Full wwPDB X-ray Structure Validation Report ⓘ

Aug 20, 2023 – 01:49 PM EDT

PDB ID	:	2O3R
Title	:	Structural Basis for Formation and Hydrolysis of Calcium Messenger Cyclic ADP-ribose by Human CD38
Authors	:	Liu, Q.; Kriksunov, I.A.; Graeff, R.; Lee, H.C.; Hao, Q.
Deposited on	:	2006-12-01
Resolution	:	1.75 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:

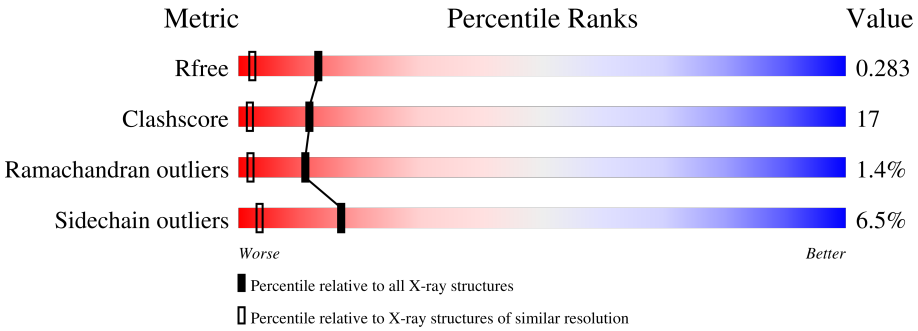
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 1.75 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	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)

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	262	72% 19% 5%
1	B	262	60% 31% 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	CXR	A	301	X	-	-	-
2	CXR	B	301	X	-	-	-

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 4484 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.

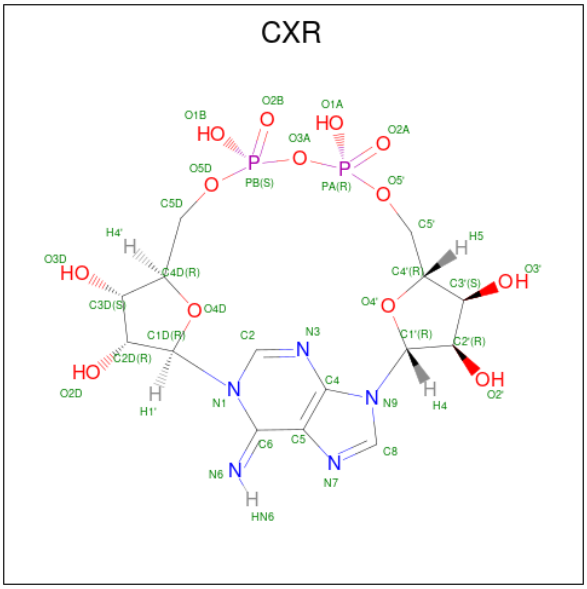
- Molecule 1 is a protein called ADP-ribosyl cyclase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	252	Total	C	N	O	S	0	0	0
			2007	1265	351	375	16			
1	B	252	Total	C	N	O	S	0	0	0
			2007	1265	351	375	16			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	39	LYS	-	cloning artifact	UNP P28907
A	40	ARG	-	cloning artifact	UNP P28907
A	41	GLU	-	cloning artifact	UNP P28907
A	42	ALA	-	cloning artifact	UNP P28907
A	43	GLU	-	cloning artifact	UNP P28907
A	44	ALA	-	cloning artifact	UNP P28907
A	49	THR	GLN	engineered mutation	UNP P28907
A	100	ASP	ASN	engineered mutation	UNP P28907
A	164	ASP	ASN	engineered mutation	UNP P28907
A	209	ASP	ASN	engineered mutation	UNP P28907
A	219	ASP	ASN	engineered mutation	UNP P28907
A	226	ASP	GLU	engineered mutation	UNP P28907
B	39	LYS	-	cloning artifact	UNP P28907
B	40	ARG	-	cloning artifact	UNP P28907
B	41	GLU	-	cloning artifact	UNP P28907
B	42	ALA	-	cloning artifact	UNP P28907
B	43	GLU	-	cloning artifact	UNP P28907
B	44	ALA	-	cloning artifact	UNP P28907
B	49	THR	GLN	engineered mutation	UNP P28907
B	100	ASP	ASN	engineered mutation	UNP P28907
B	164	ASP	ASN	engineered mutation	UNP P28907
B	209	ASP	ASN	engineered mutation	UNP P28907
B	219	ASP	ASN	engineered mutation	UNP P28907
B	226	ASP	GLU	engineered mutation	UNP P28907

- Molecule 2 is CYCLIC ADENOSINE DIPHOSPHATE-RIBOSE (three-letter code: CXR) (formula: $C_{15}H_{21}N_5O_{13}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			35	15	5	13	2		
2	B	1	Total	C	N	O	P	0	0
			35	15	5	13	2		

- Molecule 3 is water.

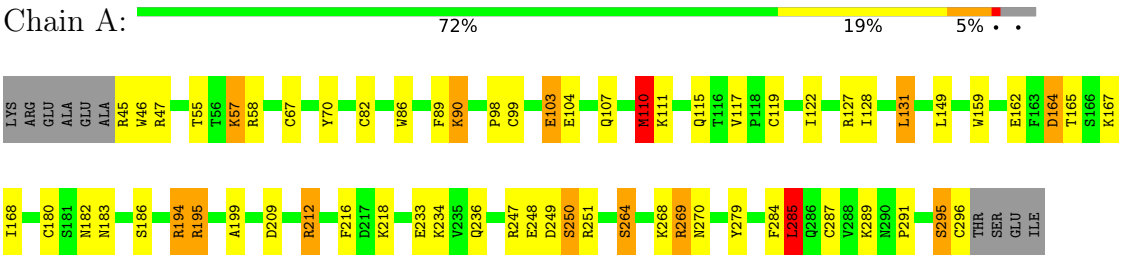
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	223	Total	O	0	0
			223	223		
3	B	177	Total	O	0	0
			177	177		

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.

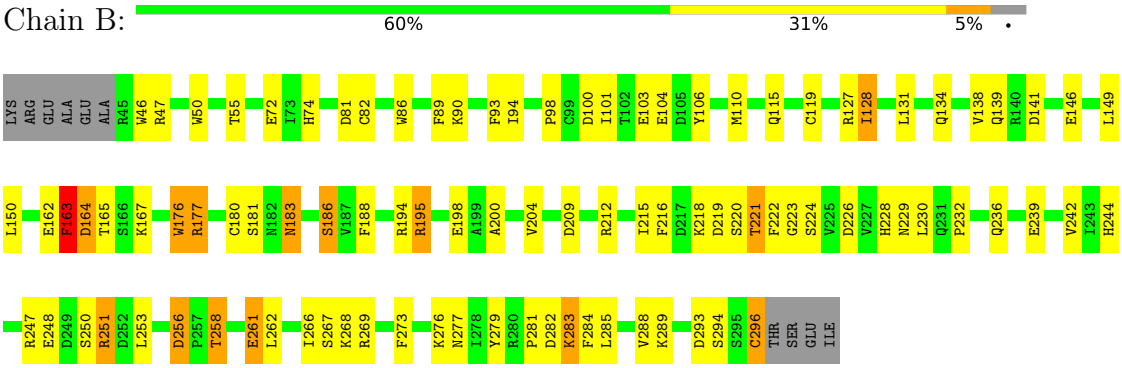
- Molecule 1: ADP-ribosyl cyclase 1

Chain A:



- Molecule 1: ADP-ribosyl cyclase 1

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	41.72Å 53.00Å 65.94Å 104.96° 91.22° 94.57°	Depositor
Resolution (Å)	20.00 – 1.75 19.86 – 1.75	Depositor EDS
% Data completeness (in resolution range)	100.0 (20.00-1.75) 94.6 (19.86-1.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.69 (at 1.76Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.183 , 0.229 0.251 , 0.283	Depositor DCC
R_{free} test set	2631 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å^2)	27.9	Xtriage
Anisotropy	0.061	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.44 , 74.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	4484	wwPDB-VP
Average B, all atoms (Å^2)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.72% 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: CXR

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	1.35	9/2057 (0.4%)	1.31	11/2784 (0.4%)
1	B	1.43	21/2057 (1.0%)	1.14	7/2784 (0.3%)
All	All	1.39	30/4114 (0.7%)	1.23	18/5568 (0.3%)

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	B	0	1

All (30) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	283	LYS	CD-CE	12.47	1.82	1.51
1	B	163	PHE	CB-CG	-9.60	1.35	1.51
1	B	239	GLU	CD-OE2	8.29	1.34	1.25
1	B	86	TRP	CE3-CZ3	8.12	1.52	1.38
1	A	70	TYR	CD1-CE1	7.61	1.50	1.39
1	A	110	MET	CG-SD	-7.47	1.61	1.81
1	B	82	CYS	CB-SG	7.28	1.94	1.82
1	B	251	ARG	CZ-NH1	7.26	1.42	1.33
1	B	176	TRP	CB-CG	-7.05	1.37	1.50
1	A	82	CYS	CB-SG	6.89	1.94	1.82
1	B	276	LYS	CE-NZ	6.86	1.66	1.49
1	B	188	PHE	CD2-CE2	6.61	1.52	1.39
1	B	119	CYS	CB-SG	-6.45	1.71	1.82
1	B	296	CYS	C-O	6.42	1.35	1.23
1	B	46	TRP	CE3-CZ3	5.97	1.48	1.38
1	B	72	GLU	CB-CG	5.92	1.63	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	93	PHE	CG-CD2	5.91	1.47	1.38
1	A	284	PHE	C-N	5.74	1.47	1.34
1	B	277	ASN	CG-OD1	5.74	1.36	1.24
1	A	234	LYS	N-CA	5.69	1.57	1.46
1	B	163	PHE	CD2-CE2	-5.53	1.28	1.39
1	B	101	ILE	N-CA	5.46	1.57	1.46
1	B	50	TRP	CG-CD1	5.41	1.44	1.36
1	B	188	PHE	CD1-CE1	5.38	1.50	1.39
1	A	264	SER	CB-OG	-5.20	1.35	1.42
1	B	186	SER	CB-OG	5.17	1.49	1.42
1	B	283	LYS	CE-NZ	5.14	1.61	1.49
1	A	67	CYS	CB-SG	-5.10	1.73	1.81
1	A	159	TRP	CE3-CZ3	5.05	1.47	1.38
1	A	233	GLU	CG-CD	5.02	1.59	1.51

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	269	ARG	NE-CZ-NH1	24.01	132.31	120.30
1	A	269	ARG	NE-CZ-NH2	-23.24	108.68	120.30
1	A	269	ARG	CD-NE-CZ	8.82	135.94	123.60
1	B	251	ARG	NE-CZ-NH1	8.21	124.41	120.30
1	B	251	ARG	NE-CZ-NH2	-7.90	116.35	120.30
1	A	285	LEU	CA-CB-CG	7.48	132.51	115.30
1	B	164	ASP	N-CA-CB	-7.39	97.31	110.60
1	B	81	ASP	CB-CG-OD2	6.63	124.27	118.30
1	B	146	GLU	OE1-CD-OE2	-6.10	115.98	123.30
1	B	55	THR	CA-CB-CG2	-5.99	104.02	112.40
1	A	195	ARG	NE-CZ-NH1	5.88	123.24	120.30
1	A	234	LYS	CD-CE-NZ	-5.76	98.45	111.70
1	A	90	LYS	CB-CA-C	-5.75	98.91	110.40
1	A	269	ARG	CG-CD-NE	-5.70	99.83	111.80
1	A	99	CYS	CA-CB-SG	-5.23	104.58	114.00
1	A	194	ARG	NE-CZ-NH2	-5.16	117.72	120.30
1	A	131	LEU	CB-CG-CD2	5.10	119.67	111.00
1	B	283	LYS	CD-CE-NZ	-5.05	100.08	111.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	164	ASP	Peptide

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	2007	0	1915	56	0
1	B	2007	0	1915	91	0
2	A	35	0	18	0	0
2	B	35	0	19	7	0
3	A	223	0	0	17	0
3	B	177	0	0	16	0
All	All	4484	0	3867	139	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 17.

All (139) 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:283:LYS:CD	1:B:283:LYS:CE	1.82	1.56
1:B:221:THR:HG21	2:B:301:CXR:C5D	1.71	1.20
1:B:221:THR:CG2	2:B:301:CXR:H12	1.78	1.13
1:A:270:ASN:HB2	3:A:523:HOH:O	1.53	1.06
1:A:165:THR:HG23	1:A:167:LYS:H	1.19	1.05
1:B:221:THR:HG21	2:B:301:CXR:H12	1.06	1.04
1:B:195:ARG:HG3	1:B:195:ARG:HH11	1.20	1.04
1:B:176:TRP:HD1	1:B:177:ARG:HG3	1.26	0.97
1:B:266:ILE:HD11	1:B:273:PHE:HB2	1.49	0.91
1:A:269:ARG:HD2	3:B:413:HOH:O	1.70	0.91
1:B:74:HIS:HD2	3:B:437:HOH:O	1.55	0.89
1:B:165:THR:HG23	1:B:167:LYS:H	1.40	0.86
1:B:115:GLN:HE22	1:B:149:LEU:H	1.30	0.80
1:A:115:GLN:HE22	1:A:149:LEU:H	1.29	0.79
1:B:74:HIS:CD2	3:B:437:HOH:O	2.34	0.79
1:B:177:ARG:CB	1:B:177:ARG:HH11	1.95	0.79
1:A:291:PRO:CA	3:A:449:HOH:O	2.34	0.76
1:B:177:ARG:NH1	1:B:177:ARG:HB3	2.00	0.75
1:B:198:GLU:HG3	1:B:229:ASN:HB3	1.68	0.75
1:A:269:ARG:HD3	1:B:100:ASP:CG	2.07	0.74
1:B:177:ARG:HH11	1:B:177:ARG:HB3	1.52	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:221:THR:HG21	2:B:301:CXR:H11	1.69	0.73
1:A:268:LYS:HD2	1:B:163:PHE:HE1	1.54	0.73
1:B:103:GLU:CD	1:B:194:ARG:HH21	1.93	0.71
1:B:195:ARG:HG3	1:B:195:ARG:NH1	1.98	0.71
1:B:236:GLN:HB3	3:B:365:HOH:O	1.92	0.70
1:B:244:HIS:HB2	1:B:279:TYR:O	1.92	0.70
1:B:176:TRP:CD1	1:B:177:ARG:HG3	2.18	0.69
1:A:268:LYS:CD	1:B:163:PHE:HE1	2.06	0.68
1:A:270:ASN:HB2	3:A:522:HOH:O	1.91	0.68
1:A:268:LYS:HD2	1:B:163:PHE:CE1	2.28	0.68
1:B:162:GLU:HB2	1:B:165:THR:HG22	1.75	0.67
1:B:195:ARG:N	1:B:195:ARG:HD2	2.10	0.67
1:A:122:ILE:CD1	3:A:444:HOH:O	2.43	0.66
1:A:199:ALA:HB3	3:A:444:HOH:O	1.94	0.66
1:A:270:ASN:CG	3:A:461:HOH:O	2.34	0.65
1:A:122:ILE:HD11	3:A:444:HOH:O	1.96	0.65
1:B:138:VAL:CG1	1:B:289:LYS:HA	2.26	0.65
1:A:110:MET:SD	1:A:195:ARG:HD2	2.37	0.65
1:A:165:THR:HG23	1:A:167:LYS:N	2.03	0.65
1:A:295:SER:C	1:A:296:CYS:SG	2.76	0.64
1:A:119:CYS:HB3	3:A:357:HOH:O	1.98	0.63
1:B:228:HIS:HD2	1:B:269:ARG:HH21	1.47	0.63
1:A:268:LYS:CD	1:B:163:PHE:CE1	2.82	0.62
1:B:90:LYS:HG2	1:B:94:ILE:HG13	1.81	0.62
1:A:183:ASN:ND2	1:A:186:SER:H	1.98	0.62
1:B:283:LYS:CE	1:B:283:LYS:CG	2.75	0.62
1:A:270:ASN:CB	3:A:522:HOH:O	2.47	0.61
1:B:138:VAL:HG13	1:B:289:LYS:HA	1.82	0.61
1:A:285:LEU:HD13	1:A:289:LYS:HE3	1.83	0.61
1:B:283:LYS:CD	1:B:283:LYS:NZ	2.64	0.60
1:A:269:ARG:HD3	1:B:100:ASP:CB	2.30	0.60
1:A:162:GLU:HB2	1:A:165:THR:HG22	1.83	0.60
1:A:269:ARG:HD3	1:B:100:ASP:HB3	1.84	0.60
1:B:209:ASP:OD2	1:B:212:ARG:NE	2.32	0.60
1:A:209:ASP:HB3	1:A:212:ARG:HG3	1.84	0.59
1:B:251:ARG:HD3	1:B:251:ARG:H	1.67	0.59
1:B:222:PHE:HA	1:B:226:ASP:HB2	1.84	0.59
1:B:195:ARG:NH1	3:B:416:HOH:O	2.36	0.58
2:B:301:CXR:O5D	2:B:301:CXR:H3	2.03	0.58
1:B:221:THR:HB	2:B:301:CXR:O2B	2.04	0.57
1:A:164:ASP:OD2	1:A:164:ASP:N	2.38	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:216:PHE:HB3	1:B:258:THR:O	2.04	0.57
1:B:253:LEU:HD22	3:B:445:HOH:O	2.04	0.56
1:B:244:HIS:NE2	1:B:279:TYR:HD1	2.03	0.56
1:B:228:HIS:HD2	1:B:269:ARG:NH2	2.04	0.55
1:B:104:GLU:HG3	3:B:415:HOH:O	2.06	0.55
1:B:266:ILE:HD11	1:B:273:PHE:CB	2.30	0.55
1:A:182:ASN:HB2	3:A:505:HOH:O	2.06	0.55
1:A:194:ARG:CZ	3:A:435:HOH:O	2.55	0.54
1:A:57:LYS:O	1:A:58:ARG:HG2	2.08	0.54
1:A:165:THR:CG2	1:A:167:LYS:H	2.08	0.53
1:A:57:LYS:C	1:A:58:ARG:HG2	2.28	0.53
1:A:162:GLU:OE2	1:A:165:THR:HG21	2.09	0.53
1:A:127:ARG:HB3	1:A:212:ARG:NE	2.24	0.53
1:B:183:ASN:ND2	1:B:186:SER:H	2.06	0.53
1:A:115:GLN:NE2	1:A:149:LEU:H	2.04	0.53
1:B:220:SER:O	1:B:223:GLY:N	2.42	0.52
1:A:98:PRO:O	1:A:183:ASN:HA	2.10	0.52
1:B:177:ARG:CB	1:B:177:ARG:NH1	2.64	0.52
1:B:47:ARG:CZ	3:B:442:HOH:O	2.56	0.52
1:B:293:ASP:H	1:B:296:CYS:HB2	1.73	0.52
1:A:104:GLU:HG2	3:A:456:HOH:O	2.09	0.52
1:B:47:ARG:NE	3:B:442:HOH:O	2.42	0.52
1:B:244:HIS:CE1	1:B:279:TYR:CD1	2.98	0.52
1:A:128:ILE:HG23	1:A:128:ILE:O	2.08	0.51
1:B:139:GLN:C	1:B:141:ASP:H	2.12	0.51
1:B:221:THR:HG22	3:B:390:HOH:O	2.11	0.51
1:B:98:PRO:O	1:B:183:ASN:HA	2.11	0.50
1:B:228:HIS:CD2	1:B:269:ARG:HH21	2.28	0.50
1:B:279:TYR:O	1:B:281:PRO:HD3	2.11	0.50
1:B:261:GLU:HG3	1:B:261:GLU:O	2.13	0.49
1:B:216:PHE:CD2	1:B:262:LEU:HB2	2.47	0.49
1:A:122:ILE:HD13	3:A:444:HOH:O	2.11	0.48
1:B:127:ARG:HE	1:B:212:ARG:HH11	1.61	0.48
1:A:55:THR:HG21	1:A:168:ILE:HG21	1.95	0.48
1:A:268:LYS:HD3	1:B:163:PHE:CE1	2.48	0.47
1:B:128:ILE:HB	1:B:209:ASP:HB2	1.96	0.47
1:B:296:CYS:HA	3:B:434:HOH:O	2.13	0.47
1:A:183:ASN:HD21	1:A:186:SER:H	1.60	0.47
1:A:249:ASP:CA	1:A:279:TYR:CD1	2.97	0.47
1:A:86:TRP:CE2	1:A:90:LYS:HG3	2.50	0.47
1:B:221:THR:HG22	2:B:301:CXR:H12	1.86	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:57:LYS:H	1:A:57:LYS:HG3	1.25	0.46
1:B:115:GLN:NE2	1:B:149:LEU:H	2.08	0.46
1:B:141:ASP:HB3	3:B:401:HOH:O	2.15	0.46
1:B:200:ALA:HB1	1:B:204:VAL:HG22	1.98	0.46
1:A:107:GLN:HA	1:A:110:MET:HG3	1.98	0.46
1:B:106:TYR:O	1:B:110:MET:HG2	2.16	0.46
1:B:244:HIS:NE2	1:B:279:TYR:CD1	2.83	0.45
1:B:266:ILE:HG13	1:B:267:SER:N	2.32	0.45
1:A:117:VAL:HG12	3:A:415:HOH:O	2.15	0.45
1:B:176:TRP:CH2	3:B:409:HOH:O	2.69	0.45
1:A:216:PHE:CE2	1:A:218:LYS:HG2	2.52	0.44
1:B:176:TRP:CZ3	1:B:181:SER:HB2	2.52	0.44
1:B:195:ARG:HD2	1:B:195:ARG:H	1.79	0.44
1:B:244:HIS:CG	1:B:279:TYR:HA	2.53	0.44
1:B:110:MET:HE1	1:B:150:LEU:HD13	2.00	0.44
1:B:215:ILE:HD12	1:B:256:ASP:CG	2.39	0.43
1:A:103:GLU:HG2	3:A:320:HOH:O	2.18	0.43
1:B:139:GLN:C	1:B:141:ASP:N	2.72	0.43
1:B:134:GLN:OE1	1:B:285:LEU:HD11	2.18	0.43
1:B:176:TRP:CD1	1:B:176:TRP:C	2.89	0.43
1:A:55:THR:HG21	1:A:168:ILE:CG2	2.49	0.42
1:A:47:ARG:O	1:A:47:ARG:HG2	2.18	0.42
1:A:180:CYS:HB2	3:A:505:HOH:O	2.20	0.42
1:B:228:HIS:CE1	3:B:456:HOH:O	2.73	0.42
1:A:287:CYS:HB3	1:A:296:CYS:HB3	1.80	0.41
1:B:176:TRP:HD1	1:B:177:ARG:CG	2.13	0.41
1:A:45:ARG:HB2	1:A:46:TRP:H	1.75	0.41
1:B:110:MET:CE	1:B:150:LEU:HD13	2.51	0.41
1:B:180:CYS:HB2	3:B:325:HOH:O	2.21	0.41
1:B:244:HIS:CD2	1:B:250:SER:HB2	2.56	0.41
1:B:284:PHE:O	1:B:288:VAL:HG23	2.21	0.40
1:A:264:SER:CB	1:B:163:PHE:HZ	2.34	0.40
1:A:295:SER:CA	3:A:341:HOH:O	2.69	0.40
1:B:176:TRP:CZ3	3:B:409:HOH:O	2.58	0.40
1:B:230:LEU:O	1:B:232:PRO:HD3	2.21	0.40
1:B:127:ARG:NE	1:B:212:ARG:HH11	2.18	0.40

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	250/262 (95%)	235 (94%)	11 (4%)	4 (2%)	9 1
1	B	250/262 (95%)	233 (93%)	14 (6%)	3 (1%)	13 3
All	All	500/524 (95%)	468 (94%)	25 (5%)	7 (1%)	11 2

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	248	GLU
1	A	295	SER
1	B	248	GLU
1	A	250	SER
1	A	247	ARG
1	B	294	SER
1	B	247	ARG

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	223/241 (92%)	211 (95%)	12 (5%)	22 5
1	B	223/241 (92%)	206 (92%)	17 (8%)	13 2
All	All	446/482 (92%)	417 (94%)	29 (6%)	17 3

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	LYS
1	A	89	PHE
1	A	103	GLU
1	A	110	MET
1	A	111	LYS
1	A	131	LEU
1	A	164	ASP
1	A	212	ARG
1	A	236	GLN
1	A	250	SER
1	A	251	ARG
1	A	285	LEU
1	B	89	PHE
1	B	128	ILE
1	B	131	LEU
1	B	163	PHE
1	B	177	ARG
1	B	183	ASN
1	B	195	ARG
1	B	218	LYS
1	B	219	ASP
1	B	221	THR
1	B	224	SER
1	B	242	VAL
1	B	256	ASP
1	B	258	THR
1	B	261	GLU
1	B	268	LYS
1	B	282	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	83	GLN
1	A	115	GLN
1	A	134	GLN
1	A	139	GLN
1	A	171	GLN
1	A	183	ASN
1	A	270	ASN
1	B	115	GLN
1	B	171	GLN
1	B	183	ASN

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Mol	Chain	Res	Type
1	B	228	HIS
1	B	286	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands are modelled in this entry.

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	$\#\|Z\| > 2$
2	CXR	A	301	-	31,39,39	2.92	13 (41%)	37,62,62	1.51	7 (18%)
2	CXR	B	301	-	31,39,39	3.09	12 (38%)	37,62,62	1.89	7 (18%)

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
2	CXR	A	301	-	1/1/10/10	0/22/58/58	0/3/5/5
2	CXR	B	301	-	1/1/10/10	4/22/58/58	0/3/5/5

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	CXR	C6-N6	9.72	1.52	1.27
2	A	301	CXR	C8-N7	9.00	1.50	1.35
2	A	301	CXR	O4'-C1'	7.26	1.51	1.41
2	B	301	CXR	C2-N1	6.41	1.51	1.36
2	B	301	CXR	O2D-C2D	5.80	1.56	1.43
2	A	301	CXR	C2-N3	5.47	1.35	1.29
2	B	301	CXR	O4'-C1'	5.05	1.48	1.41
2	A	301	CXR	O2D-C2D	4.77	1.54	1.43
2	B	301	CXR	C2D-C3D	-4.48	1.41	1.53
2	B	301	CXR	C5-C4	3.82	1.52	1.43
2	A	301	CXR	O4D-C1D	3.37	1.50	1.42
2	B	301	CXR	C8-N7	3.31	1.40	1.35
2	A	301	CXR	PA-O5'	3.13	1.72	1.59
2	A	301	CXR	C6-N6	3.01	1.35	1.27
2	B	301	CXR	O4'-C4'	2.89	1.51	1.45
2	A	301	CXR	O3D-C3D	2.80	1.49	1.43
2	B	301	CXR	C2'-C1'	-2.77	1.49	1.53
2	B	301	CXR	PB-O5D	2.62	1.69	1.59
2	A	301	CXR	C2D-C3D	-2.57	1.46	1.53
2	A	301	CXR	O5'-C5'	-2.50	1.35	1.44
2	A	301	CXR	PA-O2A	2.41	1.59	1.50
2	A	301	CXR	O4'-C4'	2.35	1.50	1.45
2	B	301	CXR	O3'-C3'	2.34	1.48	1.43
2	B	301	CXR	C4-N3	-2.30	1.30	1.37
2	A	301	CXR	PB-O1B	-2.08	1.45	1.55

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	301	CXR	C3'-C2'-C1'	7.07	111.62	100.98
2	B	301	CXR	O2'-C2'-C3'	-3.30	101.14	111.82
2	A	301	CXR	PA-O3A-PB	-3.26	121.64	132.83
2	A	301	CXR	C2'-C3'-C4'	3.19	108.83	102.64
2	A	301	CXR	O1B-PB-O2B	3.17	127.92	112.24
2	B	301	CXR	C8-N7-C5	3.01	108.72	102.99
2	B	301	CXR	PA-O3A-PB	-2.94	122.75	132.83
2	B	301	CXR	O4'-C4'-C5'	2.79	118.56	109.37
2	A	301	CXR	O2'-C2'-C1'	-2.62	101.19	110.85
2	A	301	CXR	C8-N7-C5	2.40	107.56	102.99
2	A	301	CXR	C2D-C1D-N1	2.37	119.94	113.22
2	A	301	CXR	O4D-C1D-C2D	-2.29	101.64	106.64
2	B	301	CXR	O1B-PB-O2B	2.09	122.56	112.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	301	CXR	C5'-C4'-C3'	-2.07	107.42	115.18

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	301	CXR	C3'
2	B	301	CXR	C3'

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	301	CXR	O4'-C4'-C5'-O5'
2	B	301	CXR	C3'-C4'-C5'-O5'
2	B	301	CXR	C5'-O5'-PA-O3A
2	B	301	CXR	C5D-O5D-PB-O2B

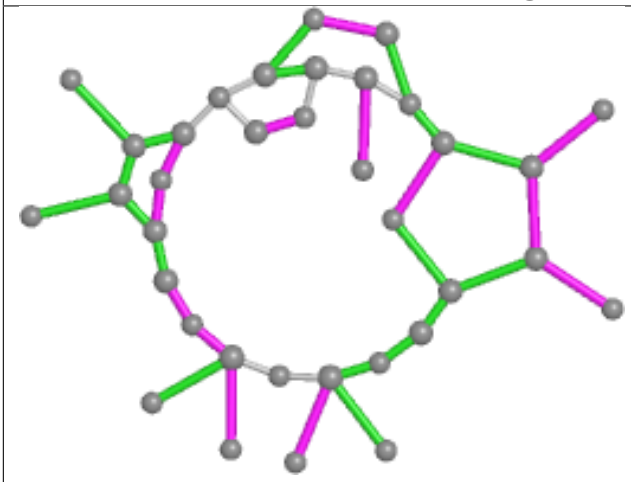
There are no ring outliers.

1 monomer is involved in 7 short contacts:

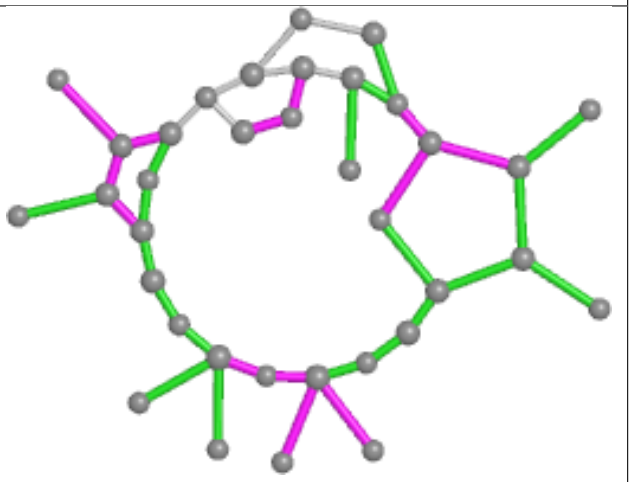
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	CXR	7	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

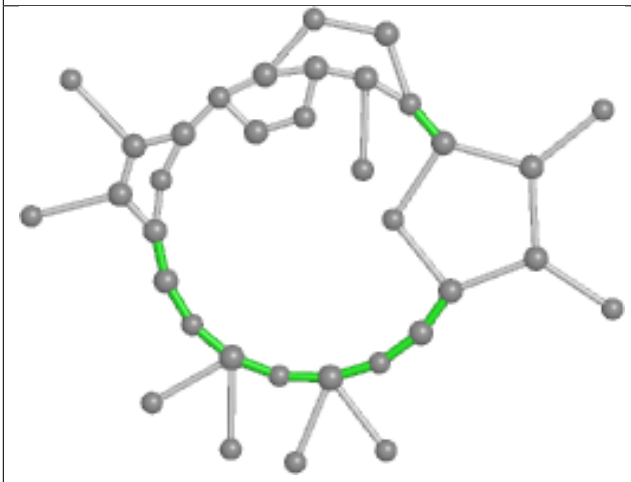
Ligand CXR A 301



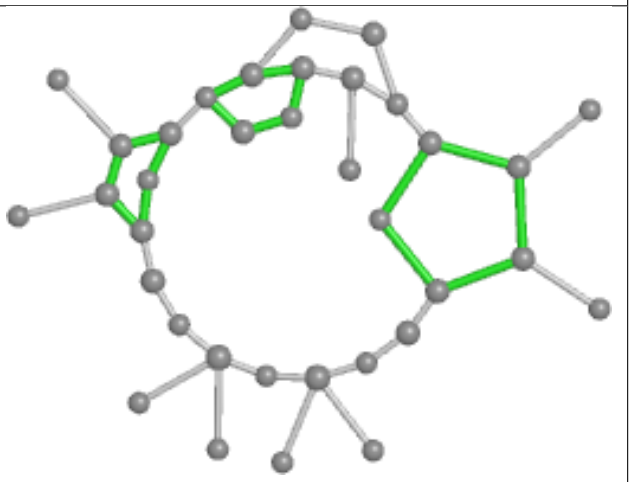
Bond lengths



Bond angles

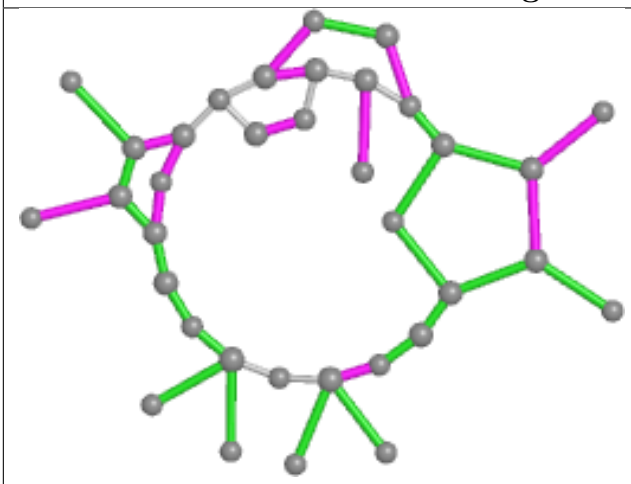


Torsions

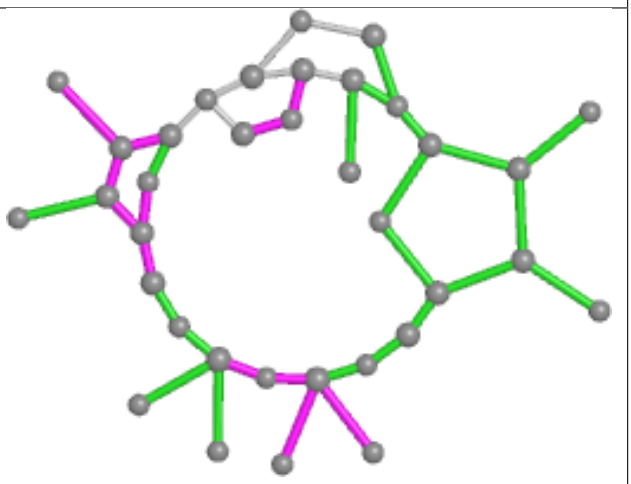


Rings

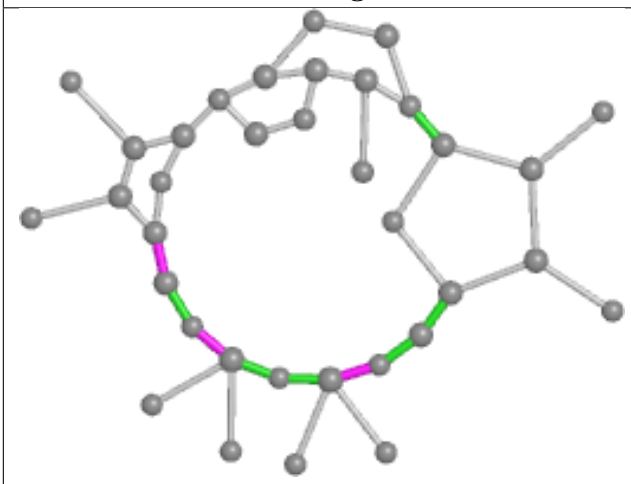
Ligand CXR B 301



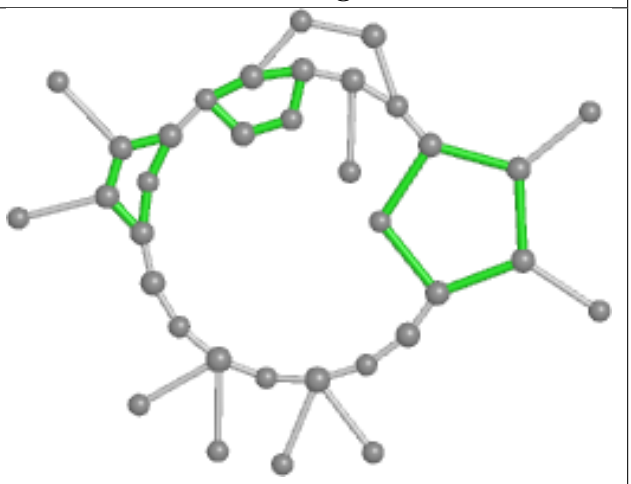
Bond lengths



Bond angles



Torsions



Rings

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

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.

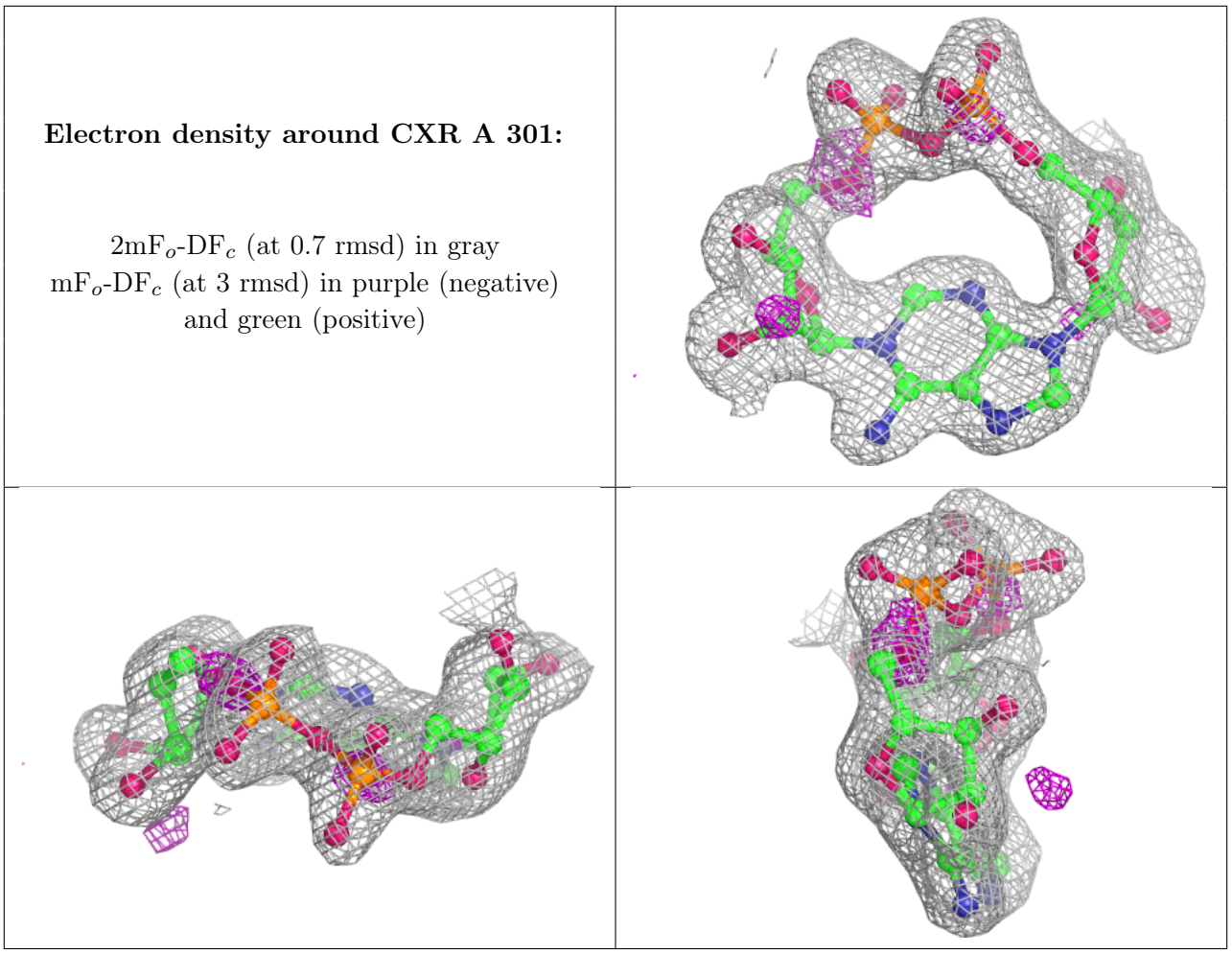
6.4 Ligands

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

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

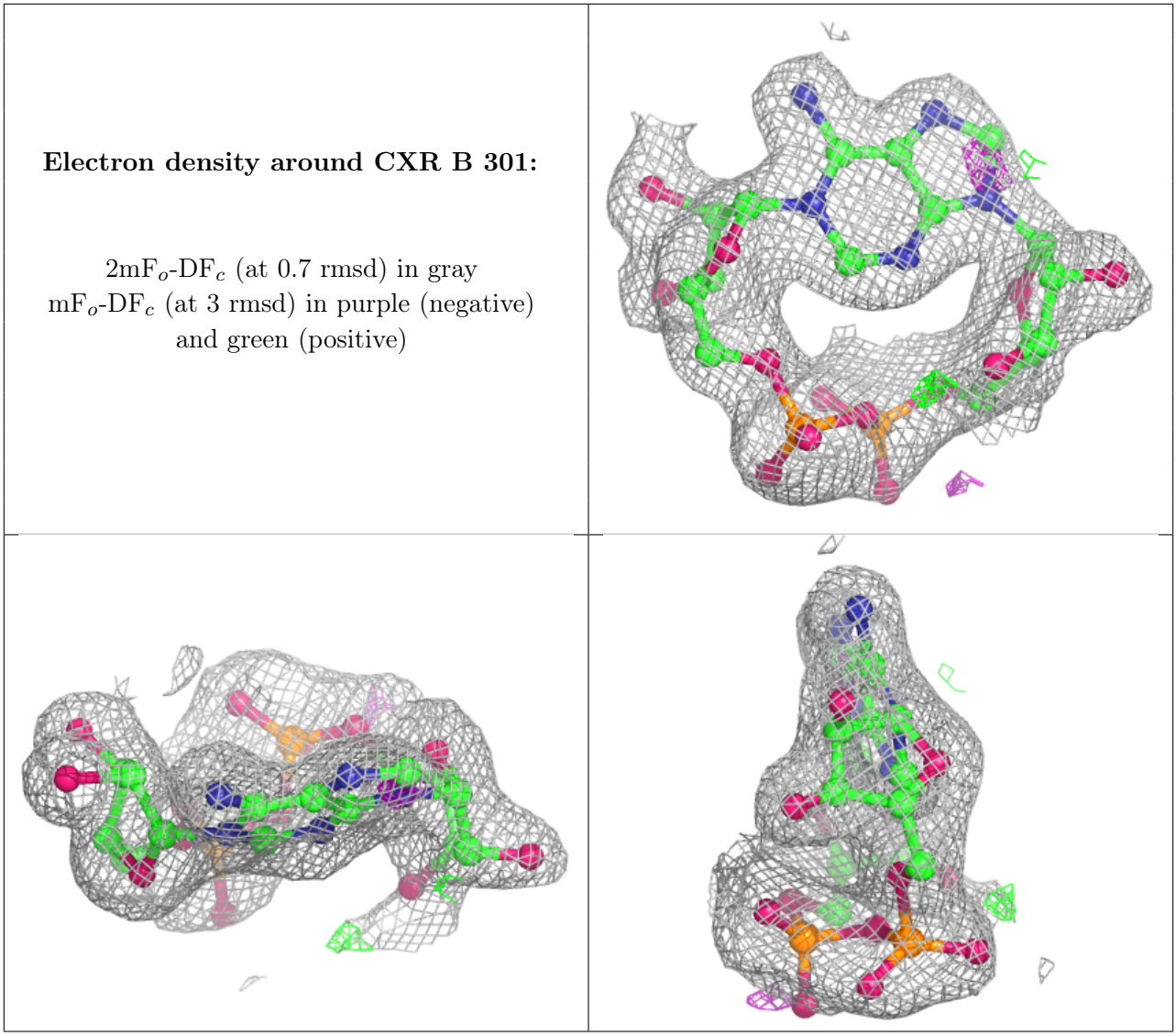
Electron density around CXR A 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



Electron density around CXR B 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



6.5 Other polymers (i)

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