



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 06:12 PM GMT

PDB ID : 4KVI  
Title : Crystal structure of Aspergillus terreus aristolochene synthase complexed with (4aS,7S)-4a-methyl-7-(prop-1-en-2-yl)-2,3,4,4a,5,6,7,8-octahydroquinolin-1-ium  
Authors : Chen, M.; Faraldos, J.A.; Al-lami, N.; Janvier, M.; D'Antonio, E.L.; Cane, D.E.; Allemann, R.K.; Christianson, D.W.  
Deposited on : 2013-05-22  
Resolution : 2.15 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

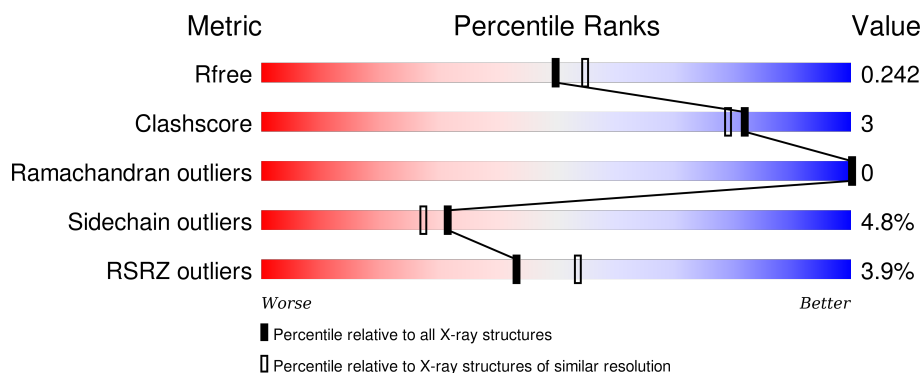
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.15 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))
$R_{free}$	91344	1045 (2.16-2.16)
Clashscore	102246	1152 (2.16-2.16)
Ramachandran outliers	100387	1131 (2.16-2.16)
Sidechain outliers	100360	1131 (2.16-2.16)
RSRZ outliers	91569	1050 (2.16-2.16)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	314	<div> <div>88%</div> <div>7%</div> <div>• •</div> </div>
1	B	314	<div> <div>88%</div> <div>8%</div> <div>• •</div> </div>
1	C	314	<div> <div>2%</div> <div>86%</div> <div>10%</div> <div>•</div> </div>
1	D	314	<div> <div>12%</div> <div>84%</div> <div>12%</div> <div>• •</div> </div>

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	MG	B	701	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 10812 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 Aristolochene synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	304	Total	C	N	O	S	0	0	0
			2454	1566	415	458	15			
1	B	304	Total	C	N	O	S	0	0	0
			2454	1566	415	458	15			
1	C	304	Total	C	N	O	S	0	0	0
			2454	1566	415	458	15			
1	D	304	Total	C	N	O	S	0	0	0
			2454	1566	415	458	15			

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	EXPRESSION TAG	UNP Q9UR08
A	2	HIS	-	EXPRESSION TAG	UNP Q9UR08
A	3	HIS	-	EXPRESSION TAG	UNP Q9UR08
A	4	HIS	-	EXPRESSION TAG	UNP Q9UR08
A	5	HIS	-	EXPRESSION TAG	UNP Q9UR08
A	6	HIS	-	EXPRESSION TAG	UNP Q9UR08
A	7	HIS	-	EXPRESSION TAG	UNP Q9UR08
B	1	MET	-	EXPRESSION TAG	UNP Q9UR08
B	2	HIS	-	EXPRESSION TAG	UNP Q9UR08
B	3	HIS	-	EXPRESSION TAG	UNP Q9UR08
B	4	HIS	-	EXPRESSION TAG	UNP Q9UR08
B	5	HIS	-	EXPRESSION TAG	UNP Q9UR08
B	6	HIS	-	EXPRESSION TAG	UNP Q9UR08
B	7	HIS	-	EXPRESSION TAG	UNP Q9UR08
C	1	MET	-	EXPRESSION TAG	UNP Q9UR08
C	2	HIS	-	EXPRESSION TAG	UNP Q9UR08
C	3	HIS	-	EXPRESSION TAG	UNP Q9UR08
C	4	HIS	-	EXPRESSION TAG	UNP Q9UR08
C	5	HIS	-	EXPRESSION TAG	UNP Q9UR08
C	6	HIS	-	EXPRESSION TAG	UNP Q9UR08
C	7	HIS	-	EXPRESSION TAG	UNP Q9UR08

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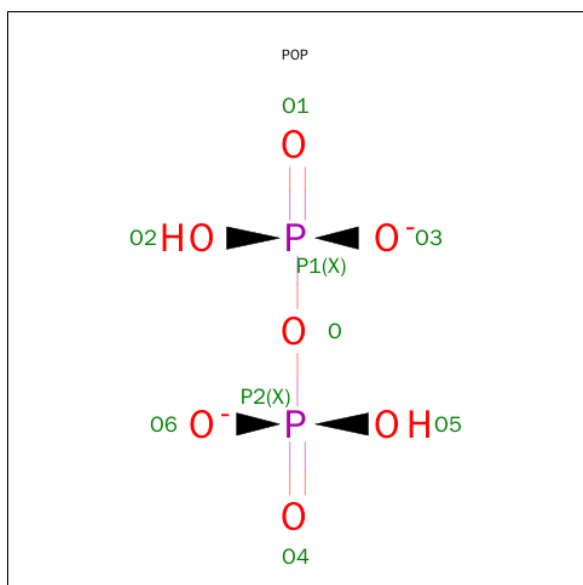
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Chain	Residue	Modelled	Actual	Comment	Reference
D	1	MET	-	EXPRESSION TAG	UNP Q9UR08
D	2	HIS	-	EXPRESSION TAG	UNP Q9UR08
D	3	HIS	-	EXPRESSION TAG	UNP Q9UR08
D	4	HIS	-	EXPRESSION TAG	UNP Q9UR08
D	5	HIS	-	EXPRESSION TAG	UNP Q9UR08
D	6	HIS	-	EXPRESSION TAG	UNP Q9UR08
D	7	HIS	-	EXPRESSION TAG	UNP Q9UR08

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	3	Total Mg 3 3	0	0
2	A	3	Total Mg 3 3	0	0
2	D	3	Total Mg 3 3	0	0
2	C	3	Total Mg 3 3	0	0

- Molecule 3 is PYROPHOSPHATE 2- (three-letter code: POP) (formula: H<sub>2</sub>O<sub>7</sub>P<sub>2</sub>).



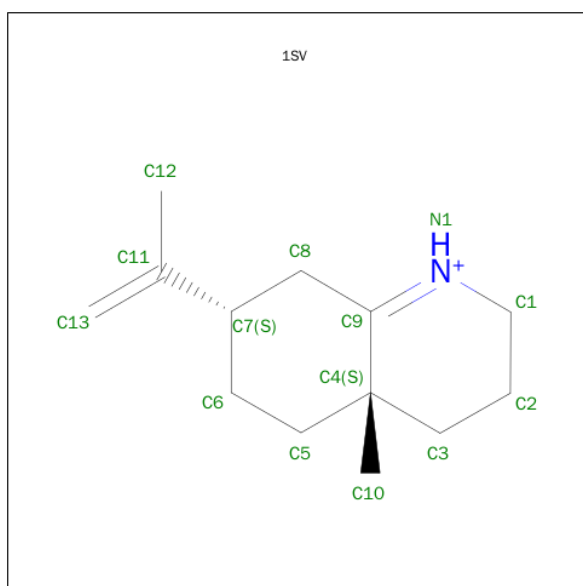
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O P 9 7 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	P	0	0
			9	7	2		
3	C	1	Total	O	P	0	0
			9	7	2		
3	D	1	Total	O	P	0	0
			9	7	2		

- Molecule 4 is (4AS,7S)-4A-METHYL-7-(PROP-1-EN-2-YL)-2,3,4,4A,5,6,7,8-OCTAHYDR OQUINOLINIUM (three-letter code: 1SV) (formula: C<sub>13</sub>H<sub>22</sub>N).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	N	0	0
			14	13	1		
4	B	1	Total	C	N	0	0
			14	13	1		
4	C	1	Total	C	N	0	0
			14	13	1		
4	D	1	Total	C	N	0	0
			14	13	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	308	Total	O	0	0
			308	308		
5	B	308	Total	O	0	0
			308	308		

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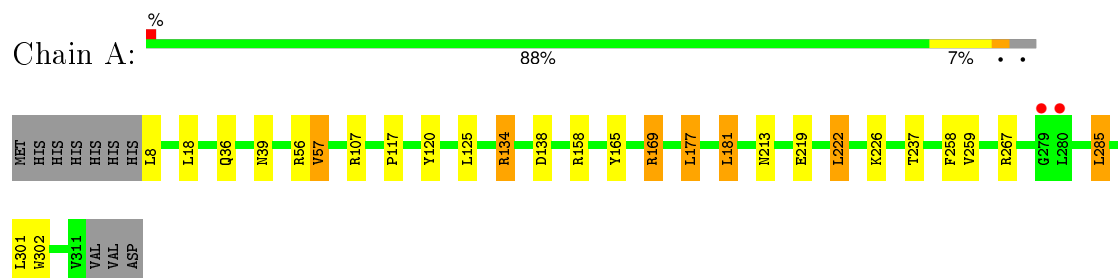
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	180	Total 180	O 180	0	0
5	D	96	Total 96	O 96	0	0

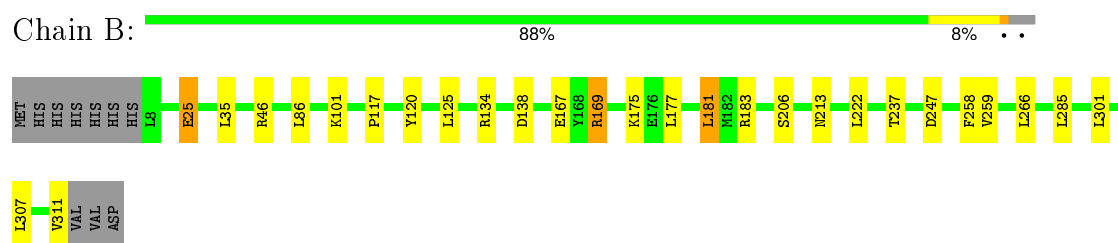
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

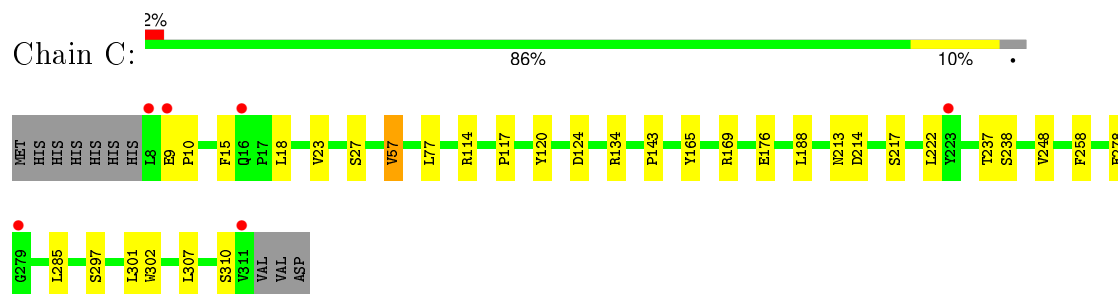
- Molecule 1: Aristolochene synthase



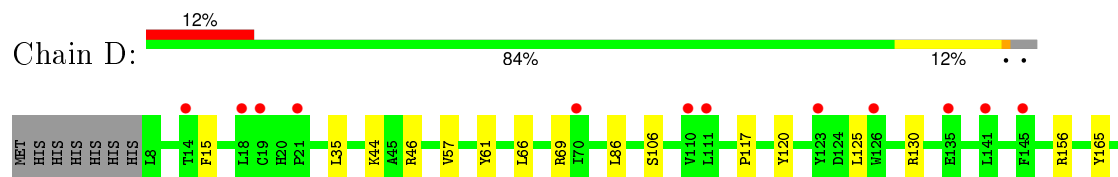
- Molecule 1: Aristolochene synthase



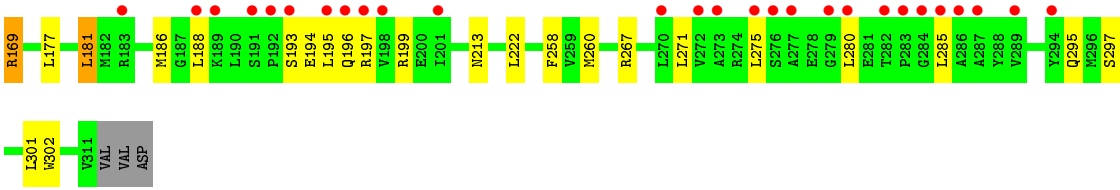
- Molecule 1: Aristolochene synthase



- Molecule 1: Aristolochene synthase







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	123.40Å 123.40Å 201.60Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.15 47.21 – 2.15	Depositor EDS
% Data completeness (in resolution range)	99.0 (50.00-2.15) 98.8 (47.21-2.15)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	0.11	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.34 (at 2.16Å)	Xtriage
Refinement program	PHENIX (phenix.refine: dev_1370)	Depositor
R, $R_{free}$	0.208 , 0.240 0.210 , 0.242	Depositor DCC
$R_{free}$ test set	4812 reflections (5.28%)	DCC
Wilson B-factor (Å <sup>2</sup> )	25.7	Xtriage
Anisotropy	0.270	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 48.9	EDS
Estimated twinning fraction	0.017 for -h,-k,l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Outliers	0 of 96118 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	10812	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.07% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: MG, 1SV, POP

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	0.22	0/2509	0.38	0/3396
1	B	0.21	0/2509	0.37	0/3396
1	C	0.21	0/2509	0.38	0/3396
1	D	0.21	0/2509	0.38	0/3396
All	All	0.21	0/10036	0.38	0/13584

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	2454	0	2426	16	0
1	B	2454	0	2426	12	0
1	C	2454	0	2426	14	0
1	D	2454	0	2425	22	0
2	A	3	0	0	0	0
2	B	3	0	0	0	0
2	C	3	0	0	0	0
2	D	3	0	0	0	0
3	A	9	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	9	0	0	1	0
3	C	9	0	0	0	0
3	D	9	0	0	2	0
4	A	14	0	22	1	0
4	B	14	0	22	1	0
4	C	14	0	22	1	0
4	D	14	0	22	1	0
5	A	308	0	0	6	0
5	B	308	0	0	3	0
5	C	180	0	0	0	0
5	D	96	0	0	1	0
All	All	10812	0	9791	62	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 3.

All (62) 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:106:SER:O	1:D:130:ARG:NH1	2.27	0.68
1:A:107:ARG:NH1	5:A:1050:HOH:O	2.30	0.65
1:B:35:LEU:O	1:B:46:ARG:NH2	2.30	0.65
1:A:8:LEU:N	5:A:909:HOH:O	2.31	0.63
1:A:165:TYR:CZ	1:A:169:ARG:HG3	2.36	0.61
1:B:134:ARG:NH2	1:B:138:ASP:OD2	2.35	0.59
1:D:165:TYR:CZ	1:D:169:ARG:HG3	2.39	0.58
1:D:275:LEU:HD21	1:D:285:LEU:HD23	1.85	0.58
1:D:35:LEU:O	1:D:46:ARG:NH2	2.37	0.57
1:A:56:ARG:NH1	5:A:1040:HOH:O	2.39	0.56
1:A:57:VAL:HG22	1:A:302:TRP:CE2	2.41	0.55
1:D:156:ARG:NH2	5:D:587:HOH:O	2.39	0.55
1:C:307:LEU:HA	1:C:310:SER:HB2	1.90	0.54
1:D:197:ARG:HH21	1:D:280:LEU:HD12	1.74	0.53
1:C:57:VAL:HG22	1:C:302:TRP:CE2	2.44	0.53
1:A:36:GLN:NE2	5:A:929:HOH:O	2.41	0.52
1:A:259:VAL:HG21	1:B:259:VAL:HG21	1.91	0.52
1:A:134:ARG:NE	1:A:138:ASP:OD2	2.43	0.52
1:D:193:SER:OG	1:D:197:ARG:NH1	2.43	0.51
1:D:196:GLN:HG3	1:D:199:ARG:HH12	1.75	0.51
1:D:169:ARG:NH2	3:D:401:POP:O3	2.44	0.49
1:D:186:MET:HB3	1:D:188:LEU:HD13	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:117:PRO:HA	1:C:120:TYR:CE2	2.47	0.49
1:B:183:ARG:NH1	5:B:986:HOH:O	2.40	0.49
1:D:117:PRO:HA	1:D:120:TYR:CE2	2.48	0.49
1:B:134:ARG:NH2	5:B:1015:HOH:O	2.45	0.48
1:C:248:VAL:HG21	1:D:260:MET:HE1	1.95	0.48
1:A:222:LEU:HD22	1:A:226:LYS:HE3	1.94	0.48
1:D:169:ARG:HH22	3:D:401:POP:P1	2.37	0.47
1:D:194:GLU:HB3	1:D:285:LEU:HD13	1.97	0.46
1:A:117:PRO:HA	1:A:120:TYR:CE2	2.50	0.46
1:B:213:ASN:ND2	4:B:705:1SV:H4	2.31	0.46
1:C:114:ARG:NH2	1:C:124:ASP:OD1	2.49	0.46
1:A:57:VAL:HG13	1:A:302:TRP:CD2	2.51	0.45
1:D:61:TYR:CD1	1:D:295:GLN:HB2	2.52	0.45
1:A:267:ARG:NH1	5:A:809:HOH:O	2.46	0.45
1:A:285:LEU:HA	1:A:285:LEU:HD12	1.80	0.45
1:D:15:PHE:HB3	1:D:297:SER:HB3	1.99	0.45
1:B:117:PRO:HA	1:B:120:TYR:CE2	2.53	0.44
1:C:213:ASN:ND2	4:C:405:1SV:H4	2.33	0.44
1:C:143:PRO:HB3	1:C:176:GLU:HB3	1.99	0.44
1:D:213:ASN:ND2	4:D:405:1SV:H4	2.33	0.44
1:B:25:GLU:OE1	5:B:950:HOH:O	2.21	0.43
1:A:213:ASN:ND2	4:A:705:1SV:H4	2.34	0.43
1:D:66:LEU:HD12	1:D:69:ARG:HE	1.84	0.43
1:C:9:GLU:HA	1:C:10:PRO:HD2	1.93	0.43
1:D:44:LYS:HE3	1:D:44:LYS:HB2	1.92	0.43
1:B:101:LYS:HB2	1:B:101:LYS:HE2	1.75	0.42
1:A:219:GLU:OE2	5:A:908:HOH:O	2.22	0.42
1:C:165:TYR:OH	1:C:214:ASP:OD2	2.24	0.42
1:C:165:TYR:CE1	1:C:238:SER:HB3	2.55	0.42
1:B:177:LEU:O	1:B:181:LEU:HB2	2.20	0.42
1:C:23:VAL:O	1:C:27:SER:OG	2.26	0.41
1:C:15:PHE:HB3	1:C:297:SER:HB3	2.02	0.41
1:D:177:LEU:O	1:D:181:LEU:HB2	2.20	0.41
1:B:175:LYS:HG2	1:B:206:SER:HB2	2.02	0.41
1:A:177:LEU:O	1:A:181:LEU:HB2	2.19	0.41
1:D:197:ARG:HE	1:D:280:LEU:HD12	1.85	0.41
1:C:213:ASN:O	1:C:217:SER:OG	2.35	0.41
1:B:169:ARG:NH2	3:B:704:POP:O3	2.54	0.41
1:C:57:VAL:HG22	1:C:302:TRP:NE1	2.36	0.40
1:D:57:VAL:HB	1:D:302:TRP:CD2	2.56	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	302/314 (96%)	300 (99%)	2 (1%)	0	100	100
1	B	302/314 (96%)	298 (99%)	4 (1%)	0	100	100
1	C	302/314 (96%)	295 (98%)	7 (2%)	0	100	100
1	D	302/314 (96%)	298 (99%)	4 (1%)	0	100	100
All	All	1208/1256 (96%)	1191 (99%)	17 (1%)	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	266/276 (96%)	252 (95%)	14 (5%)	28	23
1	B	266/276 (96%)	251 (94%)	15 (6%)	26	20
1	C	266/276 (96%)	254 (96%)	12 (4%)	34	30
1	D	266/276 (96%)	256 (96%)	10 (4%)	40	37
All	All	1064/1104 (96%)	1013 (95%)	51 (5%)	31	27

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	LEU
1	A	39	ASN

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Mol	Chain	Res	Type
1	A	57	VAL
1	A	125	LEU
1	A	134	ARG
1	A	158	ARG
1	A	169	ARG
1	A	177	LEU
1	A	181	LEU
1	A	222	LEU
1	A	237	THR
1	A	258	PHE
1	A	285	LEU
1	A	301	LEU
1	B	25	GLU
1	B	86	LEU
1	B	125	LEU
1	B	167	GLU
1	B	169	ARG
1	B	181	LEU
1	B	222	LEU
1	B	237	THR
1	B	247	ASP
1	B	258	PHE
1	B	266	LEU
1	B	285	LEU
1	B	301	LEU
1	B	307	LEU
1	B	311	VAL
1	C	18	LEU
1	C	57	VAL
1	C	77	LEU
1	C	134	ARG
1	C	169	ARG
1	C	188	LEU
1	C	222	LEU
1	C	237	THR
1	C	258	PHE
1	C	278	GLU
1	C	285	LEU
1	C	301	LEU
1	D	86	LEU
1	D	125	LEU
1	D	169	ARG

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Mol	Chain	Res	Type
1	D	181	LEU
1	D	195	LEU
1	D	222	LEU
1	D	258	PHE
1	D	267	ARG
1	D	271	LEU
1	D	301	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	36	GLN
1	D	16	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 20 ligands modelled in this entry, 12 are monoatomic - leaving 8 for Mogul analysis.

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



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	POP	A	704	2	8,8,8	0.56	0	13,13,13	1.16	1 (7%)
4	1SV	A	705	-	13,15,15	0.50	0	15,22,22	1.22	2 (13%)
3	POP	B	704	2	8,8,8	0.65	0	13,13,13	1.22	1 (7%)
4	1SV	B	705	-	13,15,15	0.50	0	15,22,22	1.15	1 (6%)
3	POP	C	401	2	8,8,8	0.51	0	13,13,13	1.24	1 (7%)
4	1SV	C	405	-	13,15,15	0.50	0	15,22,22	1.06	0
3	POP	D	401	2	8,8,8	0.52	0	13,13,13	1.26	1 (7%)
4	1SV	D	405	-	13,15,15	0.78	0	15,22,22	1.46	4 (26%)

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	POP	A	704	2	-	0/6/6/6	0/0/0/0
4	1SV	A	705	-	-	0/4/28/28	0/2/2/2
3	POP	B	704	2	-	0/6/6/6	0/0/0/0
4	1SV	B	705	-	-	0/4/28/28	0/2/2/2
3	POP	C	401	2	-	0/6/6/6	0/0/0/0
4	1SV	C	405	-	-	0/4/28/28	0/2/2/2
3	POP	D	401	2	-	0/6/6/6	0/0/0/0
4	1SV	D	405	-	-	0/4/28/28	0/2/2/2

There are no bond length outliers.

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	401	POP	P2-O-P1	-3.87	121.87	132.73
3	C	401	POP	P2-O-P1	-3.85	121.91	132.73
3	A	704	POP	P2-O-P1	-3.54	122.80	132.73
3	B	704	POP	P2-O-P1	-3.50	122.91	132.73
4	D	405	1SV	C8-C7-C11	-2.11	109.31	113.32
4	D	405	1SV	C6-C7-C8	2.06	113.16	109.88
4	D	405	1SV	C12-C11-C7	2.30	121.99	116.70
4	A	705	1SV	C6-C5-C4	2.31	116.01	113.21
4	A	705	1SV	C5-C6-C7	2.34	114.98	110.94
4	D	405	1SV	C5-C6-C7	2.44	115.16	110.94
4	B	705	1SV	C5-C6-C7	2.61	115.46	110.94

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	705	1SV	1	0
3	B	704	POP	1	0
4	B	705	1SV	1	0
4	C	405	1SV	1	0
3	D	401	POP	2	0
4	D	405	1SV	1	0

## 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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	304/314 (96%)	-0.25	2 (0%) 89 91	6, 13, 26, 43	0
1	B	304/314 (96%)	-0.28	0 100 100	5, 12, 22, 34	0
1	C	304/314 (96%)	-0.08	6 (1%) 68 75	10, 20, 34, 52	0
1	D	304/314 (96%)	0.67	39 (12%) 5 8	14, 29, 52, 83	0
All	All	1216/1256 (96%)	0.01	47 (3%) 43 54	5, 18, 40, 83	0

All (47) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	280	LEU	6.0
1	D	195	LEU	4.4
1	D	197	ARG	4.4
1	D	188	LEU	3.7
1	D	283	PRO	3.7
1	D	272	VAL	3.7
1	D	270	LEU	3.6
1	D	18	LEU	3.6
1	D	282	THR	3.5
1	D	277	ALA	3.4
1	D	196	GLN	3.4
1	C	8	LEU	3.4
1	D	198	VAL	3.2
1	D	275	LEU	3.2
1	D	193	SER	3.1
1	D	110	VAL	3.0
1	D	141	LEU	2.9
1	D	145	PHE	2.9
1	D	192	PRO	2.8
1	D	276	SER	2.8
1	C	311	VAL	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	287	ALA	2.7
1	A	280	LEU	2.7
1	D	285	LEU	2.6
1	C	223	TYR	2.6
1	D	279	GLY	2.5
1	D	135	GLU	2.5
1	D	126	TRP	2.5
1	D	284	GLY	2.4
1	D	201	ILE	2.4
1	D	19	CYS	2.4
1	D	189	LYS	2.4
1	D	286	ALA	2.4
1	D	294	TYR	2.4
1	A	279	GLY	2.3
1	D	70	ILE	2.3
1	D	21	PRO	2.3
1	D	111	LEU	2.2
1	D	273	ALA	2.2
1	D	191	SER	2.2
1	D	289	VAL	2.2
1	C	16	GLN	2.1
1	D	183	ARG	2.1
1	C	279	GLY	2.1
1	D	123	TYR	2.1
1	C	9	GLU	2.0
1	D	14	THR	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
2	MG	B	701	1/1	0.98	0.14	2.05	10,10,10,10	0
2	MG	C	403	1/1	0.93	0.10	0.82	19,19,19,19	0
4	1SV	D	405	14/14	0.92	0.13	0.44	15,19,25,26	0
3	POP	B	704	9/9	0.98	0.14	0.31	6,7,10,12	0
4	1SV	C	405	14/14	0.93	0.12	0.15	12,13,15,16	0
2	MG	A	702	1/1	0.98	0.10	0.01	13,13,13,13	0
4	1SV	B	705	14/14	0.96	0.13	0.01	4,7,11,11	0
3	POP	A	704	9/9	0.99	0.11	-0.20	6,8,12,15	0
4	1SV	A	705	14/14	0.96	0.11	-0.32	6,8,10,10	0
3	POP	D	401	9/9	0.98	0.10	-0.54	11,16,20,21	0
2	MG	D	404	1/1	0.95	0.08	-1.23	21,21,21,21	0
3	POP	C	401	9/9	0.98	0.07	-1.36	12,14,15,18	0
2	MG	C	404	1/1	0.95	0.05	-1.95	13,13,13,13	0
2	MG	D	403	1/1	0.95	0.06	-3.31	18,18,18,18	0
2	MG	A	703	1/1	0.97	0.09	-	12,12,12,12	0
2	MG	B	702	1/1	0.93	0.16	-	13,13,13,13	0
2	MG	D	402	1/1	0.97	0.07	-	18,18,18,18	0
2	MG	A	701	1/1	0.98	0.16	-	12,12,12,12	0
2	MG	B	703	1/1	0.97	0.16	-	11,11,11,11	0
2	MG	C	402	1/1	0.95	0.04	-	19,19,19,19	0

## 6.5 Other polymers

There are no such residues in this entry.