wwPDB X-ray Structure Validation Summary Report (i)

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PDB ID	:	1RPE
Title	:	THE PHAGE 434 OR2/R1-69 COMPLEX AT 2.5 ANGSTROMS RESOLUTION
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Deposited on	:	1993-03-24
Resolution	:	2.50 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
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

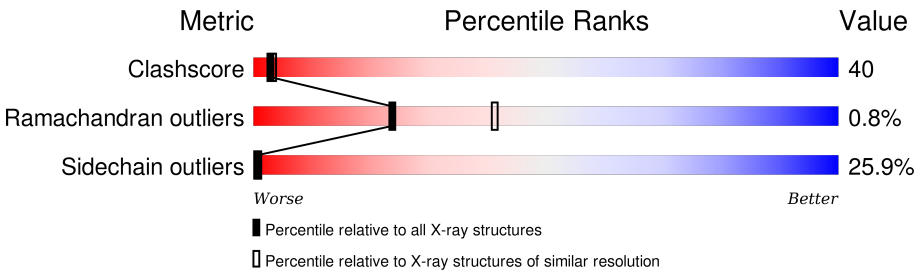
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

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 2.50 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	102246	4242 (2.50-2.50)
Ramachandran outliers	100387	4156 (2.50-2.50)
Sidechain outliers	100360	4158 (2.50-2.50)

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. 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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	B	20	10% 60% 30%
2	A	20	20% 35% 45%
3	L	69	28% 49% 13% • 9%
3	R	69	33% 42% 16% 9%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 1818 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*AP*CP*AP*AP*TP*GP*TP*AP*TP*CP*TP*TP*GP*T P*TP*TP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	B	20	406	198	66	123	19	0	0	0

- Molecule 2 is a DNA chain called DNA (5'-D(*AP*CP*AP*AP*AP*CP*AP*AP*GP*AP*TP*AP*CP*AP*TP*TP*G P*TP*AP*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	A	20	408	197	79	113	19	0	0	0

- Molecule 3 is a protein called PROTEIN (434 REPRESSOR).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	L	63	484	301	90	93	0	0	0
3	R	63	484	301	90	93	0	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	14	14	14	0	0
4	B	7	7	7	0	0
4	L	8	8	8	0	0
4	R	7	7	7	0	0

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 errors 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.

Note EDS was not executed.

• Molecule 1: DNA (5'-D(*TP*AP*TP*AP*CP*AP*AP*TP*GP*TP*AP*TP*CP*TP*TP*GP *T P*TP*TP*G)-3')

Chain B: 10% 60% 30%

T1 A2 T3 A4 C5 T8 G9 T10 A11 T12 C13 T14 T15 G16 T17 T18 T19 G20

• Molecule 2: DNA (5'-D(*AP*CP*AP*AP*AP*CP*AP*AP*GP*AP*TP*AP*CP*AP*TP*TP *G P*TP*AP*T)-3')

Chain A: 20% 35% 45%

A21 C22 A23 A24 A25 C26 A27 A28 G29 A30 T31 A32 C33 A34 T35 T36 G37 T38 A39 T40

• Molecule 3: PROTEIN (434 REPRESSOR)

Chain L: 28% 49% 13% • 9%

S1 I2 S3 S4 R5 V6 K7 S8 K9 R10 I11 Q12 L13 G14 L15 N16 Q17 A18 E19 L20 A21 Q22 K23 V24 G25 T26 Q29 S30 I31 E32 E35 K38 R41 P42 R43 F44 L45 P46 E47 L48 A49 S50 A51 L52 V56 D57 W58 L59 L60 N61 G62 T63 SER ASP SER

ASN VAL ARG

• Molecule 3: PROTEIN (434 REPRESSOR)

Chain R: 33% 42% 16% 9%

S1 I2 S3 S4 R5 V6 K7 S8 K9 R10 I11 Q12 N16 Q17 A18 E19 L20 A21 Q22 K23 T26 T27 Q28 Q29 S30 I31 E32 Q33 L34 E35 N36 G37 K38 T39 K40 R41 P42 R43 E47 L52 G53 V54 S55 V56 D57 W58 L59 L60 N61 G62 T63 SER ASP SER ASN VAL

ARG

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	149.29Å 64.29Å 27.69Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	5.50 – 2.50	Depositor
% Data completeness (in resolution range)	70.2 (5.50-2.50)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CORELS	Depositor
R, R_{free}	0.209 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1818	wwPDB-VP
Average B, all atoms ($Å^2$)	20.0	wwPDB-VP

5 Model quality (i)

5.1 Standard geometry (i)

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	B	1.40	3/453 (0.7%)	1.78	11/698 (1.6%)
2	A	1.50	3/459 (0.7%)	1.72	12/706 (1.7%)
3	L	0.96	1/488 (0.2%)	1.35	4/656 (0.6%)
3	R	0.93	2/488 (0.4%)	1.28	4/656 (0.6%)
All	All	1.21	9/1888 (0.5%)	1.55	31/2716 (1.1%)

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	10	DT	C3'-O3'	-7.04	1.34	1.44
3	L	32	GLU	CD-OE1	6.34	1.32	1.25
2	A	24	DA	N7-C5	-6.32	1.35	1.39
1	B	12	DT	C3'-O3'	-6.23	1.35	1.44
3	R	47	GLU	CD-OE1	5.55	1.31	1.25

The worst 5 of 31 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	14	DT	O4'-C1'-N1	-11.38	100.04	108.00
3	L	41	ARG	NE-CZ-NH1	8.50	124.55	120.30
2	A	34	DA	P-O3'-C3'	7.79	129.05	119.70
2	A	40	DT	O4'-C1'-N1	7.63	113.34	108.00
2	A	26	DC	O4'-C1'-N1	-7.60	102.68	108.00

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	B	406	0	232	19	2
2	A	408	0	227	28	3
3	L	484	0	512	37	0
3	R	484	0	511	52	0
4	A	14	0	0	5	0
4	B	7	0	0	3	1
4	L	8	0	0	0	0
4	R	7	0	0	0	0
All	All	1818	0	1482	123	3

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 40.

The worst 5 of 123 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:13:DC:H42	2:A:29:DG:H1	1.10	0.95
3:R:22:GLN:HE21	3:R:22:GLN:HA	1.33	0.94
1:B:2:DA:H2"	4:B:27:HOH:O	1.69	0.91
3:L:2:ILE:O	3:L:6:VAL:HG12	1.70	0.91
3:L:58:TRP:HA	3:L:63:THR:H	1.36	0.89

All (3) 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:B:1:DT:N3	2:A:21:DA:N1[1_545]	2.12	0.08
2:A:21:DA:O3'	4:B:22:HOH:O[1_565]	2.15	0.05
1:B:1:DT:N3	2:A:21:DA:C2[1_545]	2.17	0.03

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	
3	L	61/69 (88%)	53 (87%)	7 (12%)	1 (2%)	12	21
3	R	61/69 (88%)	55 (90%)	6 (10%)	0	100	100
All	All	122/138 (88%)	108 (88%)	13 (11%)	1 (1%)	24	41

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	L	17	GLN

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	
3	L	54/60 (90%)	38 (70%)	16 (30%)	0	0
3	R	54/60 (90%)	42 (78%)	12 (22%)	1	2
All	All	108/120 (90%)	80 (74%)	28 (26%)	0	1

5 of 28 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	L	47	GLU
3	L	63	THR
3	R	41	ARG
3	L	50	SER
3	L	61	ASN

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

Mol	Chain	Res	Type
3	L	33	GLN
3	L	61	ASN

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Mol	Chain	Res	Type
3	R	22	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 carbohydrates in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

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)

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates (i)

EDS was not executed - this section will therefore be empty.

6.4 Ligands (i)

EDS was not executed - this section will therefore be empty.

6.5 Other polymers (i)

EDS was not executed - this section will therefore be empty.