



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 11:40 AM UTC

PDB ID : 3FDE / pdb_00003fde
Title : Mouse UHRF1 SRA domain bound with hemi-methylated CpG DNA, crystal structure in space group C222(1) at 1.4 Å resolution
Authors : Hashimoto, H.; Horton, J.R.; Zhang, X.; Cheng, X.
Deposited on : 2008-11-25
Resolution : 1.41 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

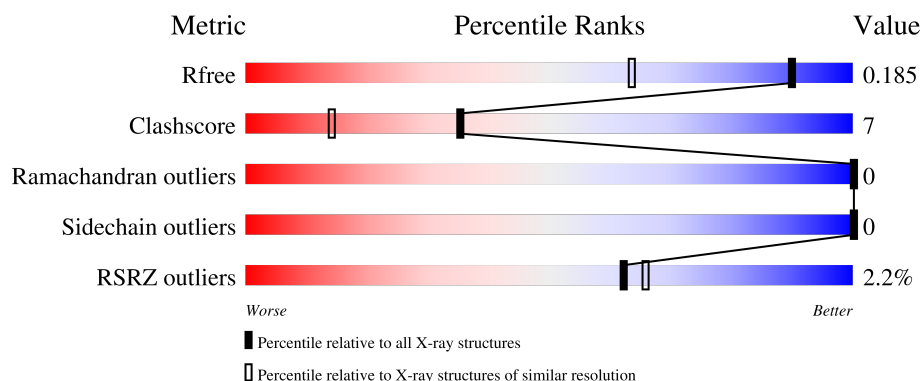
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.41 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}	180053	4041 (1.44-1.40)
Clashscore	190562	4154 (1.44-1.40)
Ramachandran outliers	187476	4083 (1.44-1.40)
Sidechain outliers	187428	4082 (1.44-1.40)
RSRZ outliers	180081	4039 (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 $\leq 5\%$. 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	212	2% 90% 9%
1	B	212	2% 92% 6%
2	C	12	58% 42%
2	D	12	75% 25%
3	E	12	67% 17% 17%

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Mol	Chain	Length	Quality of chain
3	F	12	67% 25% 8%

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
4	EDO	A	636	-	X	X	-
4	EDO	B	633	-	-	X	-
6	UNL	A	638	-	-	X	-
6	UNL	A	654	-	-	X	-
6	UNL	B	636	-	-	X	-
6	UNL	C	456	-	-	X	-
6	UNL	C	637	-	-	X	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 5159 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 E3 ubiquitin-protein ligase UHRF1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	210	Total	C	N	O	S	0	7	1
			1698	1051	326	315	6			
1	B	206	Total	C	N	O	S	0	4	0
			1651	1024	318	304	5			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	417	HIS	-	expression tag	UNP Q8VDF2
A	418	MET	-	expression tag	UNP Q8VDF2
B	417	HIS	-	expression tag	UNP Q8VDF2
B	418	MET	-	expression tag	UNP Q8VDF2

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	12	Total	C	N	O	P	0	0	0
			241	116	44	70	11			
2	C	12	Total	C	N	O	P	0	2	0
			283	136	52	82	13			

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	12	Total	C	N	O	P	0	0	0
			246	117	48	70	11			
3	F	12	Total	C	N	O	P	0	0	0
			246	117	48	70	11			

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



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

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

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Na 1 1	0	0
5	B	1	Total Na 1 1	0	0
5	E	1	Total Na 1 1	0	0
5	F	1	Total Na 1 1	0	0

- Molecule 6 is UNKNOWN LIGAND (CCD ID: UNL) (formula:).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	2	Total O 4 4	0	0
6	B	4	Total C O 12 2 10	0	0
6	C	3	Total O 6 6	0	0

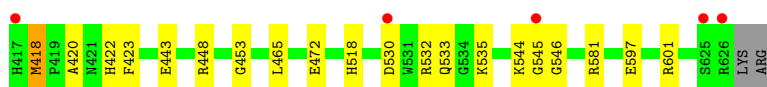
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	257	Total 257	O 257	0	0
7	B	269	Total 269	O 269	0	0
7	D	40	Total 40	O 40	0	0
7	E	37	Total 37	O 37	0	0
7	C	43	Total 43	O 43	0	0
7	F	34	Total 34	O 34	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.

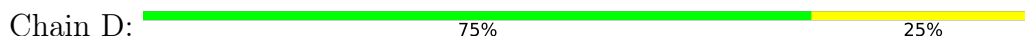
- Molecule 1: E3 ubiquitin-protein ligase UHRF1



- Molecule 1: E3 ubiquitin-protein ligase UHRF1



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



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



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



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

Chain F:  67% 25% 8%



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	84.68Å 103.69Å 149.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.79 – 1.41 32.79 – 1.41	Depositor EDS
% Data completeness (in resolution range)	96.1 (32.79-1.41) 96.1 (32.79-1.41)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.09 (at 1.41Å)	Xtriage
Refinement program	REFMAC 5.5.0044	Depositor
R, R_{free}	0.149 , 0.186 0.148 , 0.185	Depositor DCC
R_{free} test set	6067 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å ²)	14.3	Xtriage
Anisotropy	0.101	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 44.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5159	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.99% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: EDO, 5CM, NA, UNL

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	1.16	0/1740	1.00	1/2350 (0.0%)
1	B	1.22	0/1694	1.01	1/2291 (0.0%)
2	C	0.79	0/271	1.49	3/414 (0.7%)
2	D	0.94	0/246	1.69	2/375 (0.5%)
3	E	0.86	0/276	1.80	6/425 (1.4%)
3	F	0.81	0/276	1.51	1/425 (0.2%)
All	All	1.12	0/4503	1.20	14/6280 (0.2%)

There are no bond length outliers.

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	418	MET	CG-SD-CE	11.98	127.25	100.90
2	C	403	DC	O3'-P-O5'	-6.89	93.67	104.00
2	D	410	DT	C4'-C3'-O3'	-6.15	100.78	110.00
3	E	423	DC	O4'-C4'-C3'	-5.99	96.41	105.40
3	E	422	DT	C4'-C3'-O3'	-5.90	101.15	110.00
2	C	402	DC	C4'-C3'-O3'	-5.66	101.51	110.00
3	E	423	DC	C1'-O4'-C4'	-5.63	101.26	109.70
2	C	402	DC	O4'-C1'-N1	-5.56	100.06	108.40
2	D	406	DG	C2'-C3'-O3'	-5.51	103.24	111.50
3	F	425	DG	O3'-P-O5'	-5.45	95.83	104.00
3	E	421	DG	C4'-C3'-O3'	-5.42	101.88	110.00
3	E	424	DA	C4'-C3'-O3'	-5.35	101.98	110.00
1	B	615	TYR	N-CA-C	5.02	116.56	111.14
3	E	422	DT	P-O3'-C3'	5.02	127.73	120.20

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	1698	0	1618	23	0
1	B	1651	0	1566	18	0
2	C	283	0	162	1	0
2	D	241	0	138	0	0
3	E	246	0	134	2	0
3	F	246	0	136	3	0
4	A	32	0	48	7	0
4	B	20	0	30	8	0
4	C	4	0	4	0	0
4	D	4	0	4	0	0
4	E	8	0	11	0	0
4	F	20	0	29	3	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	E	1	0	0	0	0
5	F	1	0	0	0	0
6	A	4	0	0	4	0
6	B	12	0	0	5	0
6	C	6	0	0	5	0
7	A	257	0	0	11	0
7	B	269	0	0	9	0
7	C	43	0	0	1	0
7	D	40	0	0	0	0
7	E	37	0	0	0	0
7	F	34	0	0	1	0
All	All	5159	0	3880	62	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 7.

All (62) 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)
6:B:215:UNL:O1	6:B:215:UNL:O2	1.71	1.08
6:C:456:UNL:O1	6:C:456:UNL:O2	1.71	1.07

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:546:GLY:HA2	7:B:853:HOH:O	1.52	1.06
1:B:479:ASN:ND2	6:B:655:UNL:O1	1.94	1.00
6:A:638:UNL:O1	6:A:638:UNL:O2	1.86	0.94
6:C:637:UNL:O1	6:C:637:UNL:O2	1.91	0.89
3:E:423:DC:H2''	3:E:424:DA:O5'	1.74	0.86
1:A:532[B]:ARG:HB2	4:A:636:EDO:H21	1.56	0.84
1:B:572[B]:ARG:HD3	1:B:576:GLY:O	1.76	0.84
6:B:322:UNL:O1	6:B:322:UNL:O2	1.99	0.81
3:E:423:DC:H2'	3:E:424:DA:C8	2.18	0.79
1:B:572[B]:ARG:HG2	4:B:633:EDO:H12	1.65	0.77
7:A:212:HOH:O	4:B:633:EDO:H21	1.86	0.75
4:F:513:EDO:H11	7:F:327:HOH:O	1.86	0.74
1:A:601:ARG:NH2	7:A:399:HOH:O	2.22	0.73
1:B:476:ASP:HB2	4:B:630:EDO:H22	1.76	0.67
6:C:359:UNL:O1	6:C:359:UNL:O2	2.16	0.64
1:A:472:GLU:O	4:B:633:EDO:H11	1.97	0.64
1:B:572[A]:ARG:CZ	7:B:253:HOH:O	2.46	0.64
1:B:472:GLU:CG	7:B:852:HOH:O	2.46	0.63
1:A:601:ARG:NH2	1:A:601:ARG:HG2	2.12	0.62
3:F:425:DG:O6	4:F:513:EDO:H12	1.98	0.62
1:B:572[A]:ARG:NH2	7:B:253:HOH:O	2.33	0.62
6:B:636:UNL:O1	6:B:636:UNL:O2	2.18	0.62
1:A:601:ARG:HG2	1:A:601:ARG:HH21	1.64	0.62
6:C:456:UNL:O1	6:C:637:UNL:O2	2.18	0.61
1:A:532[A]:ARG:HB2	4:A:636:EDO:H21	1.84	0.59
1:A:544:LYS:O	7:A:653:HOH:O	2.16	0.59
1:B:472:GLU:CD	7:B:852:HOH:O	2.46	0.58
1:A:581:ARG:NH2	1:B:572[A]:ARG:HH12	2.02	0.58
1:A:545:GLY:HA2	7:A:700:HOH:O	2.04	0.57
4:A:630:EDO:C1	7:A:286:HOH:O	2.52	0.57
6:A:654:UNL:O1	1:B:572[A]:ARG:NH2	2.38	0.56
1:A:533[A]:GLN:HG3	4:A:636:EDO:H12	1.89	0.55
4:B:632:EDO:H22	7:C:18:HOH:O	2.06	0.55
1:A:532[B]:ARG:NH1	7:A:662:HOH:O	2.36	0.54
1:B:572[A]:ARG:HG2	4:B:633:EDO:H12	1.90	0.54
1:B:572[B]:ARG:CG	4:B:633:EDO:H12	2.37	0.54
4:A:630:EDO:H11	7:A:286:HOH:O	2.07	0.54
1:A:423:PHE:CZ	1:A:535:LYS:HD3	2.42	0.53
3:F:424:DA:N7	4:F:513:EDO:H22	2.23	0.52
2:C:410:DT:H2''	2:C:411:DG:C8	2.45	0.52
1:A:443:GLU:HG2	7:A:756:HOH:O	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:546:GLY:CA	7:B:853:HOH:O	2.32	0.51
1:A:418:MET:HE3	1:A:422:HIS:CE1	2.45	0.51
1:A:530:ASP:HB3	4:A:636:EDO:H12	1.94	0.50
1:B:573:GLY:O	4:B:633:EDO:H22	2.12	0.50
4:A:630:EDO:H12	7:A:286:HOH:O	2.13	0.47
6:B:636:UNL:O1	6:C:637:UNL:O2	2.32	0.47
1:B:527:GLU:OE1	7:B:821:HOH:O	2.20	0.47
1:A:420:ALA:HA	1:A:448[B]:ARG:CZ	2.47	0.45
1:A:465:LEU:HD12	1:A:465:LEU:C	2.42	0.45
1:A:532[B]:ARG:NH2	7:A:662:HOH:O	2.48	0.45
1:B:472:GLU:CD	7:B:853:HOH:O	2.61	0.44
1:A:597:GLU:HB2	7:A:803:HOH:O	2.20	0.41
1:A:453:GLY:O	1:A:465:LEU:HA	2.20	0.41
1:B:594:TRP:O	1:B:599:LYS:HE3	2.21	0.41
1:B:506:LEU:HD23	1:B:523[B]:GLU:HG3	2.02	0.41
6:A:654:UNL:O1	6:A:654:UNL:O2	2.39	0.40
1:B:472:GLU:HG2	7:B:852:HOH:O	2.15	0.40
1:A:518:HIS:HD2	6:A:638:UNL:O2	2.04	0.40
3:F:428:DC:H2'	3:F:429:DA:C8	2.56	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	215/212 (101%)	211 (98%)	4 (2%)	0	100	100
1	B	208/212 (98%)	205 (99%)	3 (1%)	0	100	100
All	All	423/424 (100%)	416 (98%)	7 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	
1	A	172/173 (99%)	172 (100%)	0	100	100
1	B	166/173 (96%)	166 (100%)	0	100	100
All	All	338/346 (98%)	338 (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. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	518	HIS
1	B	518	HIS
1	B	548	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

3 non-standard protein/DNA/RNA residues 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	5CM	D	407	2	18,21,22	1.47	4 (22%)	24,30,33	1.48	4 (16%)
2	5CM	C	407[B]	2	18,21,22	1.60	2 (11%)	24,30,33	1.48	3 (12%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	5CM	C	407[A]	2	18,21,22	1.70	3 (16%)	24,30,33	1.41	3 (12%)

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	5CM	D	407	2	-	0/7/21/22	0/2/2/2
2	5CM	C	407[B]	2	-	0/7/21/22	0/2/2/2
2	5CM	C	407[A]	2	-	2/7/21/22	0/2/2/2

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	407[A]	5CM	C6-C5	4.52	1.42	1.34
2	C	407[B]	5CM	C5-C4	-4.43	1.40	1.44
2	C	407[A]	5CM	C5-C4	-3.88	1.41	1.44
2	C	407[B]	5CM	C6-C5	3.75	1.40	1.34
2	D	407	5CM	C6-C5	2.79	1.39	1.34
2	C	407[A]	5CM	O4'-C1'	2.30	1.47	1.42
2	D	407	5CM	C5-C4	-2.27	1.42	1.44
2	D	407	5CM	C2-N1	-2.18	1.35	1.40
2	D	407	5CM	C4-N3	2.17	1.37	1.34

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	407[B]	5CM	C5A-C5-C6	-3.40	118.25	122.85
2	C	407[B]	5CM	C5-C6-N1	-3.40	119.62	123.31
2	C	407[A]	5CM	C5-C6-N1	-3.27	119.76	123.31
2	D	407	5CM	C5-C4-N3	-3.17	118.51	121.75
2	C	407[A]	5CM	O4'-C1'-N1	-3.14	102.29	107.86
2	C	407[B]	5CM	O4'-C1'-N1	-3.13	102.31	107.86
2	D	407	5CM	C5-C6-N1	-2.78	120.29	123.31
2	C	407[A]	5CM	C2'-C1'-N1	2.69	120.55	113.81
2	D	407	5CM	C5A-C5-C6	-2.46	119.52	122.85
2	D	407	5CM	C2'-C1'-N1	2.12	119.12	113.81

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	407[A]	5CM	O4'-C4'-C5'-O5'
2	C	407[A]	5CM	C3'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 35 ligands modelled in this entry, 4 are monoatomic and 9 are unknown - leaving 22 for Mogul analysis.

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	$\# Z > 2$
4	EDO	F	513	-	3,3,3	0.56	0	2,2,2	0.63	0
4	EDO	A	633	-	3,3,3	0.31	0	2,2,2	0.66	0
4	EDO	E	503	-	3,3,3	0.55	0	2,2,2	0.75	0
4	EDO	F	506	5	3,3,3	0.47	0	2,2,2	0.90	0
4	EDO	C	505	5	3,3,3	0.76	0	2,2,2	0.21	0
4	EDO	A	630	-	3,3,3	0.53	0	2,2,2	0.46	0
4	EDO	A	631	-	3,3,3	0.86	0	2,2,2	0.99	0
4	EDO	B	632	-	3,3,3	0.55	0	2,2,2	0.91	0
4	EDO	A	635	-	3,3,3	0.46	0	2,2,2	0.35	0
4	EDO	F	510	-	3,3,3	1.16	0	2,2,2	0.93	0
4	EDO	F	509	-	3,3,3	0.49	0	2,2,2	1.00	0
4	EDO	E	501	5	3,3,3	0.50	0	2,2,2	0.47	0
4	EDO	B	630	-	3,3,3	0.91	0	2,2,2	0.72	0
4	EDO	D	502	5	3,3,3	1.05	0	2,2,2	0.02	0
4	EDO	A	636	-	3,3,3	0.24	0	2,2,2	3.85	2 (100%)
4	EDO	B	633	-	3,3,3	0.86	0	2,2,2	0.99	0
4	EDO	A	632	-	3,3,3	0.43	0	2,2,2	0.61	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	EDO	F	511	-	3,3,3	0.88	0	2,2,2	0.05	0
4	EDO	B	629	-	3,3,3	1.53	1 (33%)	2,2,2	0.48	0
4	EDO	B	631	-	3,3,3	0.36	0	2,2,2	0.96	0
4	EDO	A	629	-	3,3,3	0.21	0	2,2,2	1.89	1 (50%)
4	EDO	A	634	-	3,3,3	0.69	0	2,2,2	0.35	0

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
4	EDO	F	513	-	-	0/1/1/1	-
4	EDO	A	633	-	-	0/1/1/1	-
4	EDO	E	503	-	-	0/1/1/1	-
4	EDO	F	506	5	-	0/1/1/1	-
4	EDO	C	505	5	-	0/1/1/1	-
4	EDO	A	630	-	-	1/1/1/1	-
4	EDO	A	631	-	-	1/1/1/1	-
4	EDO	B	632	-	-	1/1/1/1	-
4	EDO	A	635	-	-	0/1/1/1	-
4	EDO	F	510	-	-	1/1/1/1	-
4	EDO	F	509	-	-	1/1/1/1	-
4	EDO	E	501	5	-	0/1/1/1	-
4	EDO	B	630	-	-	1/1/1/1	-
4	EDO	D	502	5	-	0/1/1/1	-
4	EDO	A	636	-	-	1/1/1/1	-
4	EDO	B	633	-	-	0/1/1/1	-
4	EDO	A	632	-	-	0/1/1/1	-
4	EDO	F	511	-	-	1/1/1/1	-
4	EDO	B	629	-	-	0/1/1/1	-
4	EDO	B	631	-	-	0/1/1/1	-
4	EDO	A	629	-	-	0/1/1/1	-
4	EDO	A	634	-	-	1/1/1/1	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	629	EDO	O2-C2	2.29	1.53	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	636	EDO	O2-C2-C1	4.75	148.55	112.39
4	A	636	EDO	O1-C1-C2	-2.68	92.00	112.39
4	A	629	EDO	O1-C1-C2	-2.67	92.02	112.39

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	632	EDO	O1-C1-C2-O2
4	F	511	EDO	O1-C1-C2-O2
4	A	631	EDO	O1-C1-C2-O2
4	A	630	EDO	O1-C1-C2-O2
4	A	636	EDO	O1-C1-C2-O2
4	B	630	EDO	O1-C1-C2-O2
4	F	509	EDO	O1-C1-C2-O2
4	A	634	EDO	O1-C1-C2-O2
4	F	510	EDO	O1-C1-C2-O2

There are no ring outliers.

6 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	513	EDO	3	0
4	A	630	EDO	3	0
4	B	632	EDO	1	0
4	B	630	EDO	1	0
4	A	636	EDO	4	0
4	B	633	EDO	6	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	C	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	406:DG	O3'	407[A]:5CM	P	1.76
1	C	406:DG	O3'	407[B]:5CM	P	1.75

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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, 95th 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	210/212 (99%)	-0.46	5 (2%) 59 63	7, 14, 33, 64	7 (3%)
1	B	206/212 (97%)	-0.58	5 (2%) 59 63	7, 12, 30, 62	4 (1%)
2	C	11/12 (91%)	-0.32	0 100 100	6, 17, 48, 56	1 (9%)
2	D	11/12 (91%)	-0.76	0 100 100	12, 21, 29, 30	0
3	E	12/12 (100%)	-0.34	0 100 100	15, 23, 33, 35	0
3	F	12/12 (100%)	-0.69	0 100 100	13, 21, 42, 42	0
All	All	462/472 (97%)	-0.52	10 (2%) 62 66	6, 14, 35, 64	12 (2%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	417	HIS	4.4
1	B	620	ALA	3.6
1	B	621	ASN	3.6
1	A	545	GLY	3.3
1	B	622	LYS	3.1
1	B	619	LEU	2.8
1	A	626	ARG	2.8
1	A	530	ASP	2.6
1	A	625	SER	2.5
1	B	596	ARG	2.3

6.2 Non-standard residues in protein, DNA, RNA chains [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, 95th 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($\text{\AA}^2$)	Q<0.9
2	5CM	D	407	20/21	0.99	0.03	7,9,11,12	0
2	5CM	C	407[A]	20/21	0.99	0.04	4,7,9,9	20
2	5CM	C	407[B]	20/21	0.99	0.04	5,8,11,11	20

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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, 95th 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($\text{\AA}^2$)	Q<0.9
4	EDO	B	633	4/4	0.65	0.19	30,34,34,39	0
4	EDO	B	632	4/4	0.72	0.18	25,31,40,50	0
4	EDO	B	631	4/4	0.75	0.16	45,45,49,51	0
6	UNL	B	655	5/-	0.75	0.14	33,33,33,33	0
6	UNL	A	654	2/-	0.79	0.15	31,31,31,40	0
6	UNL	B	215	2/-	0.84	0.20	29,29,29,29	0
4	EDO	F	513	4/4	0.86	0.14	34,41,44,46	0
4	EDO	B	629	4/4	0.87	0.12	22,27,28,29	0
4	EDO	A	636	4/4	0.87	0.14	23,27,36,38	0
4	EDO	B	630	4/4	0.88	0.14	20,35,35,38	0
4	EDO	A	635	4/4	0.88	0.14	47,49,50,52	0
4	EDO	A	632	4/4	0.91	0.13	30,32,40,41	0
4	EDO	F	510	4/4	0.91	0.10	22,23,24,29	0
6	UNL	C	456	2/-	0.91	0.20	34,34,34,34	0
4	EDO	A	634	4/4	0.92	0.10	25,27,30,32	0
4	EDO	F	509	4/4	0.92	0.10	23,25,32,34	0
6	UNL	C	637	2/-	0.92	0.28	29,29,29,32	0
4	EDO	F	511	4/4	0.93	0.08	23,26,30,32	0
6	UNL	A	638	2/-	0.93	0.09	31,31,31,34	0
6	UNL	B	322	3/-	0.93	0.09	30,30,35,42	0
4	EDO	E	503	4/4	0.95	0.09	31,34,37,37	0
4	EDO	A	630	4/4	0.95	0.11	20,33,37,42	0
4	EDO	A	633	4/4	0.95	0.08	31,36,38,38	0
4	EDO	A	629	4/4	0.96	0.09	19,24,27,36	0
6	UNL	B	636	2/-	0.96	0.09	26,26,26,32	0
6	UNL	C	359	2/-	0.96	0.10	27,27,27,38	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	EDO	A	631	4/4	0.96	0.09	17,18,31,39	0
4	EDO	D	502	4/4	0.96	0.08	18,19,21,21	0
4	EDO	C	505	4/4	0.99	0.04	13,13,14,16	0
4	EDO	F	506	4/4	0.99	0.04	12,14,15,17	0
4	EDO	E	501	4/4	0.99	0.04	15,18,19,21	0
5	NA	B	634	1/1	1.00	0.08	9,9,9,9	0
5	NA	E	504	1/1	1.00	0.05	16,16,16,16	0
5	NA	F	503	1/1	1.00	0.03	12,12,12,12	0
5	NA	A	637	1/1	1.00	0.07	11,11,11,11	0

6.5 Other polymers [i](#)

There are no such residues in this entry.