Full wwPDB X-ray Structure Validation Report ⓘ

Nov 11, 2021 – 12:08 pm GMT

PDB ID	:	7A1T
Title	:	A collapsed hexameric state of a de novo coiled-coil assembly: CC-Type2-(GgLaId)4-W19BrPhe.
Authors	:	Rhys, G.G.; Brady, R.L.; Woolfson, D.N.
Deposited on	:	2020-08-14
Resolution	:	1.42 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 following versions of software and data (see references ⓘ) were used in the production of this report:

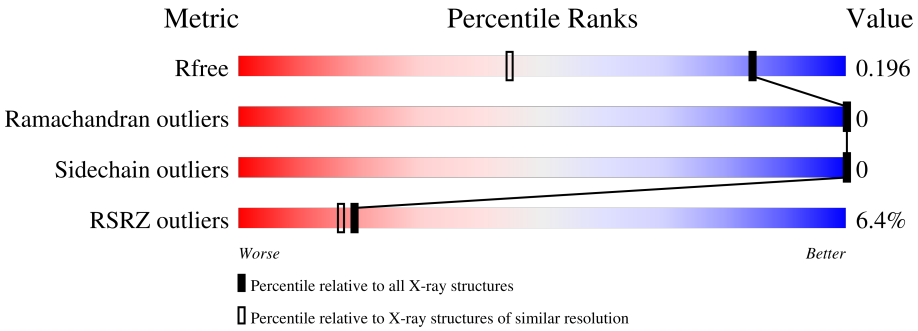
MolProbity	:	4.02b-467
Mogul	:	1.8.4 (270009), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.23.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.42 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	2579 (1.44-1.40)
Ramachandran outliers	138981	2632 (1.44-1.40)
Sidechain outliers	138945	2631 (1.44-1.40)
RSRZ outliers	127900	2528 (1.44-1.40)

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 <=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	32	16% 94% 6%
1	B	32	6% 91% 6%
1	C	32	100%
1	D	32	6% 88% 9%
1	E	32	3% 94%
1	F	32	3% 94%

2 Entry composition (i)

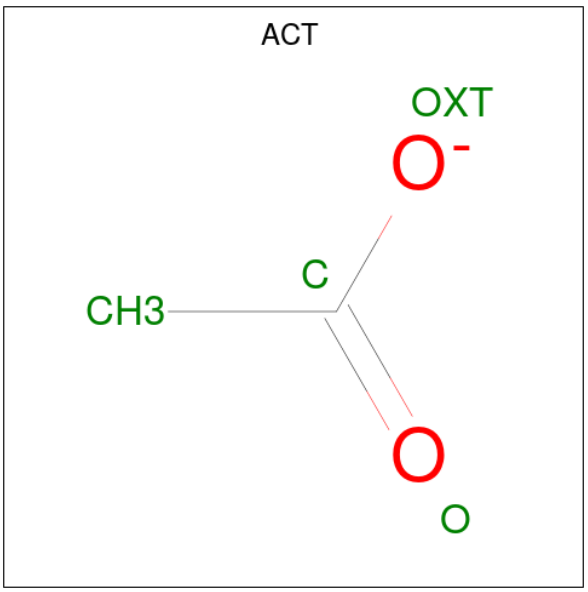
There are 5 unique types of molecules in this entry. The entry contains 1584 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 CC-Type2-(GgLaId)4-W19BrPhe.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	30	Total	Br	C	N	O	0	2	0
			237	1	153	41	42			
1	B	31	Total	Br	C	N	O	0	5	0
			256	1	162	42	51			
1	C	32	Total	Br	C	N	O	0	4	1
			259	1	165	44	49			
1	D	29	Total	Br	C	N	O	0	4	0
			254	2	163	41	48			
1	E	31	Total	Br	C	N	O	0	0	0
			220	1	142	36	41			
1	F	31	Total	Br	C	N	O	0	4	0
			256	1	164	42	49			

- Molecule 2 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).

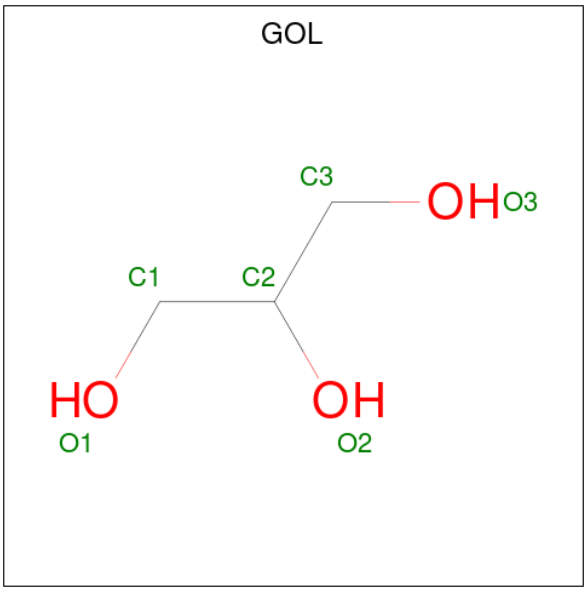


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 4 2 2	0	0
2	A	1	Total C O 4 2 2	0	0
2	A	1	Total C O 4 2 2	0	0
2	E	1	Total C O 4 2 2	0	0

- Molecule 3 is CADMIUM ION (three-letter code: CD) (formula: Cd).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Cd 1 1	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	D	1	Total C O 6 3 3	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	11	Total O 11 11	0	0

Continued on next page...

Continued from previous page...

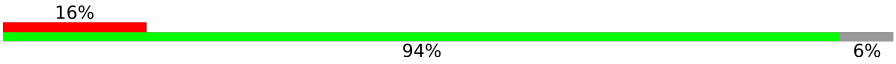
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	8	Total O 8 8	0	0
5	C	14	Total O 14 14	0	0
5	D	14	Total O 14 14	0	0
5	E	18	Total O 18 18	0	0
5	F	14	Total O 14 14	0	0

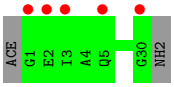
3 Residue-property plots (i)

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: CC-Type2-(GgLaId)4-W19BrPhe

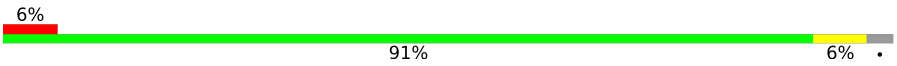
Chain A:

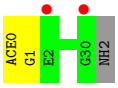




• Molecule 1: CC-Type2-(GgLaId)4-W19BrPhe

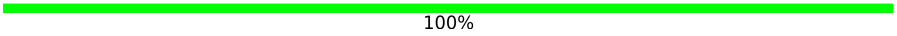
Chain B:





• Molecule 1: CC-Type2-(GgLaId)4-W19BrPhe

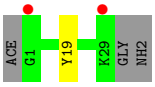
Chain C:



There are no outlier residues recorded for this chain.

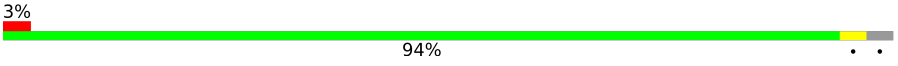
• Molecule 1: CC-Type2-(GgLaId)4-W19BrPhe

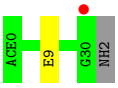
Chain D:



• Molecule 1: CC-Type2-(GgLaId)4-W19BrPhe

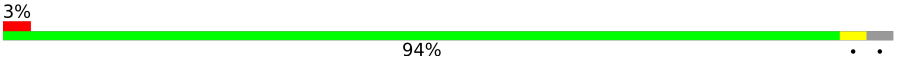
Chain E:





• Molecule 1: CC-Type2-(GgLaId)4-W19BrPhe

Chain F:




ACE0
G30
NH2

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	50.65Å 129.69Å 59.14Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.22 – 1.42 47.18 – 1.42	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.22-1.42) 99.7 (47.18-1.42)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.36 (at 1.42Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.149 , 0.193 0.153 , 0.196	Depositor DCC
R_{free} test set	1881 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	18.6	Xtriage
Anisotropy	0.043	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	1584	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.72% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: 4BF, ACE, GOL, CD, ACT, NH2

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	1.00	0/223	0.89	0/289
1	B	1.22	2/238 (0.8%)	1.07	2/312 (0.6%)
1	C	0.93	0/242	1.00	0/315
1	D	1.23	0/228	0.95	0/298
1	E	1.10	1/204 (0.5%)	0.89	0/267
1	F	1.08	1/240 (0.4%)	0.96	0/313
All	All	1.10	4/1375 (0.3%)	0.96	2/1794 (0.1%)

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	D	0	1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	9	GLU	CD-OE1	5.70	1.31	1.25
1	B	1[A]	GLY	N-CA	5.57	1.54	1.46
1	B	1[B]	GLY	N-CA	5.57	1.54	1.46
1	F	0	ACE	C-N	5.51	1.43	1.33

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	0[A]	ACE	C-N-CA	-5.93	109.85	122.30
1	B	0[B]	ACE	C-N-CA	-5.93	109.85	122.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	19[A]	4BF	Mainchain

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	237	0	265	0	0
1	B	256	0	263	0	0
1	C	259	0	277	0	0
1	D	254	0	262	0	0
1	E	220	0	235	0	0
1	F	256	0	270	0	0
2	A	12	0	9	0	0
2	E	4	0	3	0	0
3	B	1	0	0	0	0
4	D	6	0	8	0	0
5	A	11	0	0	0	0
5	B	8	0	0	0	0
5	C	14	0	0	0	0
5	D	14	0	0	0	1
5	E	18	0	0	0	0
5	F	14	0	0	0	0
All	All	1584	0	1592	0	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). Clashscore could not be calculated for this entry.

There are no clashes within the asymmetric unit.

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:D:203:HOH:O	5:D:210:HOH:O[3_654]	1.91	0.29

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	29/32 (91%)	29 (100%)	0	0	100	100
1	B	32/32 (100%)	32 (100%)	0	0	100	100
1	C	33/32 (103%)	33 (100%)	0	0	100	100
1	D	29/32 (91%)	29 (100%)	0	0	100	100
1	E	28/32 (88%)	28 (100%)	0	0	100	100
1	F	32/32 (100%)	32 (100%)	0	0	100	100
All	All	183/192 (95%)	183 (100%)	0	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	21/19 (110%)	21 (100%)	0	100	100
1	B	22/19 (116%)	22 (100%)	0	100	100
1	C	23/19 (121%)	23 (100%)	0	100	100
1	D	22/19 (116%)	22 (100%)	0	100	100
1	E	18/19 (95%)	18 (100%)	0	100	100
1	F	22/19 (116%)	22 (100%)	0	100	100
All	All	128/114 (112%)	128 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

7 non-standard protein/DNA/RNA residues are modelled in this entry.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 6 ligands modelled in this entry, 1 is monoatomic - leaving 5 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

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^{th} 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	29/32 (90%)	0.54	5 (17%) 1 1	16, 27, 65, 86	0
1	B	29/32 (90%)	-0.04	2 (6%) 16 15	14, 24, 48, 64	0
1	C	29/32 (90%)	-0.27	0 100 100	14, 24, 33, 57	0
1	D	28/32 (87%)	0.09	2 (7%) 16 14	18, 30, 54, 84	0
1	E	29/32 (90%)	-0.09	1 (3%) 45 44	15, 22, 39, 88	0
1	F	29/32 (90%)	0.18	1 (3%) 45 44	14, 22, 40, 76	0
All	All	173/192 (90%)	0.07	11 (6%) 19 17	14, 26, 62, 88	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	30	GLY	7.2
1	A	3	ILE	6.7
1	A	1	GLY	4.7
1	A	2	GLU	4.4
1	E	30	GLY	4.2
1	D	29	LYS	4.0
1	D	1	GLY	3.4
1	A	5	GLN	3.1
1	B	2[A]	GLU	2.6
1	B	30	GLY	2.2
1	A	30	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

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, 95^{th} 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
1	4BF	D	19[A]	12/13	0.92	0.11	19,22,27,44	12
1	4BF	D	19[B]	12/13	0.92	0.11	20,24,30,38	12
1	4BF	B	19	12/13	0.96	0.08	15,20,27,34	0
1	4BF	C	19	12/13	0.97	0.07	14,18,26,33	0
1	4BF	A	19	12/13	0.98	0.07	17,20,26,29	0
1	4BF	E	19	12/13	0.98	0.07	16,20,23,27	0
1	4BF	F	19	12/13	0.98	0.09	15,18,24,25	0

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, 95^{th} 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
2	ACT	A	101	4/4	0.79	0.16	55,60,63,63	0
2	ACT	A	102	4/4	0.81	0.11	54,69,76,78	0
4	GOL	D	101	6/6	0.84	0.14	48,51,54,55	0
2	ACT	A	103	4/4	0.88	0.16	53,55,61,61	0
2	ACT	E	101	4/4	0.93	0.07	29,32,35,36	0
3	CD	B	101	1/1	1.00	0.05	18,18,18,18	1

6.5 Other polymers (i)

There are no such residues in this entry.