



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2024 – 10:41 AM EST

PDB ID : 3VUS
Title : Escherichia coli PgaB N-terminal domain
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Deposited on : 2012-07-05
Resolution : 1.65 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

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

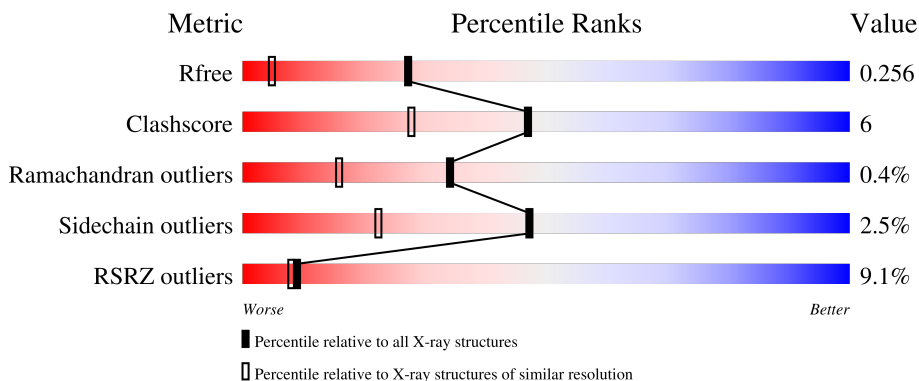
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 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	1827 (1.66-1.66)
Clashscore	141614	1931 (1.66-1.66)
Ramachandran outliers	138981	1891 (1.66-1.66)
Sidechain outliers	138945	1891 (1.66-1.66)
RSRZ outliers	127900	1791 (1.66-1.66)

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	268	
1	B	268	

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
3	ACT	B	402	-	X	-	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4445 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.

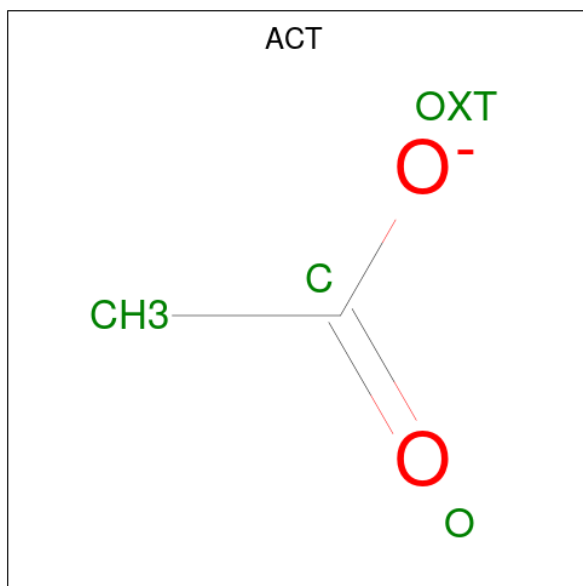
- Molecule 1 is a protein called Poly-beta-1,6-N-acetyl-D-glucosamine N-deacetylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	263	2156	1386	376	391	3	0	0	0
1	B	256	2103	1357	366	377	3	0	0	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is MERCURY (II) ION (three-letter code: HG) (formula: Hg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Hg	0	0
			1	1		

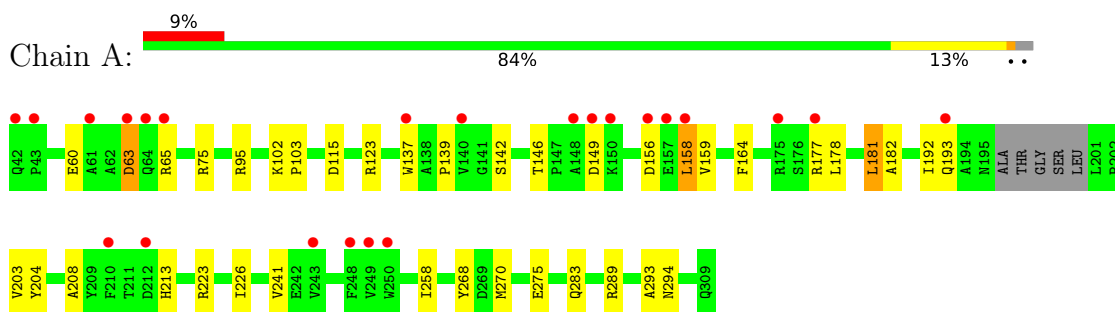
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	91	Total	O	0	0
			91	91		
5	B	84	Total	O	0	0
			84	84		

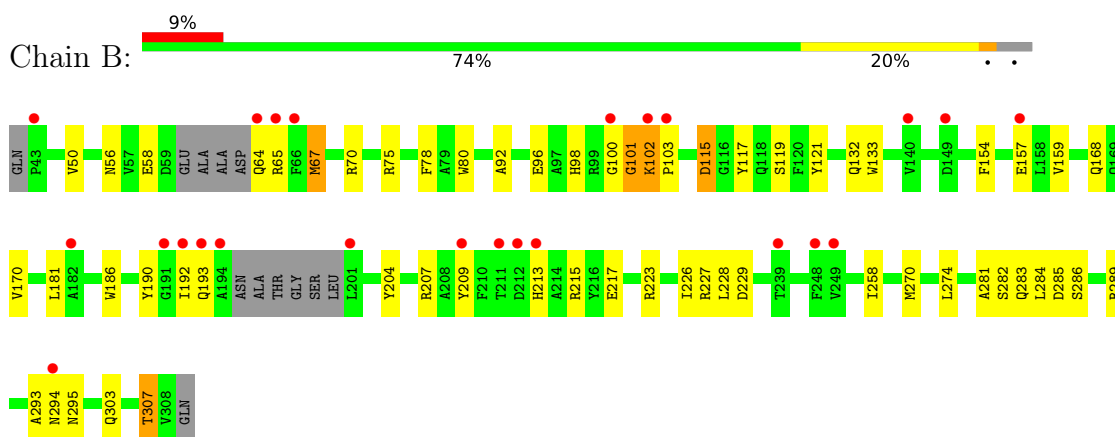
3 Residue-property plots [i](#)

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: Poly-beta-1,6-N-acetyl-D-glucosamine N-deacetylase



- Molecule 1: Poly-beta-1,6-N-acetyl-D-glucosamine N-deacetylase



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	39.56Å 53.11Å 144.17Å 90.00° 95.25° 90.00°	Depositor
Resolution (Å)	25.00 – 1.65 24.91 – 1.65	Depositor EDS
% Data completeness (in resolution range)	96.6 (25.00-1.65) 96.6 (24.91-1.65)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.75 (at 1.65Å)	Xtrriage
Refinement program	REFMAC 5.6.0119	Depositor
R, R_{free}	0.205 , 0.256 0.204 , 0.256	Depositor DCC
R_{free} test set	996 reflections (1.44%)	wwPDB-VP
Wilson B-factor (Å ²)	25.9	Xtrriage
Anisotropy	0.109	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.45 , 57.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.020 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4445	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.55% 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: ACT, HG, ZN

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	1.28	3/2219 (0.1%)	1.26	11/3023 (0.4%)
1	B	1.30	8/2165 (0.4%)	1.21	7/2947 (0.2%)
All	All	1.29	11/4384 (0.3%)	1.24	18/5970 (0.3%)

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	137	TRP	CD2-CE2	7.25	1.50	1.41
1	B	80	TRP	CD2-CE2	6.93	1.49	1.41
1	A	137	TRP	CG-CD1	6.54	1.46	1.36
1	A	268	TYR	CG-CD1	5.97	1.47	1.39
1	B	204	TYR	CG-CD2	5.88	1.46	1.39
1	B	190	TYR	CE1-CZ	5.83	1.46	1.38
1	B	133	TRP	CD2-CE2	5.75	1.48	1.41
1	B	186	TRP	CD2-CE2	5.59	1.48	1.41
1	B	119	SER	CB-OG	5.43	1.49	1.42
1	B	289	ARG	CZ-NH1	5.14	1.39	1.33
1	B	204	TYR	CE2-CZ	5.07	1.45	1.38

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	75	ARG	NE-CZ-NH1	14.97	127.78	120.30
1	A	123	ARG	NE-CZ-NH1	11.28	125.94	120.30
1	A	123	ARG	NE-CZ-NH2	-10.01	115.29	120.30
1	B	115	ASP	CB-CG-OD1	9.43	126.79	118.30
1	A	181	LEU	CB-CG-CD1	-6.98	99.13	111.00
1	B	67	MET	CG-SD-CE	6.10	109.96	100.20
1	A	270	MET	CG-SD-CE	5.94	109.70	100.20
1	A	95	ARG	NE-CZ-NH2	5.78	123.19	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	229	ASP	CB-CG-OD1	-5.77	113.11	118.30
1	A	95	ARG	NE-CZ-NH1	-5.69	117.46	120.30
1	B	227	ARG	NE-CZ-NH2	-5.47	117.56	120.30
1	A	158	LEU	CA-CB-CG	5.39	127.70	115.30
1	A	178	LEU	CB-CG-CD2	-5.34	101.92	111.00
1	B	121	TYR	CB-CG-CD2	-5.26	117.84	121.00
1	A	289	ARG	NE-CZ-NH1	5.17	122.88	120.30
1	A	63	ASP	CB-CG-OD1	5.12	122.91	118.30
1	B	50	VAL	CB-CA-C	-5.05	101.80	111.40
1	B	78	PHE	CB-CG-CD1	5.03	124.32	120.80

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	2156	0	2075	18	0
1	B	2103	0	2033	35	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	4	0	3	0	0
3	B	4	0	3	1	0
4	B	1	0	0	0	0
5	A	91	0	0	5	0
5	B	84	0	0	4	0
All	All	4445	0	4114	52	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 6.

All (52) 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:B:132:GLN:HG3	5:B:545:HOH:O	1.59	1.01

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:192:ILE:HG21	5:B:544:HOH:O	1.72	0.89
1:B:283:GLN:HE22	1:B:286:SER:H	1.24	0.81
1:A:213:HIS:HE1	5:A:540:HOH:O	1.68	0.76
1:B:303:GLN:O	1:B:307:THR:HB	1.86	0.76
1:A:181:LEU:HD13	1:A:241:VAL:HG11	1.67	0.75
1:A:275:GLU:HG3	5:A:535:HOH:O	1.86	0.74
1:A:181:LEU:CD1	1:A:241:VAL:HG11	2.17	0.74
1:B:283:GLN:HE22	1:B:286:SER:N	1.89	0.70
1:A:146:THR:HG21	5:A:527:HOH:O	1.94	0.66
1:B:75:ARG:HD3	5:B:570:HOH:O	1.95	0.65
1:B:100:GLY:O	1:B:101:GLY:O	2.19	0.60
1:B:56:ASN:ND2	1:B:58:GLU:CG	2.65	0.60
1:B:270:MET:HG2	1:B:284:LEU:HD13	1.85	0.58
1:B:64:GLN:HA	1:B:64:GLN:OE1	2.04	0.57
1:A:60:GLU:CD	1:B:168:GLN:HG3	2.26	0.56
1:A:146:THR:CG2	5:A:527:HOH:O	2.52	0.56
1:B:56:ASN:ND2	1:B:58:GLU:HG3	2.22	0.54
1:A:213:HIS:CE1	5:A:540:HOH:O	2.50	0.54
1:B:65:ARG:NH1	1:B:154:PHE:O	2.41	0.53
1:B:58:GLU:O	1:B:70:ARG:HA	2.09	0.53
1:B:98:HIS:ND1	1:B:281:ALA:O	2.41	0.52
1:B:213:HIS:CE1	5:B:582:HOH:O	2.63	0.52
1:A:192:ILE:HD13	1:A:203:VAL:HG23	1.92	0.52
1:B:70:ARG:HG3	1:B:295:ASN:HD21	1.74	0.51
1:B:170:VAL:HG13	1:B:181:LEU:HD11	1.94	0.49
1:B:223:ARG:NH2	1:B:258:ILE:HD12	2.27	0.49
1:A:204:TYR:CE1	1:A:226:ILE:HG13	2.48	0.49
1:B:274:LEU:HD11	3:B:402:ACT:H3	1.95	0.48
1:B:283:GLN:NE2	1:B:285:ASP:H	2.12	0.48
1:B:92:ALA:O	1:B:96:GLU:HG3	2.14	0.47
1:A:293:ALA:O	1:A:294:ASN:HB2	2.14	0.47
1:B:65:ARG:HB3	1:B:154:PHE:CE2	2.49	0.47
1:A:142:SER:O	1:A:146:THR:HG23	2.16	0.45
1:B:228:LEU:HD23	1:B:228:LEU:HA	1.81	0.45
1:A:63:ASP:OD2	1:A:65:ARG:NH2	2.50	0.44
1:A:192:ILE:HD12	1:A:208:ALA:HA	2.00	0.44
1:B:102:LYS:HA	1:B:103:PRO:HD2	1.85	0.44
1:B:65:ARG:HB3	1:B:154:PHE:HE2	1.83	0.43
1:B:193:GLN:HG2	1:B:209:TYR:O	2.17	0.43
1:A:159:VAL:HG11	1:A:164:PHE:HE2	1.83	0.43
1:B:157:GLU:HG2	1:B:159:VAL:HG23	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:293:ALA:O	1:B:294:ASN:HB2	2.20	0.42
1:B:56:ASN:HD21	1:B:58:GLU:CD	2.23	0.42
1:B:115:ASP:HB2	1:B:117:TYR:CE2	2.54	0.42
1:B:283:GLN:NE2	1:B:285:ASP:N	2.68	0.42
1:A:223:ARG:NH2	1:A:258:ILE:HD12	2.34	0.41
1:B:207:ARG:HD2	1:B:217:GLU:O	2.20	0.41
1:B:283:GLN:HE21	1:B:285:ASP:H	1.66	0.41
1:A:102:LYS:HA	1:A:103:PRO:HD3	1.97	0.41
1:B:98:HIS:HE1	1:B:282:SER:O	2.03	0.41
1:A:139:PRO:HD2	1:A:182:ALA:O	2.21	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	259/268 (97%)	249 (96%)	9 (4%)	1 (0%)	34	16
1	B	250/268 (93%)	236 (94%)	13 (5%)	1 (0%)	34	16
All	All	509/536 (95%)	485 (95%)	22 (4%)	2 (0%)	34	16

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	101	GLY
1	A	115	ASP

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	224/227 (99%)	218 (97%)	6 (3%)	44	19
1	B	219/227 (96%)	214 (98%)	5 (2%)	50	25
All	All	443/454 (98%)	432 (98%)	11 (2%)	47	22

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	149	ASP
1	A	156	ASP
1	A	158	LEU
1	A	177	ARG
1	A	193	GLN
1	A	283	GLN
1	B	67	MET
1	B	102	LYS
1	B	215	ARG
1	B	226	ILE
1	B	307	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	132	GLN
1	B	213	HIS
1	B	283	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, 3 are monoatomic - leaving 2 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	ACT	A	402	2	3,3,3	1.64	0	3,3,3	0.22	0
3	ACT	B	402	2	3,3,3	1.89	1 (33%)	3,3,3	3.89	2 (66%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	402	ACT	CH3-C	2.84	1.61	1.49

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	ACT	OXT-C-CH3	5.01	135.87	115.18
3	B	402	ACT	OXT-C-O	-4.26	106.33	122.05

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
3	B	402	ACT	1	0

5.7 Other polymers [i](#)

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, 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	263/268 (98%)	0.43	23 (8%) 10 9	17, 29, 57, 101	0
1	B	256/268 (95%)	0.50	24 (9%) 8 7	17, 31, 57, 79	0
All	All	519/536 (96%)	0.47	47 (9%) 9 8	17, 30, 58, 101	0

All (47) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	42	GLN	7.2
1	B	193	GLN	5.4
1	B	43	PRO	5.4
1	A	158	LEU	4.5
1	B	192	ILE	4.4
1	A	64	GLN	4.3
1	A	61	ALA	4.2
1	B	212	ASP	4.0
1	A	156	ASP	3.9
1	B	194	ALA	3.8
1	A	148	ALA	3.4
1	B	65	ARG	3.4
1	B	211	THR	3.4
1	B	209	TYR	3.3
1	A	175	ARG	3.3
1	A	157	GLU	3.3
1	B	201	LEU	3.1
1	B	100	GLY	3.0
1	B	213	HIS	2.9
1	B	64	GLN	2.9
1	B	294	ASN	2.8
1	B	102	LYS	2.8
1	A	63	ASP	2.8
1	B	249	VAL	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	149	ASP	2.8
1	A	43	PRO	2.7
1	A	177	ARG	2.7
1	A	193	GLN	2.7
1	A	249	VAL	2.7
1	A	150	LYS	2.5
1	A	149	ASP	2.5
1	A	250	TRP	2.4
1	A	248	PHE	2.4
1	A	212	ASP	2.4
1	B	66	PHE	2.3
1	A	210	PHE	2.3
1	B	248	PHE	2.3
1	A	243	VAL	2.3
1	B	239	THR	2.3
1	A	140	VAL	2.2
1	B	182	ALA	2.2
1	B	157	GLU	2.2
1	B	140	VAL	2.1
1	B	103	PRO	2.1
1	A	65	ARG	2.1
1	A	137	TRP	2.0
1	B	191	GLY	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 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.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	ACT	A	402	4/4	0.79	0.14	21,30,30,38	0
3	ACT	B	402	4/4	0.95	0.14	14,16,24,25	4
4	HG	B	403	1/1	0.95	0.09	33,33,33,33	1
2	ZN	B	401	1/1	0.99	0.05	24,24,24,24	0
2	ZN	A	401	1/1	1.00	0.04	26,26,26,26	0

6.5 Other polymers [i](#)

There are no such residues in this entry.