



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 16, 2023 – 04:06 AM EDT

PDB ID : 1YYT
Title : D100E Trichodiene Synthase: Complex With Mg, Pyrophosphate, and (4R)-7-azabisabolene
Authors : Vedula, L.S.; Rynkiewicz, M.J.; Pyun, H.J.; Coates, R.M.; Cane, D.E.; Christianson, D.W.
Deposited on : 2005-02-25
Resolution : 2.90 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 : 2.35
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) : 2.35

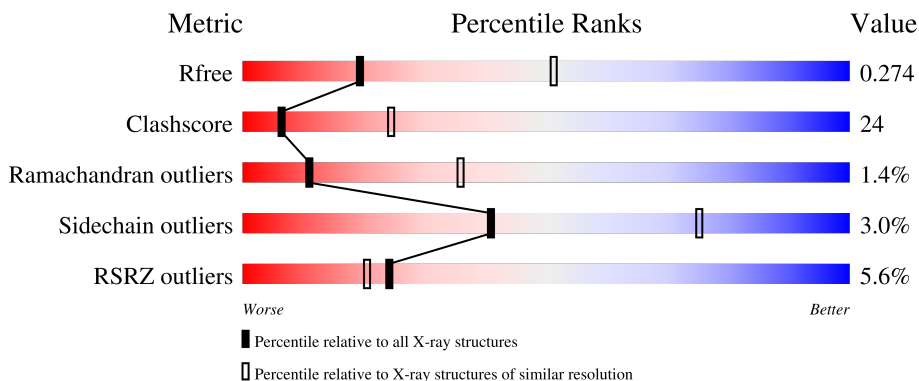
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	374	
1	B	374	

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	SAZ	A	709	X	-	-	-
2	SAZ	B	704	X	-	-	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 5994 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.

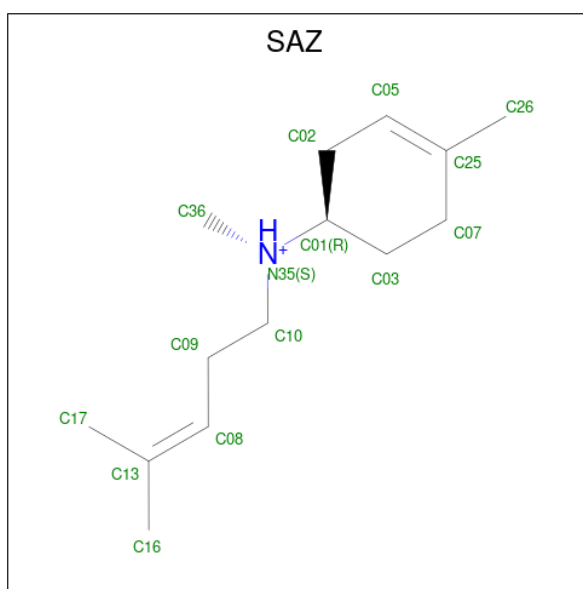
- Molecule 1 is a protein called Trichodiene synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	354	2941	1883	493	547	18	36	0	0
1	B	354	2941	1883	493	547	18	17	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	100	GLU	ASP	engineered mutation	UNP P13513
B	100	GLU	ASP	engineered mutation	UNP P13513

- Molecule 2 is (1S)-N,4-DIMETHYL-N-(4-METHYLPENT-3-ENYL)CYCLOHEX-3-ENAMINIUM (three-letter code: SAZ) (formula: C₁₄H₂₆N).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	N		
2	A	1	15	14	1	0	0

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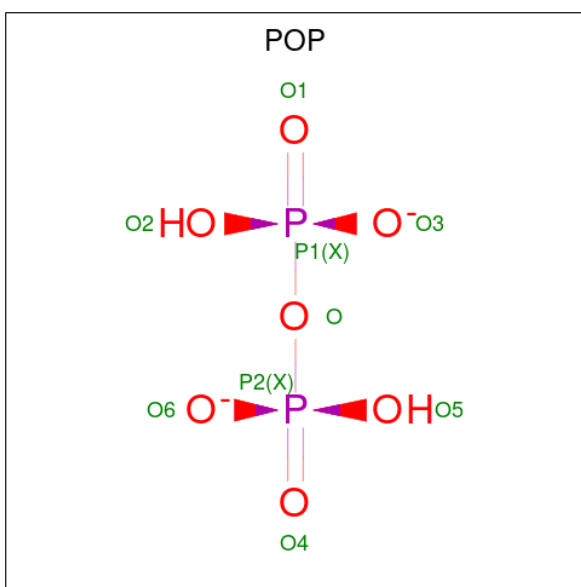
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	N	0	0
			15	14	1		

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

- Molecule 4 is PYROPHOSPHATE 2- (three-letter code: POP) (formula: H₂O₇P₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	O	P	0	0
			9	7	2		

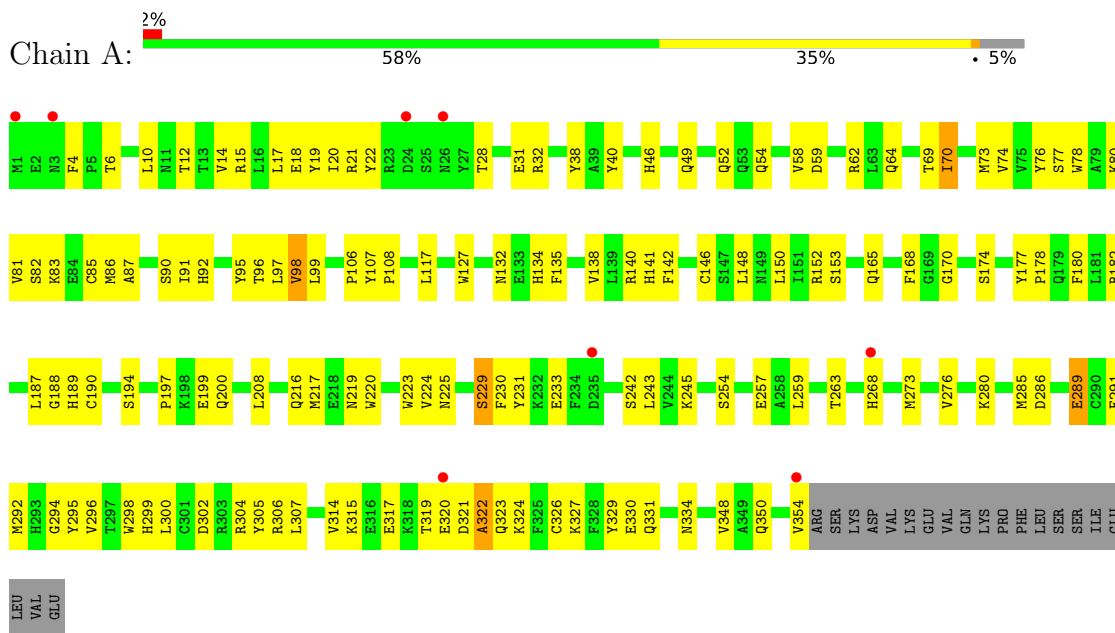
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	38	Total	O	0	0
			38	38		
5	B	33	Total	O	0	0
			33	33		

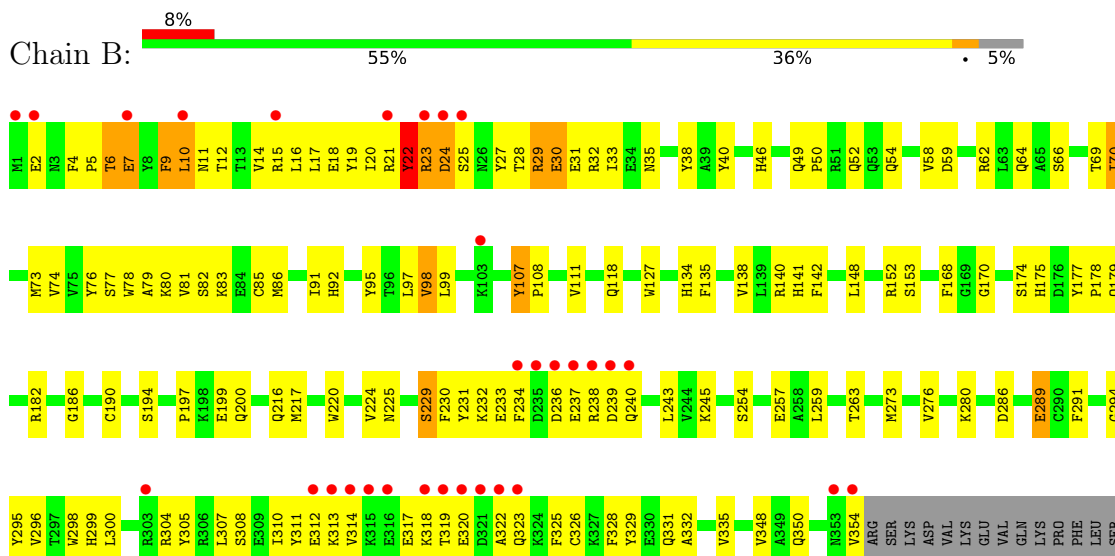
3 Residue-property plots [i](#)

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: Trichodiene synthase



• Molecule 1: Trichodiene synthase



SER
ILE
GLU
LEU
VAL
GLU

4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	122.70Å 122.70Å 151.30Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	14.00 – 2.90 13.91 – 2.90	Depositor EDS
% Data completeness (in resolution range)	97.2 (14.00-2.90) 91.7 (13.91-2.90)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.93 (at 2.90Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.225 , 0.269 0.235 , 0.274	Depositor DCC
R_{free} test set	2173 reflections (7.39%)	wwPDB-VP
Wilson B-factor (Å ²)	52.3	Xtrriage
Anisotropy	0.146	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 46.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.024 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	5994	wwPDB-VP
Average B, all atoms (Å ²)	49.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.27% of the height of the origin peak. No significant pseudotranslation is detected.*

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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: POP, MG, SAZ

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	0.40	0/3026	0.56	0/4107
1	B	0.42	1/3026 (0.0%)	0.60	0/4107
All	All	0.41	1/6052 (0.0%)	0.58	0/8214

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	9	PHE	C-N	-6.02	1.20	1.34

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	2941	0	2795	110	0
1	B	2941	0	2794	167	0
2	A	15	0	26	3	0
2	B	15	0	26	3	0
3	B	2	0	0	0	0
4	B	9	0	0	0	0
5	A	38	0	0	4	0
5	B	33	0	0	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	5994	0	5641	275	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 24.

All (275) 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:17:LEU:HD21	1:A:296:VAL:HG11	1.31	1.12
1:B:17:LEU:HD21	1:B:296:VAL:HG11	1.30	1.08
1:A:64:GLN:HE22	1:A:348:VAL:H	1.17	0.91
1:B:64:GLN:HE22	1:B:348:VAL:H	1.16	0.87
1:B:237:GLU:O	1:B:240:GLN:HG3	1.74	0.86
1:B:319:THR:HG22	1:B:320:GLU:H	1.41	0.84
1:B:17:LEU:HD22	1:B:22:TYR:CD1	2.17	0.80
1:B:317:GLU:O	1:B:323:GLN:NE2	2.18	0.77
1:B:29:ARG:HH11	1:B:29:ARG:HG3	1.49	0.76
1:A:58:VAL:HG21	1:A:98:VAL:HG13	1.67	0.76
1:A:59:ASP:HB3	1:A:62:ARG:HG3	1.68	0.76
1:B:10:LEU:HD22	1:B:325:PHE:CD1	2.21	0.76
1:B:9:PHE:O	1:B:10:LEU:HG	1.87	0.75
1:B:58:VAL:HG21	1:B:98:VAL:HG13	1.69	0.75
1:B:64:GLN:HE22	1:B:348:VAL:N	1.85	0.75
1:B:85:CYS:HA	1:B:141:HIS:CE1	2.22	0.74
1:B:300:LEU:HA	1:B:307:LEU:HD12	1.69	0.74
1:A:85:CYS:HA	1:A:141:HIS:CE1	2.22	0.74
1:A:12:THR:HG23	1:A:263:THR:HG23	1.70	0.73
1:B:59:ASP:HB3	1:B:62:ARG:HG3	1.70	0.73
1:A:225:ASN:O	1:A:229:SER:HB2	1.88	0.72
1:B:27:TYR:HB3	1:B:31:GLU:HB2	1.71	0.72
1:B:4:PHE:C	1:B:6:THR:H	1.94	0.71
1:A:225:ASN:ND2	2:A:709:SAZ:H091	2.05	0.71
1:B:326:CYS:HA	1:B:329:TYR:HB3	1.73	0.71
1:A:117:LEU:HA	5:A:723:HOH:O	1.89	0.70
1:B:14:VAL:O	1:B:18:GLU:HG3	1.90	0.70
1:B:314:VAL:HG12	1:B:314:VAL:O	1.91	0.70
1:B:225:ASN:O	1:B:229:SER:HB2	1.92	0.69
1:B:12:THR:HG23	1:B:263:THR:HG23	1.74	0.69
1:B:254:SER:OG	1:B:257:GLU:HG3	1.94	0.68
1:A:64:GLN:HE22	1:A:348:VAL:N	1.89	0.68
1:A:254:SER:OG	1:A:257:GLU:HG3	1.94	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:10:LEU:HD22	1:B:325:PHE:CG	2.32	0.65
1:A:319:THR:HB	1:A:322:ALA:HB3	1.79	0.65
1:B:10:LEU:CD2	1:B:325:PHE:CD1	2.81	0.64
1:A:58:VAL:HG21	1:A:98:VAL:CG1	2.28	0.64
1:A:38:TYR:CD2	1:A:83:LYS:HB3	2.32	0.64
1:B:38:TYR:CD2	1:B:83:LYS:HB3	2.33	0.63
1:A:28:THR:OG1	1:A:31:GLU:HG3	1.98	0.63
1:A:217:MET:CE	1:A:220:TRP:HB3	2.29	0.62
1:B:6:THR:O	1:B:10:LEU:HG	1.99	0.62
1:B:111:VAL:HA	5:B:719:HOH:O	1.99	0.62
1:B:21:ARG:O	1:B:23:ARG:N	2.31	0.62
1:A:70:ILE:HD13	1:A:97:LEU:HD22	1.80	0.62
1:B:58:VAL:HG21	1:B:98:VAL:CG1	2.29	0.62
1:B:237:GLU:O	1:B:240:GLN:CG	2.47	0.62
1:B:350:GLN:O	1:B:354:VAL:HG23	1.97	0.62
1:B:73:MET:SD	2:B:704:SAZ:H163	2.40	0.61
1:A:14:VAL:O	1:A:18:GLU:HG3	2.01	0.61
1:B:300:LEU:HD23	1:B:307:LEU:HD13	1.83	0.61
1:B:70:ILE:HD13	1:B:97:LEU:HD22	1.82	0.61
1:A:12:THR:CG2	1:A:263:THR:HG23	2.31	0.60
1:B:325:PHE:O	1:B:329:TYR:HB2	2.02	0.60
1:B:168:PHE:CE2	1:B:170:GLY:HA2	2.38	0.59
1:B:308:SER:HA	1:B:329:TYR:OH	2.02	0.59
1:B:10:LEU:O	1:B:14:VAL:HG23	2.03	0.59
1:B:27:TYR:OH	1:B:79:ALA:HA	2.02	0.59
1:B:186:GLY:O	2:B:704:SAZ:H362	2.03	0.59
1:B:319:THR:HG22	1:B:320:GLU:N	2.16	0.59
1:A:82:SER:O	1:A:86:MET:HG3	2.03	0.58
1:B:29:ARG:HG3	1:B:29:ARG:NH1	2.16	0.58
1:A:225:ASN:HD22	1:A:299:HIS:HE1	1.50	0.58
1:B:82:SER:O	1:B:86:MET:HG3	2.03	0.57
1:B:308:SER:O	1:B:311:TYR:HB3	2.04	0.57
1:A:300:LEU:HA	1:A:307:LEU:HD12	1.86	0.57
1:A:350:GLN:O	1:A:354:VAL:HG23	2.03	0.57
1:B:237:GLU:C	1:B:239:ASP:H	2.08	0.57
1:B:225:ASN:HD22	1:B:299:HIS:HE1	1.53	0.57
1:B:313:LYS:HG2	1:B:313:LYS:O	2.04	0.57
1:A:220:TRP:CZ2	1:A:224:VAL:HG21	2.40	0.57
1:A:10:LEU:HD11	1:A:314:VAL:HG21	1.86	0.56
1:A:168:PHE:CE2	1:A:170:GLY:HA2	2.41	0.56
1:A:96:THR:OG1	2:A:709:SAZ:H263	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:140:ARG:HG3	1:B:141:HIS:HD2	1.71	0.56
1:B:179:GLN:HG2	5:B:709:HOH:O	2.05	0.56
1:B:326:CYS:HA	1:B:329:TYR:CB	2.35	0.56
1:A:217:MET:HE2	1:A:220:TRP:HE3	1.70	0.56
1:B:27:TYR:H	1:B:32:ARG:HH12	1.52	0.56
1:A:10:LEU:O	1:A:14:VAL:HG23	2.06	0.56
1:A:220:TRP:CE2	1:A:224:VAL:HG21	2.41	0.55
1:B:9:PHE:O	1:B:10:LEU:CG	2.54	0.55
1:B:328:PHE:HA	1:B:331:GLN:NE2	2.21	0.55
1:B:217:MET:HE1	1:B:220:TRP:HB3	1.89	0.55
1:B:304:ARG:HD3	1:B:305:TYR:CZ	2.42	0.55
1:B:59:ASP:HB3	1:B:62:ARG:CG	2.36	0.55
1:B:199:GLU:HB2	5:B:706:HOH:O	2.06	0.55
1:B:217:MET:HE2	1:B:220:TRP:HE3	1.72	0.55
1:B:240:GLN:O	1:B:245:LYS:HD2	2.05	0.55
1:B:4:PHE:HE2	1:B:9:PHE:HB3	1.71	0.55
1:A:217:MET:CE	1:A:220:TRP:HE3	2.20	0.55
1:B:220:TRP:CZ2	1:B:224:VAL:HG21	2.42	0.55
1:A:17:LEU:HD22	1:A:22:TYR:CG	2.41	0.54
1:B:27:TYR:CE2	1:B:35:ASN:ND2	2.76	0.54
1:A:276:VAL:O	1:A:280:LYS:HD3	2.07	0.54
1:B:4:PHE:O	1:B:6:THR:N	2.30	0.54
1:B:217:MET:CE	1:B:220:TRP:HB3	2.38	0.54
1:B:140:ARG:HG3	1:B:141:HIS:CD2	2.43	0.54
1:A:140:ARG:HG3	1:A:141:HIS:HD2	1.73	0.54
1:B:80:LYS:HE2	1:B:286:ASP:OD2	2.08	0.53
1:A:188:GLY:N	5:A:735:HOH:O	2.41	0.53
1:A:327:LYS:O	1:A:331:GLN:HG3	2.08	0.53
1:B:4:PHE:HE2	1:B:9:PHE:CB	2.21	0.53
1:B:4:PHE:C	1:B:6:THR:N	2.62	0.53
1:B:276:VAL:O	1:B:280:LYS:HD3	2.09	0.53
1:B:76:TYR:O	1:B:294:GLY:HA3	2.09	0.53
1:A:225:ASN:ND2	1:A:299:HIS:HE1	2.07	0.52
1:A:304:ARG:HD3	1:A:305:TYR:CZ	2.44	0.52
1:A:148:LEU:O	1:A:152:ARG:HG3	2.09	0.52
1:A:140:ARG:HG3	1:A:141:HIS:CD2	2.44	0.52
1:A:17:LEU:CD2	1:A:296:VAL:HG11	2.20	0.52
1:A:76:TYR:O	1:A:294:GLY:HA3	2.09	0.52
1:B:314:VAL:HG13	1:B:322:ALA:HB1	1.92	0.52
1:B:220:TRP:CE2	1:B:224:VAL:HG21	2.44	0.51
1:A:87:ALA:O	1:A:90:SER:HB2	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:217:MET:CE	1:B:220:TRP:HE3	2.23	0.51
1:B:27:TYR:HE2	1:B:35:ASN:ND2	2.08	0.51
2:A:709:SAZ:H01	2:A:709:SAZ:H162	1.93	0.51
1:B:225:ASN:ND2	1:B:299:HIS:HE1	2.09	0.51
1:A:85:CYS:CA	1:A:141:HIS:CE1	2.92	0.51
1:B:17:LEU:CD2	1:B:296:VAL:HG11	2.21	0.51
1:B:17:LEU:O	1:B:22:TYR:HB2	2.11	0.51
1:B:28:THR:O	1:B:30:GLU:N	2.44	0.51
1:B:107:TYR:HB3	1:B:108:PRO:CD	2.41	0.50
1:A:219:ASN:HB3	1:A:223:TRP:CZ3	2.46	0.50
1:A:217:MET:HE1	1:A:220:TRP:HB3	1.93	0.50
1:A:59:ASP:HB3	1:A:62:ARG:CG	2.39	0.50
1:B:230:PHE:CE2	1:B:259:LEU:HD22	2.45	0.50
1:A:208:LEU:HD22	1:B:168:PHE:CG	2.47	0.50
1:A:32:ARG:HG3	1:A:32:ARG:HH11	1.77	0.50
1:A:177:TYR:HB3	1:A:178:PRO:HD3	1.94	0.50
1:B:77:SER:HB3	1:B:291:PHE:CD1	2.46	0.50
1:B:307:LEU:HD22	1:B:310:ILE:HD12	1.94	0.50
1:A:217:MET:CE	1:A:220:TRP:CE3	2.95	0.49
1:B:85:CYS:CA	1:B:141:HIS:CE1	2.93	0.49
1:A:77:SER:HB3	1:A:291:PHE:CD1	2.47	0.49
1:A:217:MET:HE3	1:A:220:TRP:HB3	1.93	0.49
1:B:217:MET:CE	1:B:220:TRP:CE3	2.96	0.49
1:B:232:LYS:O	1:B:233:GLU:HG3	2.12	0.49
1:B:46:HIS:O	1:B:49:GLN:HG3	2.12	0.49
1:A:216:GLN:NE2	1:B:174:SER:OG	2.45	0.49
2:B:704:SAZ:C08	2:B:704:SAZ:H01	2.42	0.49
1:A:78:TRP:O	1:A:81:VAL:HG22	2.13	0.49
1:B:27:TYR:HB2	1:B:32:ARG:HG3	1.93	0.49
1:A:99:LEU:HD13	1:A:127:TRP:CG	2.47	0.48
1:A:4:PHE:CE1	1:A:231:TYR:HA	2.48	0.48
1:B:16:LEU:O	1:B:20:ILE:HG23	2.12	0.48
1:B:78:TRP:O	1:B:81:VAL:HG22	2.13	0.48
1:B:10:LEU:HD21	1:B:310:ILE:CG2	2.44	0.48
1:B:25:SER:OG	1:B:335:VAL:HG21	2.14	0.48
1:A:58:VAL:CG2	1:A:98:VAL:HG13	2.40	0.48
1:A:233:GLU:HG2	5:A:739:HOH:O	2.13	0.48
1:A:107:TYR:HB3	1:A:108:PRO:CD	2.44	0.48
1:A:315:LYS:HA	1:A:326:CYS:SG	2.54	0.48
1:A:319:THR:HB	1:A:322:ALA:CB	2.43	0.48
1:B:28:THR:O	1:B:31:GLU:N	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:148:LEU:O	1:B:152:ARG:HG3	2.13	0.48
1:B:28:THR:HG23	1:B:31:GLU:OE1	2.14	0.48
1:A:70:ILE:CD1	1:A:97:LEU:HD22	2.44	0.48
1:B:230:PHE:HE2	1:B:259:LEU:HD22	1.79	0.48
1:B:236:ASP:OD1	1:B:238:ARG:HB2	2.14	0.47
1:A:295:TYR:O	1:A:299:HIS:HD2	1.97	0.47
1:A:152:ARG:NH2	1:A:189:HIS:ND1	2.62	0.47
1:A:314:VAL:HG13	1:A:322:ALA:HB1	1.96	0.47
1:A:319:THR:HG22	1:A:320:GLU:N	2.29	0.47
1:B:15:ARG:O	1:B:19:TYR:HD1	1.97	0.47
1:A:217:MET:HE1	1:A:220:TRP:CE3	2.50	0.47
1:B:4:PHE:CE1	1:B:231:TYR:HA	2.50	0.47
1:B:4:PHE:HE1	1:B:231:TYR:HA	1.78	0.47
1:B:58:VAL:CG2	1:B:98:VAL:HG13	2.40	0.47
1:B:232:LYS:C	1:B:233:GLU:HG3	2.35	0.47
1:B:99:LEU:HD13	1:B:127:TRP:CG	2.50	0.47
1:A:20:ILE:O	1:A:21:ARG:HB2	2.14	0.47
1:B:318:LYS:HA	1:B:323:GLN:HE21	1.80	0.47
1:A:69:THR:CG2	1:A:298:TRP:HZ2	2.28	0.46
1:B:23:ARG:NH2	1:B:289:GLU:OE2	2.47	0.46
1:A:15:ARG:O	1:A:19:TYR:HD1	1.96	0.46
1:A:317:GLU:O	1:A:323:GLN:HG3	2.15	0.46
1:A:321:ASP:O	1:A:324:LYS:N	2.49	0.46
1:A:285:MET:CE	1:A:289:GLU:HB2	2.45	0.46
1:B:50:PRO:HD2	5:B:711:HOH:O	2.16	0.46
1:A:73:MET:HB2	1:A:298:TRP:CZ2	2.51	0.45
1:A:300:LEU:HD23	1:A:307:LEU:HD13	1.98	0.45
1:A:46:HIS:O	1:A:52:GLN:HG3	2.16	0.45
1:B:12:THR:CG2	1:B:263:THR:HG23	2.44	0.45
1:A:49:GLN:HB2	1:A:52:GLN:HG2	1.98	0.45
1:B:25:SER:OG	1:B:335:VAL:HG11	2.17	0.45
1:B:4:PHE:CE2	1:B:9:PHE:CD2	3.05	0.45
1:B:314:VAL:O	1:B:314:VAL:CG1	2.63	0.45
1:B:99:LEU:HB2	1:B:127:TRP:NE1	2.31	0.45
1:B:4:PHE:HA	1:B:234:PHE:CZ	2.52	0.45
1:B:28:THR:O	1:B:29:ARG:C	2.55	0.45
1:B:14:VAL:HG12	1:B:18:GLU:OE2	2.17	0.45
1:B:32:ARG:HG3	1:B:32:ARG:HH11	1.83	0.44
1:B:73:MET:HB2	1:B:298:TRP:CZ2	2.52	0.44
1:B:92:HIS:HB2	1:B:138:VAL:HG21	2.00	0.44
1:A:153:SER:OG	1:A:187:LEU:HA	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:4:PHE:CE2	1:B:9:PHE:HD2	2.35	0.44
1:A:292:MET:O	1:A:296:VAL:HG23	2.17	0.44
1:A:153:SER:HB3	1:A:190:CYS:HB2	2.00	0.44
1:B:4:PHE:CZ	1:B:9:PHE:CD2	3.05	0.44
1:B:142:PHE:CE2	1:B:194:SER:HA	2.53	0.44
1:B:74:VAL:HA	1:B:78:TRP:CE3	2.53	0.44
1:B:12:THR:O	1:B:15:ARG:HB2	2.18	0.43
1:B:177:TYR:HB3	1:B:178:PRO:HD3	2.00	0.43
1:A:177:TYR:O	1:A:180:PHE:HB3	2.18	0.43
1:A:199:GLU:HB3	1:A:200:GLN:NE2	2.33	0.43
1:B:11:ASN:O	1:B:15:ARG:HG2	2.18	0.43
1:A:182:ARG:HB2	1:A:243:LEU:HD13	1.99	0.43
1:A:40:TYR:C	1:A:40:TYR:CD2	2.92	0.43
1:A:320:GLU:O	1:A:324:LYS:HB2	2.18	0.43
1:B:329:TYR:CD1	1:B:329:TYR:C	2.92	0.43
1:A:99:LEU:HB2	1:A:127:TRP:NE1	2.34	0.43
1:A:230:PHE:CZ	1:A:259:LEU:HD22	2.54	0.43
1:B:10:LEU:CD2	1:B:325:PHE:CE1	3.02	0.43
1:A:146:CYS:O	1:A:150:LEU:HD12	2.19	0.43
1:A:314:VAL:CG1	1:A:322:ALA:HB1	2.49	0.43
1:B:5:PRO:O	1:B:7:GLU:N	2.51	0.43
1:B:237:GLU:C	1:B:239:ASP:N	2.73	0.43
1:B:23:ARG:HG3	1:B:23:ARG:HH11	1.84	0.42
1:A:132:ASN:HB3	1:B:118:GLN:OE1	2.18	0.42
1:A:225:ASN:HD22	1:A:299:HIS:CE1	2.34	0.42
1:B:52:GLN:OE1	1:B:95:TYR:OH	2.38	0.42
1:B:295:TYR:O	1:B:299:HIS:HD2	2.03	0.42
1:B:319:THR:CG2	1:B:320:GLU:H	2.23	0.42
1:A:321:ASP:O	1:A:322:ALA:C	2.58	0.42
1:B:217:MET:HE2	1:B:220:TRP:CE3	2.52	0.42
1:B:329:TYR:O	1:B:332:ALA:HB3	2.19	0.42
1:A:74:VAL:HA	1:A:78:TRP:CE3	2.53	0.42
1:B:310:ILE:CG2	1:B:325:PHE:CZ	3.03	0.42
1:A:52:GLN:OE1	1:A:95:TYR:OH	2.37	0.42
1:A:330:GLU:O	1:A:334:ASN:ND2	2.53	0.42
1:A:302:ASP:OD1	1:A:304:ARG:HB2	2.20	0.42
1:B:69:THR:CG2	1:B:298:TRP:HZ2	2.33	0.42
1:B:237:GLU:OE1	1:B:237:GLU:HA	2.20	0.42
1:B:314:VAL:CG1	1:B:322:ALA:HB1	2.49	0.42
1:A:242:SER:OG	1:A:245:LYS:HG3	2.20	0.42
1:B:49:GLN:HB2	1:B:52:GLN:HG2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:66:SER:HB3	1:B:97:LEU:HD23	2.02	0.42
1:B:153:SER:HB3	1:B:190:CYS:HB2	2.02	0.42
1:B:46:HIS:O	1:B:52:GLN:HG3	2.19	0.42
1:A:92:HIS:HB2	1:A:138:VAL:HG21	2.01	0.41
1:B:328:PHE:O	1:B:329:TYR:C	2.58	0.41
1:A:291:PHE:O	1:A:295:TYR:HB2	2.20	0.41
1:B:217:MET:HE1	1:B:220:TRP:CE3	2.56	0.41
1:B:312:GLU:OE1	1:B:312:GLU:HA	2.20	0.41
1:A:70:ILE:HD13	1:A:97:LEU:CD2	2.49	0.41
1:A:80:LYS:HE2	1:A:286:ASP:OD2	2.21	0.41
1:B:40:TYR:CD2	1:B:40:TYR:C	2.94	0.41
1:B:27:TYR:HB2	1:B:32:ARG:NH1	2.36	0.41
1:A:81:VAL:HG12	1:A:197:PRO:HG2	2.03	0.41
1:A:106:PRO:HD3	1:A:165:GLN:OE1	2.21	0.41
1:A:142:PHE:CE2	1:A:194:SER:HA	2.55	0.41
1:B:22:TYR:C	1:B:23:ARG:O	2.59	0.41
1:A:329:TYR:C	1:A:329:TYR:CD1	2.94	0.41
1:B:70:ILE:CD1	1:B:97:LEU:HD22	2.50	0.41
1:B:81:VAL:HG12	1:B:197:PRO:HG2	2.03	0.41
1:B:182:ARG:HB2	1:B:243:LEU:HD13	2.02	0.41
1:B:199:GLU:HB3	1:B:200:GLN:NE2	2.36	0.41
1:B:91:ILE:HG21	1:B:134:HIS:NE2	2.36	0.41
1:B:107:TYR:HB3	1:B:108:PRO:HD3	2.03	0.41
1:A:14:VAL:HG12	1:A:18:GLU:OE2	2.21	0.40
1:A:91:ILE:HD12	5:A:714:HOH:O	2.20	0.40
1:A:174:SER:OG	1:B:216:GLN:NE2	2.54	0.40
1:B:28:THR:OG1	1:B:31:GLU:HG3	2.21	0.40
1:B:17:LEU:HD13	1:B:22:TYR:CD1	2.56	0.40
1:B:4:PHE:HA	1:B:5:PRO:HD3	1.95	0.40
1:B:17:LEU:HD23	1:B:17:LEU:HA	1.84	0.40
1:B:24:ASP:HB3	1:B:25:SER:H	1.68	0.40
1:B:29:ARG:O	1:B:33:ILE:HG13	2.21	0.40
1:B:175:HIS:O	1:B:178:PRO:HD2	2.22	0.40
1:B:319:THR:HB	1:B:322:ALA:H	1.85	0.40
1:A:91:ILE:HG21	1:A:134:HIS:NE2	2.37	0.40
1:B:29:ARG:NH1	1:B:29:ARG:CG	2.79	0.40
1:B:328:PHE:O	1:B:331:GLN:HB2	2.22	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	352/374 (94%)	321 (91%)	29 (8%)	2 (1%)	25	58
1	B	352/374 (94%)	308 (88%)	36 (10%)	8 (2%)	6	23
All	All	704/748 (94%)	629 (89%)	65 (9%)	10 (1%)	11	36

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	6	THR
1	B	22	TYR
1	B	24	ASP
1	B	2	GLU
1	B	10	LEU
1	B	23	ARG
1	B	29	ARG
1	A	306	ARG
1	A	322	ALA
1	B	107	TYR

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	320/340 (94%)	311 (97%)	9 (3%)	43	76
1	B	320/340 (94%)	310 (97%)	10 (3%)	40	74
All	All	640/680 (94%)	621 (97%)	19 (3%)	41	75

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	THR
1	A	54	GLN
1	A	70	ILE
1	A	98	VAL
1	A	135	PHE
1	A	229	SER
1	A	268	HIS
1	A	273	MET
1	A	289	GLU
1	B	7	GLU
1	B	22	TYR
1	B	30	GLU
1	B	54	GLN
1	B	70	ILE
1	B	98	VAL
1	B	135	PHE
1	B	229	SER
1	B	273	MET
1	B	289	GLU

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

Mol	Chain	Res	Type
1	A	49	GLN
1	A	64	GLN
1	A	68	GLN
1	A	137	ASN
1	A	175	HIS
1	A	200	GLN
1	A	216	GLN
1	A	219	ASN
1	A	225	ASN
1	A	256	HIS
1	A	264	GLN
1	A	299	HIS
1	A	331	GLN
1	A	334	ASN
1	A	350	GLN
1	B	49	GLN
1	B	64	GLN
1	B	68	GLN

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Mol	Chain	Res	Type
1	B	137	ASN
1	B	175	HIS
1	B	216	GLN
1	B	264	GLN
1	B	299	HIS
1	B	331	GLN
1	B	350	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 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 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	SAZ	B	704	-	14,15,15	2.18	4 (28%)	18,19,19	1.39	3 (16%)
4	POP	B	700	3	6,8,8	1.48	1 (16%)	13,13,13	1.72	1 (7%)
2	SAZ	A	709	-	14,15,15	2.16	4 (28%)	18,19,19	1.31	3 (16%)

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	SAZ	B	704	-	1/1/4/6	5/10/20/20	0/1/1/1
4	POP	B	700	3	-	0/6/6/6	-
2	SAZ	A	709	-	1/1/4/6	3/10/20/20	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	709	SAZ	C05-C25	5.73	1.53	1.33
2	B	704	SAZ	C05-C25	5.66	1.53	1.33
2	B	704	SAZ	C07-C25	-3.04	1.37	1.49
2	A	709	SAZ	C07-C25	-2.87	1.38	1.49
2	B	704	SAZ	C02-C05	2.73	1.56	1.50
2	A	709	SAZ	C02-C05	2.68	1.56	1.50
4	B	700	POP	P2-O6	-2.54	1.45	1.54
2	A	709	SAZ	C02-C01	2.54	1.57	1.52
2	B	704	SAZ	C02-C01	2.44	1.56	1.52

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	700	POP	O2-P1-O	5.22	122.13	104.64
2	A	709	SAZ	C03-C07-C25	2.79	123.59	113.89
2	B	704	SAZ	C36-N35-C10	-2.74	106.49	110.53
2	B	704	SAZ	C03-C07-C25	2.74	123.41	113.89
2	A	709	SAZ	C02-C05-C25	-2.73	113.11	124.21
2	B	704	SAZ	C02-C05-C25	-2.64	113.47	124.21
2	A	709	SAZ	C36-N35-C10	-2.01	107.56	110.53

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	709	SAZ	C01
2	B	704	SAZ	C01

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	709	SAZ	C03-C01-N35-C36
2	A	709	SAZ	C08-C09-C10-N35

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Mol	Chain	Res	Type	Atoms
2	B	704	SAZ	C02-C01-N35-C10
2	B	704	SAZ	C02-C01-N35-C36
2	B	704	SAZ	C03-C01-N35-C10
2	B	704	SAZ	C08-C09-C10-N35
2	A	709	SAZ	C02-C01-N35-C36
2	B	704	SAZ	C03-C01-N35-C36

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	704	SAZ	3	0
2	A	709	SAZ	3	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	B	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	B	9:PHE	C	10:LEU	N	1.20

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, 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	350/374 (93%)	-0.41	8 (2%) 60 58	27, 44, 73, 95	0
1	B	352/374 (94%)	0.01	31 (8%) 10 7	20, 44, 106, 134	0
All	All	702/748 (93%)	-0.20	39 (5%) 24 20	20, 44, 88, 134	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	235	ASP	5.9
1	B	315	LYS	5.4
1	B	316	GLU	5.4
1	B	2	GLU	5.4
1	B	239	ASP	5.2
1	B	319	THR	5.1
1	B	238	ARG	5.0
1	B	237	GLU	4.9
1	B	323	GLN	4.4
1	B	24	ASP	4.0
1	B	318	LYS	3.9
1	B	1	MET	3.8
1	B	322	ALA	3.8
1	B	312	GLU	3.8
1	B	240	GLN	3.5
1	A	1	MET	3.4
1	B	354	VAL	3.3
1	B	303	ARG	3.2
1	B	25	SER	2.9
1	B	353	ASN	2.8
1	B	10	LEU	2.7
1	B	23	ARG	2.7
1	B	314	VAL	2.7
1	A	354	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	236	ASP	2.6
1	B	103	LYS	2.6
1	B	320	GLU	2.5
1	B	15	ARG	2.4
1	B	321	ASP	2.4
1	A	268	HIS	2.4
1	A	320	GLU	2.3
1	B	234	PHE	2.3
1	B	7	GLU	2.2
1	A	235	ASP	2.1
1	B	21	ARG	2.1
1	A	26	ASN	2.1
1	A	3	ASN	2.1
1	A	24	ASP	2.1
1	B	313	LYS	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, 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
3	MG	B	701	1/1	0.77	0.12	114,114,114,114	0
2	SAZ	A	709	15/15	0.79	0.33	74,76,78,78	0
2	SAZ	B	704	15/15	0.86	0.29	73,76,77,78	0
3	MG	B	702	1/1	0.94	0.09	33,33,33,33	0
4	POP	B	700	9/9	0.95	0.19	106,107,108,108	0

6.5 Other polymers [i](#)

There are no such residues in this entry.