wwPDB X-ray Structure Validation Summary Report (i)

May 26, 2020 – 09:15 am BST

PDB ID	:	3ORC
Title	:	CRYSTAL STRUCTURE OF AN ENGINEERED CRO MONOMER BOUND NONSPECIFICALLY TO DNA
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Deposited on	:	1998-04-23
Resolution	:	3.00 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

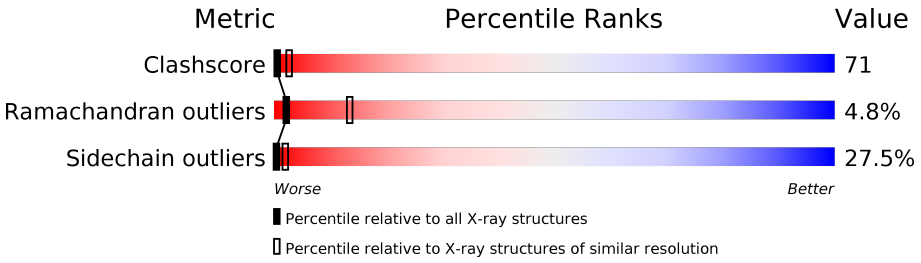
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 3.00 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))
Clashscore	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)

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 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	R	8	13% 38% 50%
1	S	8	13% 38% 50%
2	A	65	18% 54% 25% .

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 826 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(*TP*AP*TP*CP*GP*AP*TP*A)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	R	8	Total	C	N	O	P	0	0	0
			161	79	29	46	7			
1	S	8	Total	C	N	O	P	0	0	0
			161	79	29	46	7			

- Molecule 2 is a protein called PROTEIN (CRO REPRESSOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	65	Total	C	N	O	S	0	0	0
			501	317	88	95	1			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	57	ASP	ASP	SEE REMARK 999	UNP P03040
A	58	GLY	GLY	SEE REMARK 999	UNP P03040
A	59	GLU	GLU	SEE REMARK 999	UNP P03040
A	60	VAL	VAL	SEE REMARK 999	UNP P03040
A	61	LYS	LYS	SEE REMARK 999	UNP P03040
A	62	PRO	PRO	SEE REMARK 999	UNP P03040
A	63	PHE	PHE	SEE REMARK 999	UNP P03040
A	64	PRO	PRO	SEE REMARK 999	UNP P03040
A	65	SER	SER	SEE REMARK 999	UNP P03040
A	66	ASN	ASN	SEE REMARK 999	UNP P03040

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	3	Total	O	0	0
			3	3		

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 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(*TP*AP*TP*CP*GP*AP*TP*A)-3')

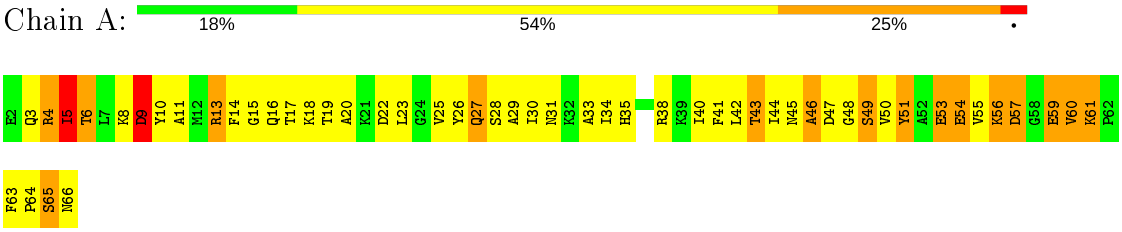
Chain R:

- Molecule 1: DNA (5'-D(*TP*AP*TP*CP*GP*AP*TP*A)-3')

Chain S:

- Molecule 2: PROTEIN (CRO REPRESSOR)

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	45.72Å 60.66Å 45.72Å 90.00° 112.70° 90.00°	Depositor
Resolution (Å)	20.00 – 3.00 24.62 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.7 (20.00-3.00) 92.3 (24.62-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
$< I/\sigma(I) >$ [1]	1.28 (at 2.39Å)	Xtriage
Refinement program	TNT 5EB	Depositor
R, R_{free}	(Not available) , (Not available) 0.216 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	43.2	Xtriage
Anisotropy	0.340	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.16 , 91.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	826	wwPDB-VP
Average B, all atoms (Å^2)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.99% 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	R	1.67	4/180 (2.2%)	2.07	7/276 (2.5%)
1	S	1.67	4/180 (2.2%)	2.07	7/276 (2.5%)
2	A	1.06	3/509 (0.6%)	1.62	10/685 (1.5%)
All	All	1.34	11/869 (1.3%)	1.84	24/1237 (1.9%)

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	59	GLU	CD-OE2	6.51	1.32	1.25
2	A	54	GLU	CD-OE2	6.27	1.32	1.25
1	R	4	DC	C3'-O3'	6.21	1.52	1.44
1	S	4	DC	C3'-O3'	6.21	1.52	1.44
1	R	2	DA	C3'-O3'	6.16	1.51	1.44

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	R	2	DA	P-O3'-C3'	10.45	132.24	119.70
1	S	2	DA	P-O3'-C3'	10.45	132.24	119.70
1	R	7	DT	O4'-C4'-C3'	-8.64	100.82	106.00
1	S	7	DT	O4'-C4'-C3'	-8.64	100.82	106.00
1	R	4	DC	O4'-C1'-N1	-8.14	102.30	108.00

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	R	161	0	93	14	0
1	S	161	0	93	15	0
2	A	501	0	497	73	0
3	A	3	0	0	0	0
All	All	826	0	683	95	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 71.

The worst 5 of 95 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)
2:A:16:GLN:HE22	2:A:31:ASN:HB2	1.20	1.00
2:A:31:ASN:HA	2:A:34:ILE:HD12	1.45	0.97
1:S:7:DT:H2"	1:S:8:DA:H5'	1.47	0.96
1:R:7:DT:H2"	1:R:8:DA:H5'	1.47	0.94
2:A:45:ASN:HB2	2:A:49:SER:OG	1.84	0.78

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
2	A	63/65 (97%)	42 (67%)	18 (29%)	3 (5%)	2 13

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	15	GLY
2	A	46	ALA
2	A	56	LYS

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
2	A	51/53 (96%)	37 (72%)	14 (28%)	0 2

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	27	GLN
2	A	28	SER
2	A	60	VAL
2	A	13	ARG
2	A	51	TYR

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

Mol	Chain	Res	Type
2	A	16	GLN
2	A	27	GLN
2	A	31	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

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.