIS
1	A	205	HIS
1	A	216	HIS
1	A	285	ASN
1	A	333	HIS
1	A	350	GLN
1	A	401	HIS
1	A	405	GLN
1	B	15	GLN

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Mol	Chain	Res	Type
1	B	45	GLN
1	B	52	GLN
1	B	114	HIS
1	B	125	GLN
1	B	177	HIS
1	B	285	ASN
1	B	333	HIS
1	B	354	GLN
1	B	401	HIS
1	B	429	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

3 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	2PE	B	600	-	12,12,27	0.44	0	11,11,26	0.68	0
2	2PE	A	600	-	12,12,27	0.99	0	11,11,26	0.78	0
3	GOL	A	601	-	5,5,5	0.48	0	5,5,5	1.34	1 (20%)

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	2PE	B	600	-	-	5/10/10/25	-
2	2PE	A	600	-	-	3/10/10/25	-
3	GOL	A	601	-	-	1/4/4/4	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	601	GOL	O2-C2-C3	-2.27	99.14	109.12

There are no chirality outliers.

All (9) torsion outliers are listed below:

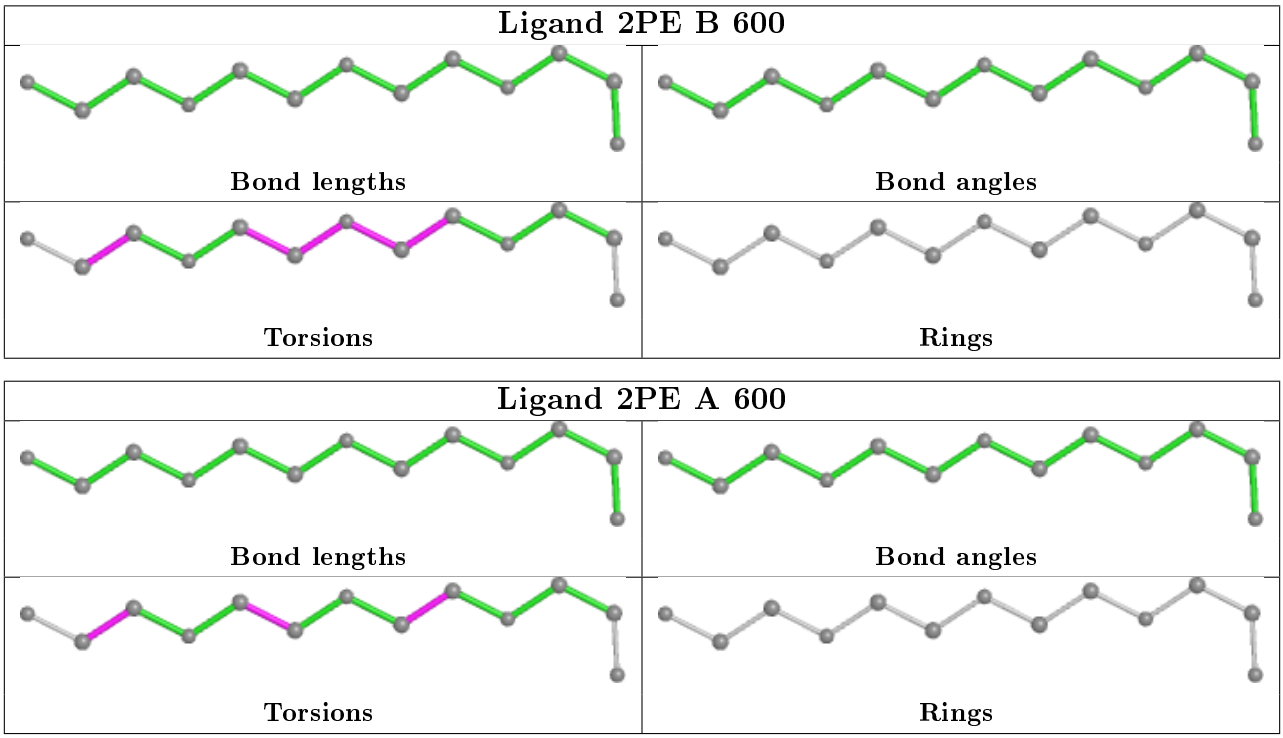
Mol	Chain	Res	Type	Atoms
2	A	600	2PE	O4-C5-C6-O7
2	B	600	2PE	O4-C5-C6-O7
2	B	600	2PE	O7-C8-C9-O10
3	A	601	GOL	O1-C1-C2-C3
2	A	600	2PE	O7-C8-C9-O10
2	B	600	2PE	O10-C11-C12-O13
2	A	600	2PE	O10-C11-C12-O13
2	B	600	2PE	C5-C6-O7-C8
2	B	600	2PE	C9-C8-O7-C6

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

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	428/441 (97%)	-0.19	8 (1%) 66 73	14, 27, 55, 75	0
1	B	428/441 (97%)	-0.03	12 (2%) 53 60	16, 34, 62, 84	0
All	All	856/882 (97%)	-0.11	20 (2%) 60 67	14, 31, 60, 84	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	137	GLN	4.0
1	A	35	SER	3.9
1	A	179	ASN	3.6
1	B	413	ASN	3.6
1	B	178	SER	3.1
1	B	157	GLU	2.9
1	B	286	TYR	2.9
1	A	63	GLN	2.7
1	A	413	ASN	2.6
1	B	234	ASP	2.6
1	B	179	ASN	2.5
1	B	36	THR	2.5
1	A	137	GLN	2.5
1	B	156	LYS	2.5
1	B	63	GLN	2.5
1	A	234	ASP	2.4
1	B	412	THR	2.4
1	A	178	SER	2.4
1	B	271	ARG	2.2
1	A	157	GLU	2.2

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 carbohydrates in this entry.

6.4 Ligands (i)

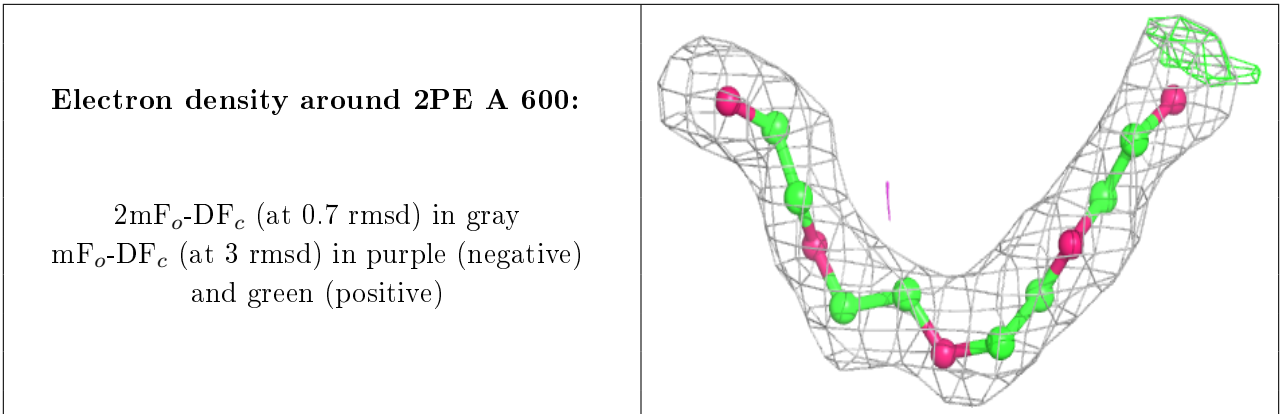
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

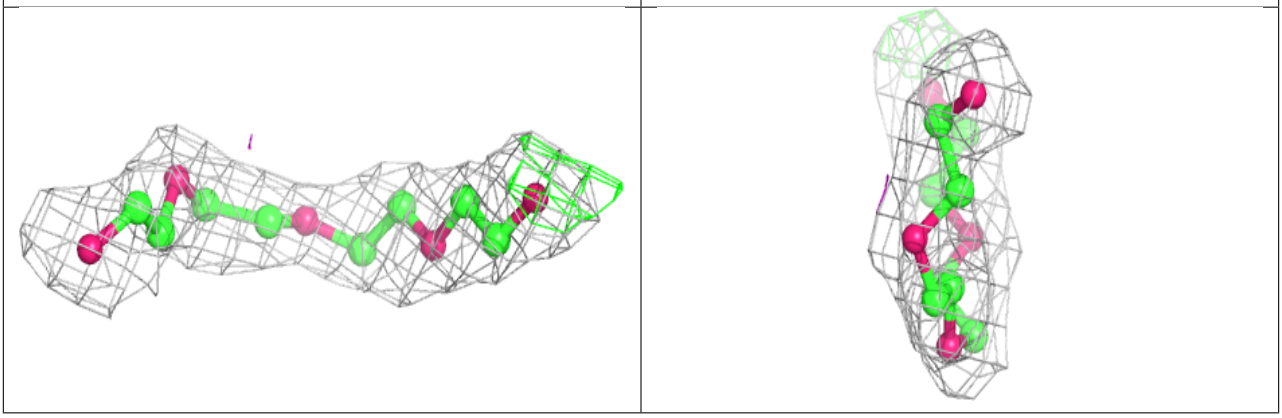
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	2PE	A	600	13/28	0.85	0.21	49,53,55,56	0
2	2PE	B	600	13/28	0.88	0.20	48,57,61,63	0
3	GOL	A	601	6/6	0.95	0.10	22,24,25,28	0

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 2PE A 600:

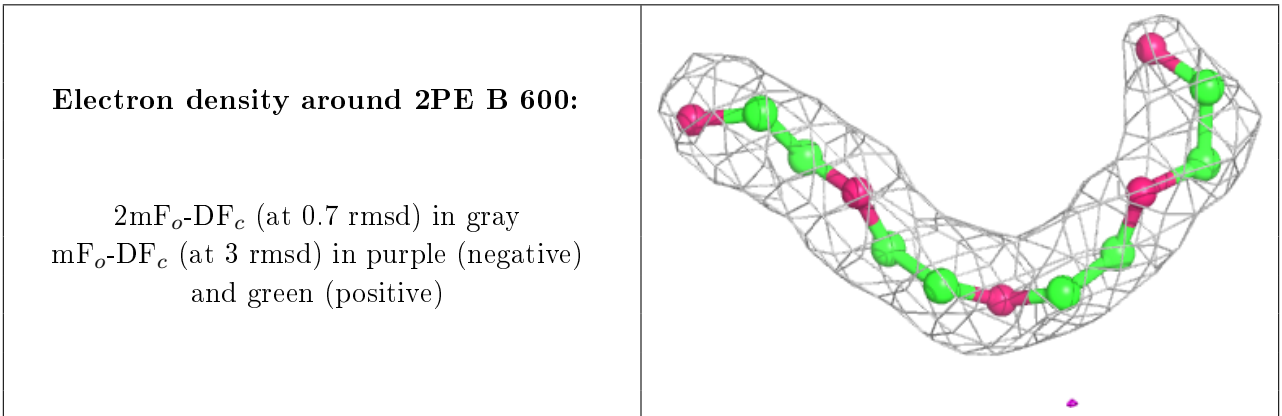
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

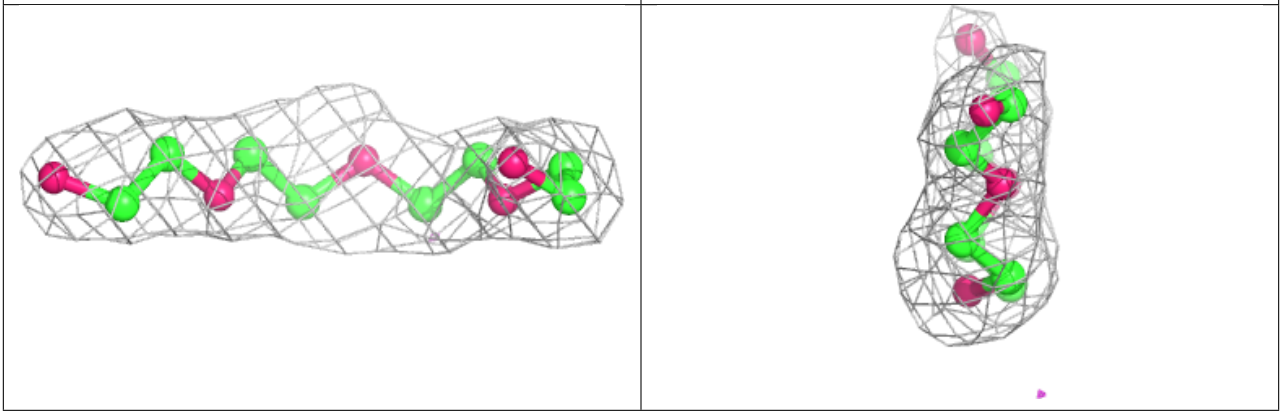




Electron density around 2PE B 600:

$2mF_o$-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.