



wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 21, 2023 – 06:20 AM JST

PDB ID : 7F36
Title : TacT complexed with acetyl-glycyl-tRNAGly
Authors : Yashiro, Y.; Tomita, K.
Deposited on : 2021-06-15
Resolution : 3.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

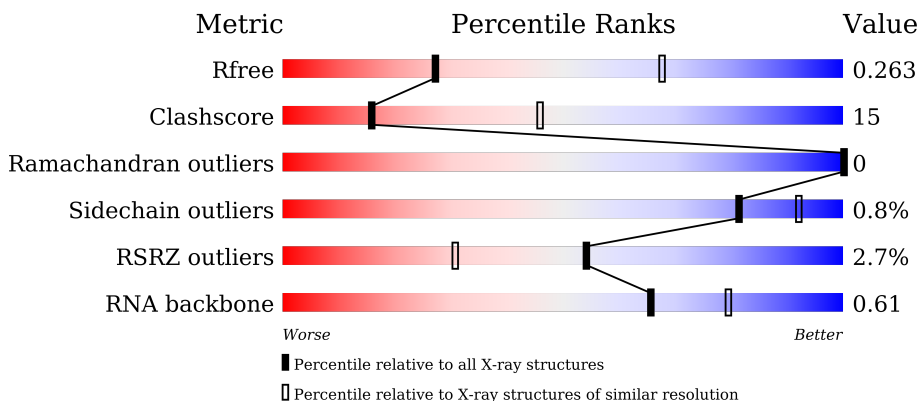
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 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.



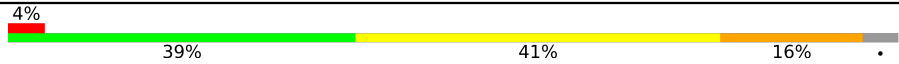



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)
RNA backbone	3102	1116 (3.40-2.80)

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	169	 2% 75% 19% • 6%
1	B	169	 66% 27% • 7%
1	C	169	 67% 26% • 7%
1	D	169	 3% 64% 29% • 6%

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Mol	Chain	Length	Quality of chain
2	E	76	
2	F	76	
2	G	76	
2	H	76	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 11302 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 N-acetyltransferase domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	159	1231	783	226	218	4	0	0	0
1	B	158	1225	780	223	218	4	0	0	0
1	D	159	1231	783	226	218	4	0	0	0
1	C	158	1227	781	225	217	4	0	0	0

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	140	PHE	TYR	engineered mutation	UNP Q8ZL98
A	162	LEU	-	expression tag	UNP Q8ZL98
A	163	GLU	-	expression tag	UNP Q8ZL98
A	164	HIS	-	expression tag	UNP Q8ZL98
A	165	HIS	-	expression tag	UNP Q8ZL98
A	166	HIS	-	expression tag	UNP Q8ZL98
A	167	HIS	-	expression tag	UNP Q8ZL98
A	168	HIS	-	expression tag	UNP Q8ZL98
A	169	HIS	-	expression tag	UNP Q8ZL98
B	140	PHE	TYR	engineered mutation	UNP Q8ZL98
B	162	LEU	-	expression tag	UNP Q8ZL98
B	163	GLU	-	expression tag	UNP Q8ZL98
B	164	HIS	-	expression tag	UNP Q8ZL98
B	165	HIS	-	expression tag	UNP Q8ZL98
B	166	HIS	-	expression tag	UNP Q8ZL98
B	167	HIS	-	expression tag	UNP Q8ZL98
B	168	HIS	-	expression tag	UNP Q8ZL98
B	169	HIS	-	expression tag	UNP Q8ZL98
D	140	PHE	TYR	engineered mutation	UNP Q8ZL98
D	162	LEU	-	expression tag	UNP Q8ZL98
D	163	GLU	-	expression tag	UNP Q8ZL98

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Chain	Residue	Modelled	Actual	Comment	Reference
D	164	HIS	-	expression tag	UNP Q8ZL98
D	165	HIS	-	expression tag	UNP Q8ZL98
D	166	HIS	-	expression tag	UNP Q8ZL98
D	167	HIS	-	expression tag	UNP Q8ZL98
D	168	HIS	-	expression tag	UNP Q8ZL98
D	169	HIS	-	expression tag	UNP Q8ZL98
C	140	PHE	TYR	engineered mutation	UNP Q8ZL98
C	162	LEU	-	expression tag	UNP Q8ZL98
C	163	GLU	-	expression tag	UNP Q8ZL98
C	164	HIS	-	expression tag	UNP Q8ZL98
C	165	HIS	-	expression tag	UNP Q8ZL98
C	166	HIS	-	expression tag	UNP Q8ZL98
C	167	HIS	-	expression tag	UNP Q8ZL98
C	168	HIS	-	expression tag	UNP Q8ZL98
C	169	HIS	-	expression tag	UNP Q8ZL98

- Molecule 2 is a RNA chain called RNA (76-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	F	76	Total 1622	C 722	N 287	O 537	P 76	0	0	0
2	G	76	Total 1622	C 722	N 287	O 537	P 76	0	0	0
2	H	72	Total 1537	C 684	N 271	O 510	P 72	0	0	0
2	E	73	Total 1559	C 694	N 276	O 516	P 73	0	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

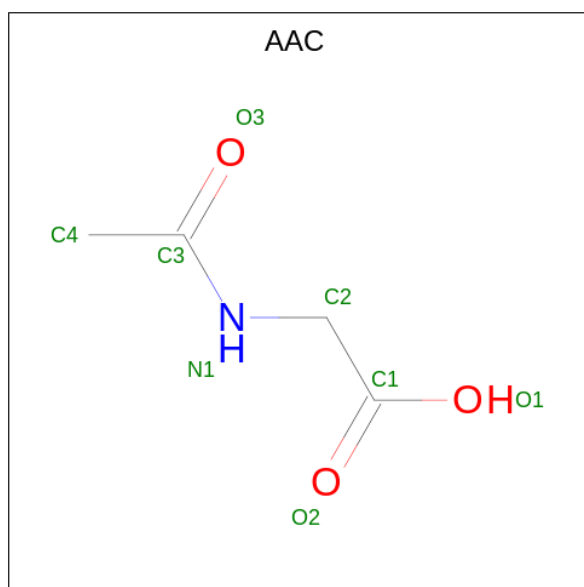
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Ca 1	0	0
3	B	1	Total 1	Ca 1	0	0
3	F	13	Total 13	Ca 13	0	0
3	D	1	Total 1	Ca 1	0	0
3	C	1	Total 1	Ca 1	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	6	Total	Ca	0	0
			6	6		
3	H	8	Total	Ca	0	0
			8	8		
3	E	10	Total	Ca	0	0
			10	10		

- Molecule 4 is ACETYLAMINO-ACETIC ACID (three-letter code: AAC) (formula: C₄H₇NO₃).

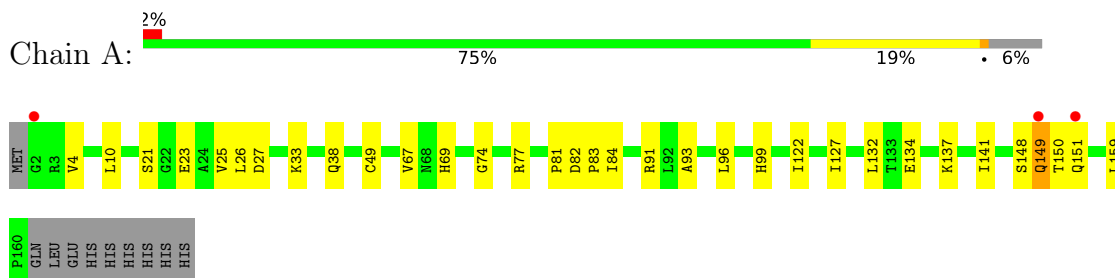


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	E	1	Total	C	N	O	0	0
			7	4	1	2		

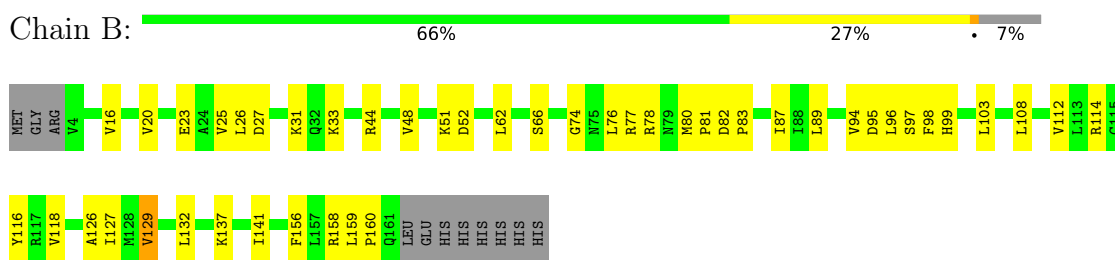
3 Residue-property plots [i](#)

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.

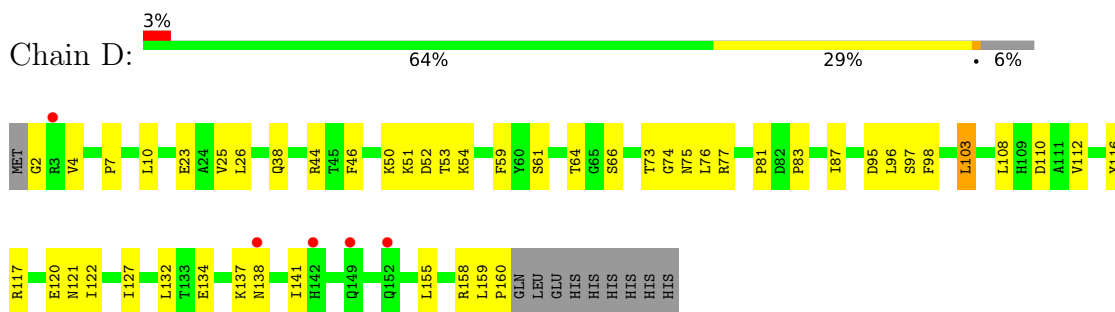
- Molecule 1: N-acetyltransferase domain-containing protein



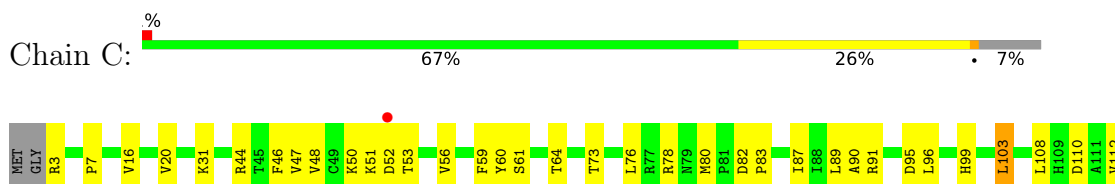
- Molecule 1: N-acetyltransferase domain-containing protein



- Molecule 1: N-acetyltransferase domain-containing protein

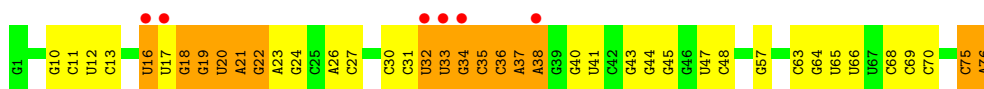


- Molecule 1: N-acetyltransferase domain-containing protein

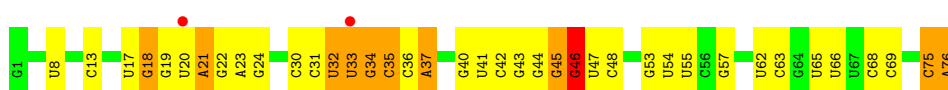




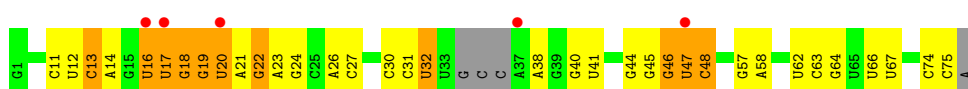
• Molecule 2: RNA (76-MER)



• Molecule 2: RNA (76-MER)



• Molecule 2: RNA (76-MER)



• Molecule 2: RNA (76-MER)



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	52.74Å 121.87Å 127.26Å 90.00° 91.07° 90.00°	Depositor
Resolution (Å)	49.04 – 3.10 49.04 – 3.10	Depositor EDS
% Data completeness (in resolution range)	99.2 (49.04-3.10) 99.3 (49.04-3.10)	Depositor EDS
R_{merge}	0.24	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.55 (at 3.12Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.208 , 0.263 0.209 , 0.263	Depositor DCC
R_{free} test set	1456 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	70.5	Xtriage
Anisotropy	0.192	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 52.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k 0.000 for -h,-l,-k 0.003 for h,-k,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	11302	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.75% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, AAC

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	0.36	0/1256	0.58	0/1699
1	B	0.39	0/1250	0.60	0/1692
1	C	0.35	0/1252	0.54	0/1694
1	D	0.34	0/1256	0.53	0/1699
2	E	0.40	0/1740	0.94	1/2707 (0.0%)
2	F	0.47	0/1811	1.04	1/2820 (0.0%)
2	G	0.39	0/1811	0.90	1/2820 (0.0%)
2	H	0.42	0/1715	0.95	1/2668 (0.0%)
All	All	0.40	0/12091	0.83	4/17799 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	74	C	C6-N1-C2	5.97	122.69	120.30
2	F	38	A	C4-N9-C1'	5.40	136.03	126.30
2	E	31	C	C2-N1-C1'	5.12	124.44	118.80
2	G	46	G	O4'-C1'-N9	-5.08	104.14	108.20

There are no chirality outliers.

There are no planarity outliers.

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	1231	0	1249	27	0
1	B	1225	0	1242	39	0
1	C	1227	0	1247	40	0
1	D	1231	0	1250	45	0
2	E	1559	0	787	40	0
2	F	1622	0	820	45	0
2	G	1622	0	820	40	0
2	H	1537	0	777	28	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	10	0	0	0	0
3	F	13	0	0	0	0
3	G	6	0	0	0	0
3	H	8	0	0	0	0
4	E	7	0	6	2	0
All	All	11302	0	8198	281	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.

The worst 5 of 281 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:C:89:LEU:HB3	1:C:129:VAL:HG12	1.32	1.06
1:B:116:TYR:OH	1:B:160:PRO:HD2	1.61	0.98
2:E:47:U:H4'	2:E:48:C:H5'	1.43	0.98
2:E:47:U:H4'	2:E:48:C:C5'	1.97	0.94
2:F:36:C:H2'	2:F:37:A:C8	2.05	0.92

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	157/169 (93%)	152 (97%)	5 (3%)	0	100	100
1	B	156/169 (92%)	151 (97%)	5 (3%)	0	100	100
1	C	156/169 (92%)	150 (96%)	6 (4%)	0	100	100
1	D	157/169 (93%)	152 (97%)	5 (3%)	0	100	100
All	All	626/676 (93%)	605 (97%)	21 (3%)	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	129/139 (93%)	128 (99%)	1 (1%)	81	92
1	B	129/139 (93%)	128 (99%)	1 (1%)	81	92
1	C	129/139 (93%)	128 (99%)	1 (1%)	81	92
1	D	129/139 (93%)	128 (99%)	1 (1%)	81	92
All	All	516/556 (93%)	512 (99%)	4 (1%)	81	92

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	149	GLN
1	B	129	VAL
1	D	103	LEU
1	C	103	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	E	71/76 (93%)	15 (21%)	4 (5%)
2	F	75/76 (98%)	15 (20%)	2 (2%)
2	G	75/76 (98%)	16 (21%)	3 (4%)
2	H	70/76 (92%)	14 (20%)	4 (5%)
All	All	291/304 (95%)	60 (20%)	13 (4%)

5 of 60 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	F	13	C
2	F	16	U
2	F	18	G
2	F	19	G
2	F	20	U

5 of 13 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	H	21	A
2	H	47	U
2	E	47	U
2	E	19	G
2	E	21	A

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 42 ligands modelled in this entry, 41 are monoatomic - leaving 1 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	$\# Z > 2$
4	AAC	E	101	2	6,6,7	0.58	0	6,6,8	1.27	1 (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
4	AAC	E	101	2	-	0/3/4/5	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	101	AAC	O2-C1-C2	-3.02	116.67	125.42

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	101	AAC	2	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	159/169 (94%)	0.00	3 (1%) 66 46	28, 51, 86, 103	0
1	B	158/169 (93%)	-0.12	0 100 100	28, 44, 79, 101	0
1	C	158/169 (93%)	-0.06	1 (0%) 89 78	35, 54, 80, 100	0
1	D	159/169 (94%)	0.11	5 (3%) 49 26	34, 61, 97, 110	0
2	E	73/76 (96%)	0.18	3 (4%) 37 18	35, 81, 147, 162	0
2	F	76/76 (100%)	0.29	6 (7%) 12 5	37, 69, 160, 169	0
2	G	76/76 (100%)	0.28	2 (2%) 56 33	52, 82, 164, 168	0
2	H	72/76 (94%)	0.49	5 (6%) 16 7	44, 88, 137, 155	0
All	All	931/980 (95%)	0.09	25 (2%) 54 31	28, 61, 110, 169	0

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	2	GLY	4.5
2	H	37	A	4.0
2	G	33	U	3.6
2	F	34	G	3.3
1	D	149	GLN	3.2

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands

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	CA	E	109	1/1	0.60	0.19	101,101,101,101	0
3	CA	G	103	1/1	0.65	0.14	89,89,89,89	0
4	AAC	E	101	7/8	0.68	0.30	59,74,78,79	0
3	CA	E	105	1/1	0.76	0.13	102,102,102,102	0
3	CA	H	107	1/1	0.76	0.16	88,88,88,88	0
3	CA	E	102	1/1	0.76	0.13	99,99,99,99	0
3	CA	H	104	1/1	0.80	0.23	81,81,81,81	0
3	CA	H	108	1/1	0.80	0.10	88,88,88,88	0
3	CA	C	201	1/1	0.81	0.17	88,88,88,88	0
3	CA	B	201	1/1	0.81	0.11	94,94,94,94	0
3	CA	F	101	1/1	0.81	0.14	78,78,78,78	0
3	CA	D	201	1/1	0.82	0.14	83,83,83,83	0
3	CA	F	108	1/1	0.82	0.15	102,102,102,102	0
3	CA	F	102	1/1	0.86	0.09	84,84,84,84	0
3	CA	H	102	1/1	0.87	0.08	95,95,95,95	0
3	CA	F	103	1/1	0.87	0.07	73,73,73,73	0
3	CA	F	110	1/1	0.87	0.16	131,131,131,131	0
3	CA	F	111	1/1	0.87	0.13	68,68,68,68	0
3	CA	H	101	1/1	0.88	0.07	85,85,85,85	0
3	CA	F	104	1/1	0.88	0.24	82,82,82,82	0
3	CA	E	104	1/1	0.88	0.09	97,97,97,97	0
3	CA	F	109	1/1	0.88	0.21	91,91,91,91	0
3	CA	H	105	1/1	0.88	0.07	82,82,82,82	0
3	CA	F	113	1/1	0.88	0.11	82,82,82,82	0
3	CA	F	106	1/1	0.89	0.23	71,71,71,71	0
3	CA	H	106	1/1	0.89	0.11	85,85,85,85	0
3	CA	A	201	1/1	0.89	0.13	78,78,78,78	0
3	CA	E	111	1/1	0.90	0.24	103,103,103,103	0
3	CA	F	105	1/1	0.91	0.23	62,62,62,62	0
3	CA	G	101	1/1	0.91	0.11	94,94,94,94	0
3	CA	H	103	1/1	0.93	0.08	96,96,96,96	0
3	CA	E	107	1/1	0.93	0.08	84,84,84,84	0
3	CA	G	105	1/1	0.93	0.20	67,67,67,67	0
3	CA	F	112	1/1	0.93	0.22	86,86,86,86	0
3	CA	F	107	1/1	0.93	0.29	72,72,72,72	0
3	CA	G	104	1/1	0.94	0.27	76,76,76,76	0
3	CA	E	103	1/1	0.94	0.08	83,83,83,83	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	CA	G	106	1/1	0.95	0.11	105,105,105,105	0
3	CA	E	108	1/1	0.96	0.17	73,73,73,73	0
3	CA	E	106	1/1	0.97	0.12	74,74,74,74	0
3	CA	G	102	1/1	0.98	0.31	71,71,71,71	0
3	CA	E	110	1/1	0.98	0.13	86,86,86,86	0

6.5 Other polymers [i](#)

There are no such residues in this entry.