Full wwPDB X-ray Structure Validation Report ⓘ

Apr 15, 2024 – 04:56 PM EDT

PDB ID	:	8SL5
Title	:	[2T13] Self-assembling left-handed two-turn tensegrity triangle with 13 inter-junction base pairs and R3 symmetry
Authors	:	Vecchioni, S.; Janowski, J.; Sha, R.; Ohayon, Y.P.
Deposited on	:	2023-04-21
Resolution	:	6.55 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:

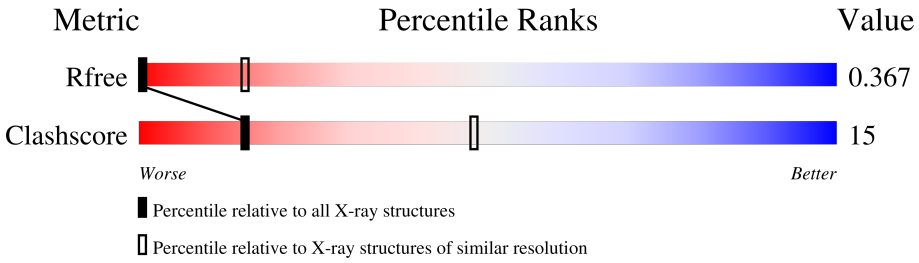
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.1

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 6.55 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	1000 (9.00-3.90)
Clashscore	141614	1064 (9.00-3.90)

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 <=5%

Mol	Chain	Length	Quality of chain
1	A	13	31% 69%
2	B	8	50% 50%
3	C	8	50% 50%
4	D	13	23% 77%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 855 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 DNA chain called DNA (5'-D(*GP*AP*GP*CP*CP*TP*GP*AP*CP*TP*AP*CP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	A	13	263	126	51	74	12	0	0	0

- Molecule 2 is a DNA chain called DNA (5'-D(P*CP*GP*TP*GP*GP*AP*CP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	B	8	166	78	33	47	8	0	0	0

- Molecule 3 is a DNA chain called DNA (5'-D(*TP*CP*TP*GP*TP*GP*GP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	C	8	161	78	27	49	7	0	0	0

- Molecule 4 is a DNA chain called DNA (5'-D(P*TP*GP*TP*AP*GP*TP*CP*AP*CP*CP*AP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
4	D	13	265	126	48	78	13	0	0	0

3 Residue-property plots (i)

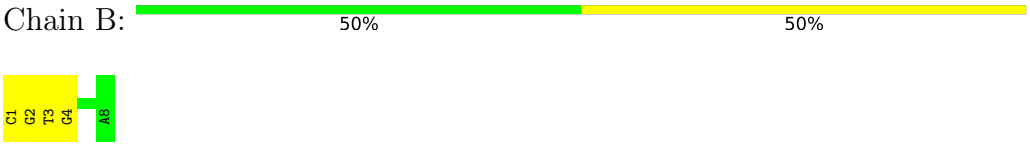
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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: DNA (5'-D(*GP*AP*GP*CP*CP*TP*GP*AP*CP*TP*AP*CP*A)-3')

Chain A:

- Molecule 2: DNA (5'-D(P*CP*GP*TP*GP*GP*AP*CP*A)-3')

Chain B:



- Molecule 3: DNA (5'-D(*TP*CP*TP*GP*TP*GP*GP*C)-3')

Chain C:

- Molecule 4: DNA (5'-D(P*TP*GP*TP*AP*GP*TP*CP*AP*CP*CP*AP*CP*G)-3')

Chain D:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α, β, γ	111.89Å 111.89Å 69.19Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	32.30 – 6.55 55.94 – 6.55	Depositor EDS
% Data completeness (in resolution range)	77.4 (32.30-6.55) 66.9 (55.94-6.55)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.37 (at 6.69Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.203 , 0.349 0.199 , 0.367	Depositor DCC
R_{free} test set	16 reflections (3.23%)	wwPDB-VP
Wilson B-factor (Å^2)	286.6	Xtriage
Anisotropy	0.494	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.15 , 80.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.57$, $< L^2 > = 0.42$	Xtriage
Estimated twinning fraction	0.069 for -1/3*h+1/3*k+4/3*l,-k,2/3*h+1/3*k+1/3*l 0.059 for -2/3*h-1/3*k-4/3*l,-1/3*h-2/3*k+4/3*l,-1/3*h+1/3*k+1/3*l 0.000 for -h,1/3*h-1/3*k-4/3*l,-1/3*h-2/3*k+1/3*l 0.149 for -1/3*h-2/3*k+4/3*l,-2/3*h-1/3*k-4/3*l,1/3*h-1/3*k-1/3*l 0.064 for -h,2/3*h+1/3*k+4/3*l,1/3*h+2/3*k-1/3*l 0.077 for 1/3*h+2/3*k-4/3*l,-k,-2/3*h-1/3*k-1/3*l 0.095 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	855	wwPDB-VP
Average B, all atoms (Å^2)	579.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 14.20% 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

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	0.54	0/295	0.82	0/453
2	B	0.50	0/186	0.93	0/285
3	C	0.64	0/179	1.06	0/275
4	D	0.54	0/296	0.93	0/454
All	All	0.55	0/956	0.92	0/1467

There are no bond length outliers.

There are no bond angle outliers.

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	263	0	147	7	2
2	B	166	0	90	2	2
3	C	161	0	93	5	0
4	D	265	0	147	6	2
All	All	855	0	477	20	4

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 (20) 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:15:DT:H2'	1:A:16:DA:C8	2.30	0.67
4:D:9:DC:H2"	4:D:10:DC:H5'	1.84	0.59
1:A:15:DT:H2'	1:A:16:DA:H8	1.67	0.58
1:A:16:DA:H2"	1:A:17:DC:H5"	1.86	0.56
4:D:7:DC:H2"	4:D:8:DA:C8	2.40	0.56
3:C:9:DG:H2"	3:C:10:DT:OP1	2.04	0.56
2:B:2:DG:H2"	2:B:3:DT:H71	1.89	0.54
3:C:9:DG:H2'	3:C:10:DT:H6	1.75	0.52
3:C:6:DT:H2'	3:C:7:DC:C6	2.45	0.51
3:C:9:DG:H2'	3:C:10:DT:C6	2.47	0.50
4:D:12:DC:H4'	4:D:13:DG:OP1	2.11	0.48
3:C:10:DT:H6	3:C:10:DT:H5"	1.78	0.47
1:A:17:DC:H1'	1:A:18:DA:H5'	1.99	0.45
1:A:10:DC:H2'	1:A:11:DT:H71	1.99	0.44
4:D:5:DG:H2'	4:D:6:DT:H71	2.00	0.43
4:D:6:DT:H2"	4:D:7:DC:C6	2.55	0.41
1:A:9:DC:C2	1:A:10:DC:C5	3.09	0.41
1:A:12:DG:H2"	1:A:13:DA:C8	2.56	0.41
2:B:3:DT:H2"	2:B:4:DG:C8	2.56	0.40
4:D:4:DA:H2"	4:D:5:DG:C8	2.57	0.40

All (4) 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)
1:A:18:DA:O3'	2:B:1:DC:P[2_555]	1.60	0.60
4:D:1:DT:P	4:D:13:DG:O3'[2_555]	1.60	0.60
4:D:1:DT:O5'	4:D:13:DG:O3'[2_555]	1.64	0.56
1:A:18:DA:O3'	2:B:1:DC:O5'[2_555]	2.09	0.11

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

There are no protein molecules in this entry.

5.3.2 Protein sidechains (i)

There are no protein molecules in this entry.

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 monosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

5.7 Other polymers

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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.