



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 09:09 AM GMT

PDB ID : 3HEG
Title : P38 in complex with Sorafenib
Authors : Namboodiri, H.V.; Karpusas, M.
Deposited on : 2009-05-08
Resolution : 2.20 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
<http://wwpdb.org/validation/2016/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 : 1.7 (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

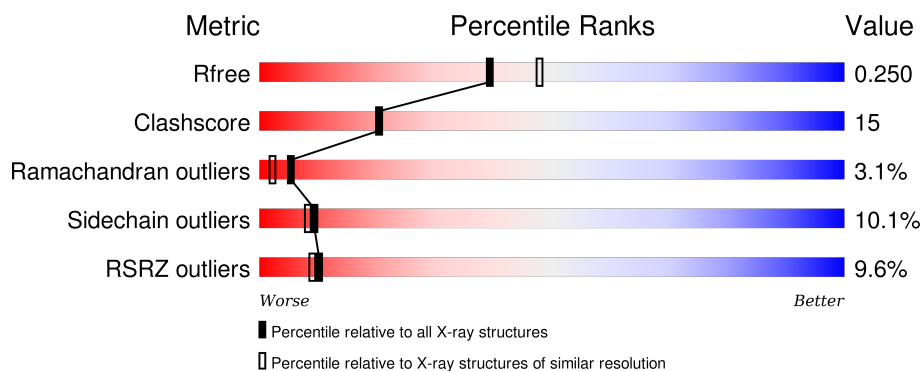
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	3774 (2.20-2.20)
Clashscore	102246	4477 (2.20-2.20)
Ramachandran outliers	100387	4404 (2.20-2.20)
Sidechain outliers	100360	4405 (2.20-2.20)
RSRZ outliers	91569	3781 (2.20-2.20)

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. 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	348	<div> <div>9%</div> <div>65%</div> <div>24%</div> <div>6%</div> <div>• •</div> </div>

2 Entry composition (i)

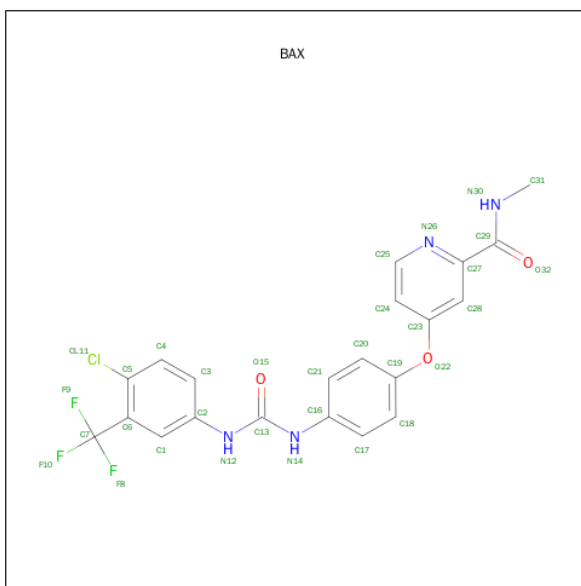
There are 3 unique types of molecules in this entry. The entry contains 2845 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Mitogen-activated protein kinase 14.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	333	Total	C	N	O	S	0	2	0
			2704	1739	463	490	12			

- Molecule 2 is 4-{4-[(4-CHLORO-3-(TRIFLUOROMETHYL)PHENYL)AMINO]CARBONYL)AMINO]PHENOXY}-N-METHYLPYRIDINE-2-CARBOXAMIDE (three-letter code: BAX) (formula: $C_{21}H_{16}ClF_3N_4O_3$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	Cl	F	N	O	0	0
			32	21	1	3	4	3		

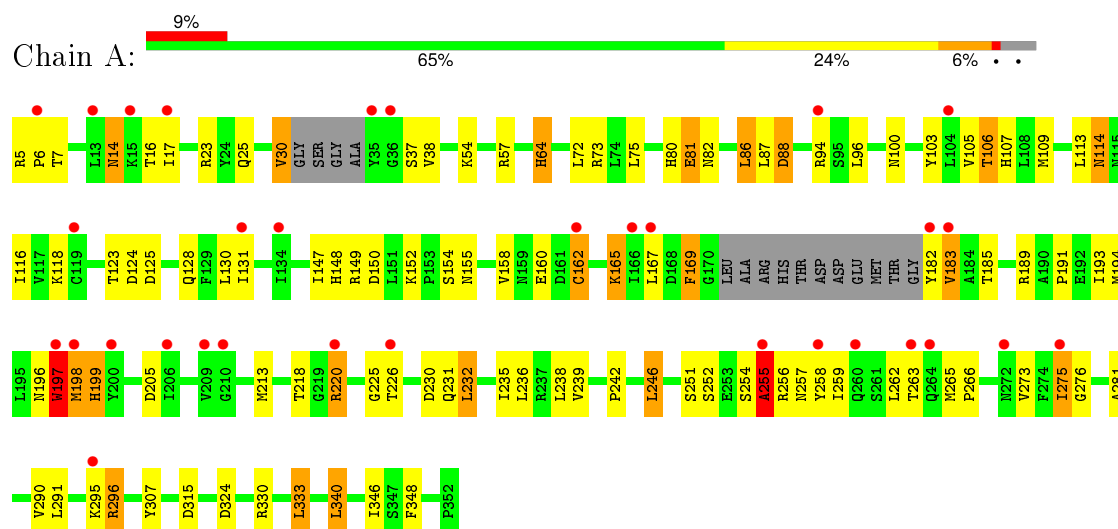
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	109	Total O 109 109	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: Mitogen-activated protein kinase 14



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	65.49Å 74.25Å 77.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.20 25.06 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.3 (40.00-2.20) 99.5 (25.06-2.40)	Depositor EDS
R_{merge}	0.86	Depositor
R_{sym}	0.64	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.29 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.236 , 0.309 0.233 , 0.250	Depositor DCC
R_{free} test set	1173 reflections (8.29%)	DCC
Wilson B-factor (Å ²)	40.1	Xtriage
Anisotropy	0.424	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 37.3	EDS
Estimated twinning fraction	0.032 for -h,l,k	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	0 of 15320 reflections	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	2845	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.16% 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, 0.375 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: BAX

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	0.73	1/2772 (0.0%)	0.83	8/3761 (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	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	162	CYS	CB-SG	11.93	2.02	1.82

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	88	ASP	CB-CG-OD2	5.58	123.33	118.30
1	A	296	ARG	NE-CZ-NH2	-5.51	117.55	120.30
1	A	255	ALA	N-CA-C	5.51	125.87	111.00
1	A	333	LEU	CA-CB-CG	5.41	127.73	115.30
1	A	296	ARG	NE-CZ-NH1	5.28	122.94	120.30
1	A	340	LEU	CA-CB-CG	5.15	127.14	115.30
1	A	109	MET	CB-CG-SD	5.01	127.44	112.40
1	A	205	ASP	CB-CG-OD2	5.01	122.81	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	197	TRP	Peptide

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2704	0	2713	80	0
2	A	32	0	16	1	0
3	A	109	0	0	2	0
All	All	2845	0	2729	80	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 15.

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:162:CYS:SG	1:A:162:CYS:CB	2.02	1.47
1:A:123:THR:HG22	1:A:125:ASP:H	1.14	1.06
1:A:242:PRO:HB3	1:A:246:LEU:HD12	1.45	0.96
1:A:275:ILE:HG12	1:A:276:GLY:H	1.29	0.96
1:A:131:ILE:HG21	1:A:213:MET:HE3	1.50	0.93
1:A:106:THR:HG21	2:A:1:BAX:H24	1.58	0.84
1:A:242:PRO:HB3	1:A:246:LEU:CD1	2.07	0.84
1:A:123:THR:HG22	1:A:125:ASP:N	1.95	0.78
1:A:131:ILE:HG21	1:A:213:MET:CE	2.13	0.78
1:A:242:PRO:HG2	1:A:259:ILE:HG21	1.70	0.73
1:A:80:HIS:CD2	1:A:82:ASN:H	2.07	0.73
1:A:57:ARG:O	1:A:64:HIS:HD2	1.75	0.70
1:A:80:HIS:HD2	1:A:82:ASN:H	1.40	0.68
1:A:242:PRO:CG	1:A:259:ILE:HG21	2.25	0.67
1:A:148:HIS:HD2	1:A:150:ASP:H	1.42	0.65
1:A:235:ILE:O	1:A:239:VAL:HG22	1.97	0.64
1:A:189:ARG:HH11	1:A:193:ILE:HG21	1.63	0.64
1:A:152:LYS:HE3	1:A:154:SER:OG	2.00	0.62
1:A:131:ILE:HG13	1:A:213:MET:HE2	1.81	0.62
1:A:148:HIS:HE1	1:A:167:LEU:O	1.84	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:106:THR:HG22	1:A:107:HIS:O	2.03	0.59
1:A:275:ILE:HG12	1:A:276:GLY:N	2.12	0.59
1:A:147:ILE:HG22	1:A:149:ARG:HG3	1.86	0.58
1:A:254:SER:HB2	1:A:257:ASN:HB2	1.84	0.57
1:A:150:ASP:OD2	1:A:185:THR:HG23	2.03	0.57
1:A:182:TYR:CA	1:A:183:VAL:HG22	2.35	0.57
1:A:242:PRO:HG2	1:A:259:ILE:CG2	2.35	0.56
1:A:64:HIS:HE1	3:A:416:HOH:O	1.89	0.55
1:A:197:TRP:HD1	1:A:199:HIS:HB2	1.71	0.55
1:A:114:ASN:O	1:A:118:LYS:HG2	2.08	0.54
1:A:155:ASN:ND2	1:A:169:PHE:H	2.06	0.54
1:A:242:PRO:HD2	1:A:259:ILE:HG23	1.91	0.53
1:A:116:ILE:HG13	1:A:158:VAL:HB	1.91	0.53
1:A:197:TRP:HB3	1:A:198:MET:CA	2.39	0.52
1:A:57:ARG:O	1:A:64:HIS:CD2	2.60	0.52
1:A:198:MET:O	1:A:199:HIS:CB	2.58	0.52
1:A:275:ILE:CG1	1:A:276:GLY:H	2.06	0.52
1:A:124:ASP:O	1:A:128:GLN:HG3	2.09	0.51
1:A:242:PRO:CG	1:A:259:ILE:CG2	2.89	0.51
1:A:54:LYS:HG3	1:A:103:TYR:CE2	2.46	0.51
1:A:290:VAL:O	1:A:296:ARG:HD2	2.10	0.50
1:A:252:SER:HB3	1:A:255:ALA:HB3	1.92	0.50
1:A:252:SER:CB	1:A:255:ALA:HB3	2.41	0.50
1:A:198:MET:O	1:A:199:HIS:HB2	2.12	0.49
1:A:290:VAL:HG11	1:A:295:LYS:HB2	1.96	0.48
1:A:197:TRP:HB3	1:A:198:MET:HA	1.95	0.47
1:A:254:SER:CB	1:A:257:ASN:HB2	2.45	0.47
1:A:232:LEU:O	1:A:236:LEU:HG	2.15	0.47
1:A:14:ASN:C	1:A:16:THR:H	2.19	0.47
1:A:238:LEU:HD11	1:A:273:VAL:HG11	1.95	0.47
1:A:131:ILE:CG2	1:A:213:MET:HE3	2.34	0.47
1:A:30:VAL:HG12	1:A:38:VAL:HG12	1.96	0.46
1:A:81:GLU:O	1:A:165:LYS:HE2	2.15	0.46
1:A:246:LEU:O	1:A:246:LEU:HD22	2.16	0.45
1:A:281:ALA:HB2	1:A:307:TYR:CE1	2.52	0.45
1:A:275:ILE:CG1	1:A:276:GLY:N	2.76	0.45
1:A:226:THR:HG22	1:A:230:ASP:CB	2.48	0.44
1:A:88:ASP:HB3	1:A:105:VAL:HB	2.00	0.44
1:A:73:ARG:NH2	1:A:324:ASP:O	2.49	0.43
1:A:148:HIS:CE1	1:A:167:LEU:O	2.67	0.43
1:A:189:ARG:HD2	1:A:193:ILE:HG21	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:189:ARG:HH11	1:A:193:ILE:HD13	1.82	0.43
1:A:165:LYS:HE2	1:A:165:LYS:HB3	1.87	0.43
1:A:189:ARG:NH1	1:A:193:ILE:HG21	2.31	0.43
1:A:191:PRO:HG3	1:A:291:LEU:HD12	2.01	0.42
1:A:218:THR:HG22	1:A:220:ARG:H	1.84	0.42
1:A:252:SER:HB3	1:A:255:ALA:CB	2.48	0.42
1:A:265:MET:HA	1:A:266:PRO:HD3	1.93	0.42
1:A:194:MET:SD	1:A:231:GLN:HG2	2.59	0.42
1:A:80:HIS:HD2	1:A:82:ASN:N	2.11	0.42
1:A:254:SER:HA	1:A:257:ASN:H	1.84	0.42
1:A:155:ASN:HD21	1:A:169:PHE:H	1.67	0.42
1:A:258[A]:TYR:CZ	1:A:262:LEU:HD22	2.56	0.41
1:A:75:LEU:HB3	1:A:86:LEU:HG	2.03	0.41
1:A:315:ASP:O	3:A:400:HOH:O	2.22	0.41
1:A:150:ASP:OD2	1:A:185:THR:CG2	2.67	0.40
1:A:242:PRO:HB3	1:A:246:LEU:HD13	1.97	0.40
1:A:185:THR:CG2	1:A:189:ARG:HE	2.34	0.40
1:A:88:ASP:HA	1:A:348:PHE:CE2	2.56	0.40
1:A:5:ARG:HA	1:A:6:PRO:HD3	1.87	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	329/348 (94%)	300 (91%)	19 (6%)	10 (3%)	5 2

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	169	PHE
1	A	255	ALA

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Mol	Chain	Res	Type
1	A	183	VAL
1	A	199	HIS
1	A	23	ARG
1	A	37	SER
1	A	275	ILE
1	A	198	MET
1	A	263	THR
1	A	225	GLY

5.3.2 Protein sidechains ⓘ

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	298/308 (97%)	268 (90%)	30 (10%)	9 8

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	THR
1	A	14	ASN
1	A	17	ILE
1	A	25	GLN
1	A	30	VAL
1	A	64	HIS
1	A	72	LEU
1	A	81	GLU
1	A	86	LEU
1	A	87	LEU
1	A	94	ARG
1	A	96	LEU
1	A	100	ASN
1	A	106	THR
1	A	113	LEU
1	A	114	ASN
1	A	130	LEU
1	A	160	GLU

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Mol	Chain	Res	Type
1	A	165	LYS
1	A	196	ASN
1	A	197	TRP
1	A	220	ARG
1	A	232	LEU
1	A	246	LEU
1	A	251	SER
1	A	256	ARG
1	A	330	ARG
1	A	333	LEU
1	A	340	LEU
1	A	346	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	ASN
1	A	64	HIS
1	A	80	HIS
1	A	114	ASN
1	A	126	HIS
1	A	148	HIS
1	A	155	ASN
1	A	196	ASN
1	A	257	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 ⓘ

1 ligand is 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	BAX	A	1	-	34,34,34	1.51	5 (14%)	45,48,48	1.52	6 (13%)

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	BAX	A	1	-	-	0/24/24/24	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1	BAX	C2-N12	-3.51	1.35	1.41
2	A	1	BAX	C16-N14	-2.57	1.36	1.41
2	A	1	BAX	C13-N14	-2.54	1.33	1.37
2	A	1	BAX	C5-CL11	2.56	1.79	1.73
2	A	1	BAX	C5-C6	4.61	1.48	1.39

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1	BAX	C24-C25-N26	-4.24	119.06	123.90
2	A	1	BAX	C28-C27-N26	-2.99	119.78	123.30
2	A	1	BAX	C1-C6-C7	2.08	121.13	116.51
2	A	1	BAX	C4-C3-C2	2.19	122.75	120.28
2	A	1	BAX	C23-O22-C19	4.37	129.69	118.81
2	A	1	BAX	C25-N26-C27	4.43	122.86	116.92

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1	BAX	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, 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	333/348 (95%)	0.55	32 (9%) 10 9	21, 41, 66, 75	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	198	MET	5.3
1	A	263	THR	5.0
1	A	226	THR	4.8
1	A	200	TYR	4.6
1	A	119	CYS	4.4
1	A	183	VAL	3.8
1	A	264	GLN	3.8
1	A	275	ILE	3.7
1	A	36	GLY	3.7
1	A	258[A]	TYR	3.6
1	A	94	ARG	3.3
1	A	182	TYR	3.2
1	A	35	TYR	3.1
1	A	13	LEU	2.9
1	A	104	LEU	2.8
1	A	255	ALA	2.7
1	A	15	LYS	2.6
1	A	6	PRO	2.6
1	A	210	GLY	2.6
1	A	162	CYS	2.6
1	A	17	ILE	2.5
1	A	167	LEU	2.4
1	A	166	ILE	2.4
1	A	209	VAL	2.3
1	A	206	ILE	2.3
1	A	197	TRP	2.2
1	A	131	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	295	LYS	2.1
1	A	220	ARG	2.1
1	A	134	ILE	2.1
1	A	260	GLN	2.0
1	A	272	ASN	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, 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	LLDF	B-factors(Å ²)	Q<0.9
2	BAX	A	1	32/32	0.94	0.16	-0.25	18,29,43,45	0

6.5 Other polymers [i](#)

There are no such residues in this entry.