



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 09:56 PM UTC

PDB ID : 3F4Z / pdb_00003f4z
Title : Trimeric helix bundle formed by an alpha/beta-peptide derivative of the HIV gp41 CHR domain
Authors : Horne, W.S.; Gellman, S.H.
Deposited on : 2008-11-03
Resolution : 2.10 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

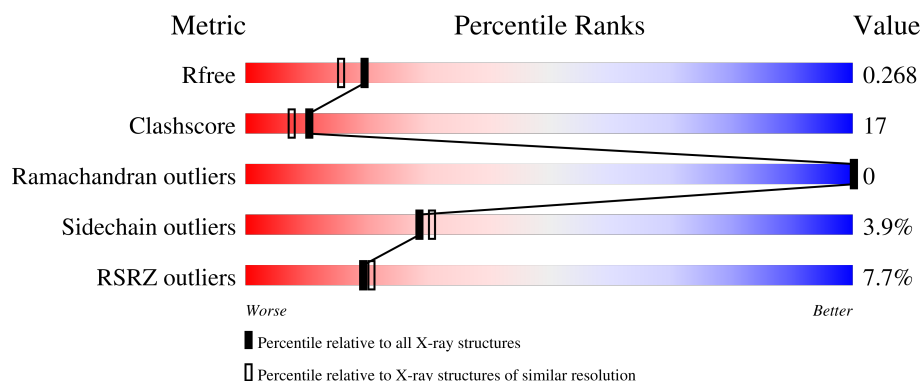
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	40	
1	B	40	
1	C	40	

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	MPD	A	40	-	-	X	-
2	MPD	A	42	X	-	-	-
2	MPD	A	43	X	-	-	-
2	MPD	B	40	-	-	X	-
2	MPD	B	42	X	-	-	-

2 Entry composition [i](#)

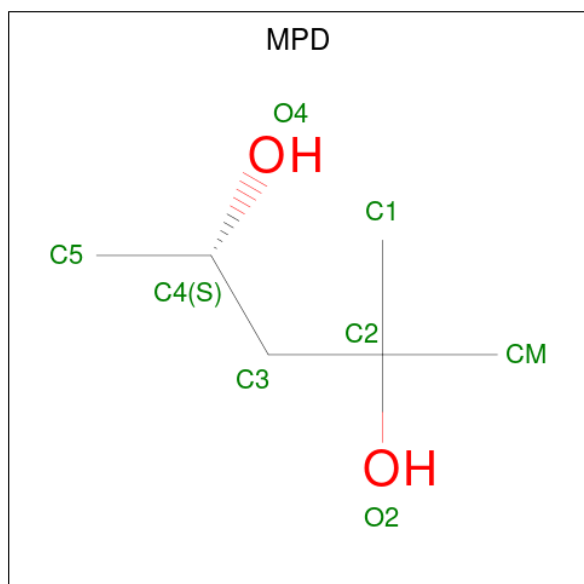
There are 3 unique types of molecules in this entry. The entry contains 2170 atoms, of which 1134 are hydrogens and 0 are deuteriums.

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 alpha/beta-peptide analogue of the HIV gp41 CHR domain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	39	Total	C	H	N	O	79	1	0
			622	206	308	50	58			
1	B	34	Total	C	H	N	O	69	1	0
			555	175	281	47	52			
1	C	40	Total	C	H	N	O	78	1	1
			616	205	299	52	60			

- Molecule 2 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	11	0
			22	6	14	2		
2	A	1	Total	C	H	O	11	0
			22	6	14	2		
2	A	1	Total	C	H	O	11	0
			22	6	14	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	11	0
			22	6	14	2		
2	B	1	Total	C	H	O	11	0
			22	6	14	2		
2	B	1	Total	C	H	O	11	0
			22	6	14	2		
2	B	1	Total	C	H	O	11	0
			22	6	14	2		
2	C	1	Total	C	H	O	11	0
			22	6	14	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	22	Total	H	O	44	0
			66	44	22		
3	B	18	Total	H	O	36	0
			54	36	18		
3	C	27	Total	H	O	54	0
			81	54	27		

3 Residue-property plots

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: alpha/beta-peptide analogue of the HIV gp41 CHR domain



- Molecule 1: alpha/beta-peptide analogue of the HIV gp41 CHR domain



- Molecule 1: alpha/beta-peptide analogue of the HIV gp41 CHR domain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	71.33Å 43.99Å 58.14Å 90.00° 105.40° 90.00°	Depositor
Resolution (Å)	25.00 – 2.10 25.00 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.8 (25.00-2.10) 99.7 (25.00-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.76 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0063	Depositor
R, R_{free}	0.204 , 0.249 (Not available) , 0.268	Depositor DCC
R_{free} test set	495 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å ²)	30.5	Xtriage
Anisotropy	0.233	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 67.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.52$, $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	2170	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 23.37 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.7273e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: B3E, ACE, NH2, B3T, MPD, XPC, XCP

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	0.67	0/217	0.86	0/280
1	B	0.75	0/183	0.93	0/231
1	C	0.72	0/205	0.97	0/264
All	All	0.71	0/605	0.92	0/775

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	A	0	15
1	B	0	12
1	C	0	17
All	All	0	44

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (44) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1	B3T	Mainchain,Peptide
1	A	12	B3E	Mainchain,Peptide
1	A	14	ALA	Peptide
1	A	18	GLU	Peptide
1	A	21	ILE	Peptide
1	A	26	B3E	Mainchain,Peptide
1	A	29	B3E	Mainchain,Peptide

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Mol	Chain	Res	Type	Group
1	A	32	GLU	Peptide
1	A	35	LEU	Peptide
1	A	4	GLU	Peptide
1	A	7	ASP	Peptide
1	B	12	B3E	Mainchain,Peptide
1	B	14	ALA	Peptide
1	B	18	GLU	Peptide
1	B	21	ILE	Peptide
1	B	26	B3E	Mainchain,Peptide
1	B	29	B3E	Mainchain,Peptide
1	B	32	GLU	Peptide
1	B	35	LEU	Peptide
1	B	7	ASP	Peptide
1	C	1[A]	B3T	Mainchain,Peptide
1	C	1[B]	B3T	Mainchain,Peptide
1	C	12	B3E	Mainchain,Peptide
1	C	14	ALA	Peptide
1	C	18	GLU	Peptide
1	C	21	ILE	Peptide
1	C	26	B3E	Mainchain,Peptide
1	C	29	B3E	Mainchain,Peptide
1	C	32	GLU	Peptide
1	C	35	LEU	Peptide
1	C	4	GLU	Peptide
1	C	7	ASP	Peptide

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	314	308	280	18	0
1	B	274	281	257	8	2
1	C	317	299	270	2	0
2	A	32	56	56	12	2
2	B	24	42	42	7	0
2	C	8	14	14	2	0
3	A	22	44	0	4	0
3	B	18	36	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	27	54	0	1	0
All	All	1036	1134	919	32	2

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 (32) 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:43:MPD:O4	3:A:63:HOH:O	1.84	0.94
2:A:42:MPD:HM3	3:A:53:HOH:O	1.70	0.91
1:B:7:ASP:OD2	2:B:40:MPD:HM1	1.71	0.90
1:A:6:TRP:CD1	2:B:40:MPD:H51	2.10	0.86
1:A:10[A]:ILE:CD1	1:B:10:ILE:HD11	2.06	0.84
2:A:41:MPD:HM3	3:A:46:HOH:O	1.82	0.78
1:A:22:XPC:HE	2:A:40:MPD:H12	1.69	0.75
1:A:10[A]:ILE:HD13	1:B:10:ILE:HD11	1.70	0.73
1:C:32:GLU:OE2	3:C:41:HOH:O	2.14	0.66
1:A:6:TRP:CD1	2:B:40:MPD:C5	2.80	0.65
2:A:41:MPD:H53	1:B:10:ILE:HG21	1.80	0.64
2:B:40:MPD:H12	2:B:40:MPD:H52	1.81	0.63
2:A:41:MPD:HM1	2:A:41:MPD:H52	1.79	0.62
1:A:10[A]:ILE:HD11	1:B:10:ILE:HD11	1.81	0.61
1:A:2:THR:HG22	1:A:6:TRP:CZ3	2.36	0.60
1:A:37:GLU:O	1:A:37:GLU:CG	2.55	0.54
2:C:40:MPD:O2	2:C:40:MPD:C5	2.55	0.54
1:A:37:GLU:O	1:A:37:GLU:HG2	2.07	0.54
1:A:19:XCP:HEA	2:A:40:MPD:H11	1.92	0.51
2:A:41:MPD:CM	3:A:46:HOH:O	2.47	0.50
2:B:40:MPD:H52	2:B:40:MPD:C1	2.41	0.49
2:C:40:MPD:H52	2:C:40:MPD:H13	1.95	0.48
1:A:10[A]:ILE:CD1	1:B:10:ILE:CD1	2.87	0.47
1:A:19:XCP:HEA	2:A:40:MPD:C1	2.45	0.46
1:A:24:ALA:HB2	2:B:42:MPD:H11	1.97	0.46
1:A:19:XCP:HEA	2:A:40:MPD:H32	1.97	0.46
1:A:6:TRP:O	1:A:10[A]:ILE:HG12	2.15	0.45
1:A:22:XPC:CE	2:A:40:MPD:H12	2.43	0.45
1:A:9:ALA:CB	2:B:40:MPD:H4	2.47	0.44
2:A:43:MPD:H52	2:A:43:MPD:H11	1.99	0.42
1:B:34:ALA:CB	1:C:31:ASN:HB3	2.50	0.42
1:A:34:ALA:HB1	1:B:35:LEU:HD22	2.03	0.41

All (2) 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:12:B3E:OF1	2:A:40:MPD:H12[4_556]	1.19	0.41
1:B:12:B3E:OF1	2:A:40:MPD:C1[4_556]	2.04	0.16

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	27/40 (68%)	26 (96%)	1 (4%)	0	100	100
1	B	24/40 (60%)	24 (100%)	0	0	100	100
1	C	27/40 (68%)	27 (100%)	0	0	100	100
All	All	78/120 (65%)	77 (99%)	1 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	19/21 (90%)	18 (95%)	1 (5%)	20	19
1	B	17/21 (81%)	16 (94%)	1 (6%)	18	16
1	C	17/21 (81%)	17 (100%)	0	100	100
All	All	53/63 (84%)	51 (96%)	2 (4%)	28	32

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	THR
1	B	37	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

33 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
1	B3E	A	29	1	6,6,10	0.42	0	4,6,12	1.64	1 (25%)
1	B3E	B	26	1	9,9,10	1.53	1 (11%)	8,10,12	1.07	0
1	XCP	B	5	1	8,8,9	1.02	1 (12%)	4,10,12	0.71	0
1	XPC	B	8	1	7,8,9	1.54	2 (28%)	4,10,12	1.17	1 (25%)
1	B3E	B	29	1	9,9,10	0.98	0	8,10,12	1.26	0
1	XCP	A	33	1	8,8,9	0.92	0	4,10,12	1.51	1 (25%)
1	B3T	C	1[A]	1	6,7,8	0.48	0	3,8,10	0.31	0
1	B3E	A	26	1	9,9,10	1.15	0	8,10,12	1.11	0
1	B3T	A	1	1	6,7,8	1.09	1 (16%)	3,8,10	1.95	1 (33%)
1	XPC	B	36	1	7,8,9	1.68	3 (42%)	4,10,12	2.33	2 (50%)
1	XCP	C	33	1	8,8,9	1.04	1 (12%)	4,10,12	1.30	1 (25%)
1	B3E	C	12	1	9,9,10	1.12	0	8,10,12	1.71	2 (25%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	XPC	A	22	1	7,8,9	1.26	1 (14%)	4,10,12	2.18	3 (75%)
1	XCP	C	5	1	8,8,9	0.95	0	4,10,12	1.11	0
1	XPC	B	22	1	7,8,9	1.16	1 (14%)	4,10,12	2.27	3 (75%)
1	XPC	A	36	1	7,8,9	1.71	3 (42%)	4,10,12	1.32	1 (25%)
1	XCP	B	19	1	8,8,9	1.02	1 (12%)	4,10,12	0.93	0
1	XCP	B	15	1	8,8,9	0.76	0	4,10,12	1.11	0
1	B3E	A	12	1	9,9,10	1.03	0	8,10,12	1.41	1 (12%)
1	XCP	B	33	1	8,8,9	0.86	0	4,10,12	1.53	1 (25%)
1	XCP	A	19	1	8,8,9	0.88	0	4,10,12	1.37	0
1	XPC	C	36	1	7,8,9	1.53	2 (28%)	4,10,12	1.34	0
1	XCP	A	5	1	8,8,9	0.90	0	4,10,12	1.18	0
1	B3T	C	1[B]	1	6,7,8	0.50	0	3,8,10	2.62	1 (33%)
1	XPC	C	22	1	7,8,9	1.22	0	4,10,12	1.83	1 (25%)
1	XPC	A	8	1	7,8,9	1.21	1 (14%)	4,10,12	2.29	2 (50%)
1	XCP	C	15	1	8,8,9	1.30	1 (12%)	4,10,12	1.29	0
1	B3E	B	12	1	9,9,10	1.05	1 (11%)	8,10,12	1.62	1 (12%)
1	B3E	C	26	1	9,9,10	0.83	0	8,10,12	1.14	0
1	B3E	C	29	1	9,9,10	1.05	1 (11%)	8,10,12	1.31	2 (25%)
1	XCP	A	15	1	8,8,9	0.53	0	4,10,12	1.29	0
1	XPC	C	8	1	7,8,9	1.66	3 (42%)	4,10,12	1.50	1 (25%)
1	XCP	C	19	1	8,8,9	0.76	0	4,10,12	1.50	1 (25%)

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
1	B3E	A	29	1	-	2/5/5/9	-
1	B3E	B	26	1	-	1/8/8/9	-
1	XCP	B	5	1	-	1/1/12/14	0/1/1/1
1	XPC	B	8	1	-	1/1/12/14	0/1/1/1
1	B3E	B	29	1	-	2/8/8/9	-
1	XCP	A	33	1	-	1/1/12/14	0/1/1/1
1	B3T	C	1[A]	1	-	3/7/7/8	-
1	B3E	A	26	1	-	3/8/8/9	-
1	B3T	A	1	1	-	1/7/7/8	-
1	XPC	B	36	1	-	1/1/12/14	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	XCP	C	33	1	-	1/1/12/14	0/1/1/1
1	B3E	C	12	1	-	4/8/8/9	-
1	XPC	A	22	1	-	1/1/12/14	0/1/1/1
1	XCP	C	5	1	-	1/1/12/14	0/1/1/1
1	XPC	B	22	1	-	1/1/12/14	0/1/1/1
1	XPC	A	36	1	-	1/1/12/14	0/1/1/1
1	XCP	B	19	1	-	1/1/12/14	0/1/1/1
1	XCP	B	15	1	-	1/1/12/14	0/1/1/1
1	B3E	A	12	1	-	2/8/8/9	-
1	XCP	B	33	1	-	1/1/12/14	0/1/1/1
1	XCP	A	19	1	-	1/1/12/14	0/1/1/1
1	XPC	C	36	1	-	1/1/12/14	0/1/1/1
1	XCP	A	5	1	-	1/1/12/14	0/1/1/1
1	B3T	C	1[B]	1	-	1/7/7/8	-
1	XPC	C	22	1	-	1/1/12/14	0/1/1/1
1	XPC	A	8	1	-	1/1/12/14	0/1/1/1
1	XCP	C	15	1	-	1/1/12/14	0/1/1/1
1	B3E	B	12	1	-	2/8/8/9	-
1	B3E	C	26	1	-	2/8/8/9	-
1	B3E	C	29	1	-	2/8/8/9	-
1	XCP	A	15	1	-	1/1/12/14	0/1/1/1
1	XPC	C	8	1	-	1/1/12/14	0/1/1/1
1	XCP	C	19	1	-	1/1/12/14	0/1/1/1

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	26	B3E	CB-CA	-3.58	1.48	1.53
1	C	8	XPC	CA-CB	-2.79	1.51	1.55
1	B	8	XPC	CG-ND	2.71	1.55	1.46
1	C	15	XCP	CA-CB	-2.67	1.51	1.55
1	A	36	XPC	CG-ND	2.61	1.54	1.46
1	C	36	XPC	CE-ND	2.58	1.54	1.46
1	B	36	XPC	CG-ND	2.57	1.54	1.46
1	C	33	XCP	CA-C	2.54	1.54	1.50
1	A	1	B3T	CB-CA	2.53	1.56	1.53
1	B	36	XPC	CE-ND	2.52	1.54	1.46
1	B	19	XCP	CA-C	2.49	1.54	1.50
1	A	36	XPC	CE-ND	2.48	1.54	1.46
1	B	36	XPC	CA-C	2.40	1.54	1.50
1	B	8	XPC	CE-ND	2.36	1.54	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	8	XPC	CE-ND	2.34	1.54	1.46
1	A	22	XPC	CG-ND	2.32	1.53	1.46
1	C	29	B3E	CB-CA	-2.27	1.50	1.53
1	C	36	XPC	CG-ND	2.25	1.53	1.46
1	C	8	XPC	CG-ND	2.19	1.53	1.46
1	B	22	XPC	CG-ND	2.19	1.53	1.46
1	A	8	XPC	CG-ND	2.18	1.53	1.46
1	B	5	XCP	CA-C	2.15	1.53	1.50
1	A	36	XPC	CA-C	2.07	1.53	1.50
1	B	12	B3E	OF1-CE	-2.05	1.24	1.30

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	1[B]	B3T	CA-CB-C	-4.14	104.48	113.31
1	B	36	XPC	CG-CB-CA	3.72	107.44	104.14
1	A	8	XPC	O-C-CA	-3.19	118.01	125.19
1	A	1	B3T	CA-CB-C	-3.07	106.76	113.31
1	B	22	XPC	CE-CA-C	-2.93	108.16	113.17
1	A	8	XPC	CE-CA-C	-2.86	108.28	113.17
1	A	22	XPC	CE-CA-C	-2.85	108.29	113.17
1	C	12	B3E	OF1-CE-CD	2.81	122.87	114.00
1	A	12	B3E	OF1-CE-CD	2.56	122.08	114.00
1	C	22	XPC	O-C-CA	-2.51	119.55	125.19
1	B	36	XPC	O-C-CA	-2.50	119.58	125.19
1	A	33	XCP	O-C-CA	-2.49	119.58	125.19
1	C	19	XCP	O-C-CA	-2.49	119.60	125.19
1	A	22	XPC	CG-CB-CA	-2.47	101.95	104.14
1	A	29	B3E	CA-CB-C	2.44	116.10	112.17
1	B	33	XCP	O-C-CA	-2.43	119.71	125.19
1	B	12	B3E	OF1-CE-CD	2.42	121.63	114.00
1	A	36	XPC	O-C-CA	-2.41	119.78	125.19
1	C	33	XCP	O-C-CA	-2.32	119.97	125.19
1	C	29	B3E	OF2-CE-CD	-2.30	115.81	123.09
1	C	8	XPC	CG-CB-CA	2.26	106.14	104.14
1	B	22	XPC	CG-CB-CA	-2.26	102.14	104.14
1	C	12	B3E	CA-CB-C	-2.25	108.53	112.17
1	B	22	XPC	O-C-CA	-2.19	120.26	125.19
1	B	8	XPC	O-C-CA	-2.18	120.28	125.19
1	C	29	B3E	OF1-CE-CD	2.17	120.87	114.00
1	A	22	XPC	O-C-CA	-2.14	120.37	125.19

There are no chirality outliers.

All (46) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	C	1[B]	B3T	O-C-CB-CA
1	C	8	XPC	O-C-CA-CB
1	A	15	XCP	O-C-CA-CB
1	A	22	XPC	O-C-CA-CB
1	A	33	XCP	O-C-CA-CB
1	C	33	XCP	O-C-CA-CB
1	A	5	XCP	O-C-CA-CB
1	A	8	XPC	O-C-CA-CB
1	B	8	XPC	O-C-CA-CB
1	B	15	XCP	O-C-CA-CB
1	C	15	XCP	O-C-CA-CB
1	B	19	XCP	O-C-CA-CB
1	C	19	XCP	O-C-CA-CB
1	B	22	XPC	O-C-CA-CB
1	C	22	XPC	O-C-CA-CB
1	B	33	XCP	O-C-CA-CB
1	A	36	XPC	O-C-CA-CB
1	C	1[A]	B3T	N-CA-CG-CD2
1	A	29	B3E	O-C-CB-CA
1	B	12	B3E	O-C-CB-CA
1	B	26	B3E	O-C-CB-CA
1	C	12	B3E	O-C-CB-CA
1	C	26	B3E	O-C-CB-CA
1	C	29	B3E	O-C-CB-CA
1	A	1	B3T	O-C-CB-CA
1	C	1[A]	B3T	N-CA-CB-C
1	C	5	XCP	O-C-CA-CB
1	A	19	XCP	O-C-CA-CB
1	C	36	XPC	O-C-CA-CB
1	A	12	B3E	N-CA-CB-C
1	A	12	B3E	O-C-CB-CA
1	A	26	B3E	O-C-CB-CA
1	B	29	B3E	O-C-CB-CA
1	C	12	B3E	CG-CD-CE-OF1
1	B	5	XCP	O-C-CA-CB
1	B	36	XPC	O-C-CA-CB
1	A	26	B3E	N-CA-CB-C
1	A	29	B3E	N-CA-CB-C
1	B	12	B3E	N-CA-CB-C
1	C	12	B3E	N-CA-CB-C

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Mol	Chain	Res	Type	Atoms
1	C	26	B3E	N-CA-CB-C
1	C	29	B3E	N-CA-CB-C
1	C	12	B3E	CG-CD-CE-OF2
1	C	1[A]	B3T	CB-CA-CG-OD1
1	A	26	B3E	CG-CD-CE-OF1
1	B	29	B3E	CG-CD-CE-OF2

There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	22	XPC	2	0
1	A	19	XCP	3	0
1	B	12	B3E	0	2

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 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	MPD	B	42	-	7,7,7	0.71	0	9,10,10	0.65	0
2	MPD	A	41	-	7,7,7	0.46	0	9,10,10	0.72	0
2	MPD	A	43	-	7,7,7	0.63	0	9,10,10	0.95	1 (11%)
2	MPD	A	40	-	7,7,7	0.32	0	9,10,10	0.46	0
2	MPD	B	41	-	7,7,7	0.59	0	9,10,10	0.77	0
2	MPD	C	40	-	7,7,7	0.54	0	9,10,10	0.82	0
2	MPD	A	42	-	7,7,7	0.57	0	9,10,10	0.87	0
2	MPD	B	40	-	7,7,7	0.49	0	9,10,10	0.95	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
2	MPD	B	42	-	1/1/2/2	2/5/5/5	-
2	MPD	A	41	-	-	2/5/5/5	-
2	MPD	A	43	-	1/1/2/2	4/5/5/5	-
2	MPD	A	40	-	-	4/5/5/5	-
2	MPD	B	41	-	-	4/5/5/5	-
2	MPD	C	40	-	-	2/5/5/5	-
2	MPD	A	42	-	1/1/2/2	2/5/5/5	-
2	MPD	B	40	-	-	2/5/5/5	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	43	MPD	O2-C2-CM	-2.27	100.91	107.99

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	42	MPD	C4
2	A	43	MPD	C4
2	B	42	MPD	C4

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	40	MPD	C2-C3-C4-O4
2	A	40	MPD	C2-C3-C4-C5
2	A	41	MPD	C2-C3-C4-O4
2	A	41	MPD	C2-C3-C4-C5
2	A	43	MPD	C1-C2-C3-C4
2	A	43	MPD	O2-C2-C3-C4
2	A	43	MPD	C2-C3-C4-C5
2	B	40	MPD	C2-C3-C4-O4
2	B	40	MPD	C2-C3-C4-C5
2	B	41	MPD	C2-C3-C4-O4
2	B	41	MPD	C2-C3-C4-C5

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Mol	Chain	Res	Type	Atoms
2	C	40	MPD	C2-C3-C4-O4
2	C	40	MPD	C2-C3-C4-C5
2	B	42	MPD	O2-C2-C3-C4
2	A	40	MPD	CM-C2-C3-C4
2	B	41	MPD	CM-C2-C3-C4
2	B	42	MPD	C2-C3-C4-O4
2	A	40	MPD	C1-C2-C3-C4
2	A	42	MPD	C1-C2-C3-C4
2	A	42	MPD	CM-C2-C3-C4
2	A	43	MPD	CM-C2-C3-C4
2	B	41	MPD	C1-C2-C3-C4

There are no ring outliers.

7 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	42	MPD	1	0
2	A	41	MPD	4	0
2	A	43	MPD	2	0
2	A	40	MPD	5	2
2	C	40	MPD	2	0
2	A	42	MPD	1	0
2	B	40	MPD	6	0

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 ⓘ

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	27/40 (67%)	0.66	4 (14%) 5 6	9, 29, 56, 72	1 (3%)
1	B	24/40 (60%)	0.40	1 (4%) 40 42	16, 26, 48, 68	1 (4%)
1	C	27/40 (67%)	0.04	1 (3%) 45 47	14, 27, 36, 46	0
All	All	78/120 (65%)	0.36	6 (7%) 19 21	9, 27, 56, 72	2 (2%)

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	6	TRP	8.2
1	A	38	LEU	5.8
1	A	6	TRP	4.2
1	C	3	TRP	3.6
1	A	35	LEU	2.5
1	A	34	ALA	2.1

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

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(Å ²)	Q<0.9
1	XCP	B	5	8/9	0.78	0.15	63,64,64,65	1
1	XPC	A	36	8/9	0.79	0.14	66,67,68,68	0
1	B3T	C	1[A]	8/9	0.82	0.16	39,41,43,44	17
1	B3T	C	1[B]	8/9	0.82	0.16	38,39,41,41	17
1	XPC	B	36	8/9	0.83	0.14	62,64,65,65	0
1	B3T	A	1	8/9	0.86	0.14	55,60,63,63	4
1	XCP	A	33	8/9	0.86	0.14	56,57,59,59	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	B3E	B	29	10/11	0.91	0.12	32,34,53,53	0
1	B3E	A	26	10/11	0.92	0.09	32,34,46,47	0
1	XCP	B	33	8/9	0.92	0.10	46,49,50,51	0
1	B3E	C	29	10/11	0.92	0.10	33,34,53,54	0
1	XPC	B	8	8/9	0.92	0.08	41,45,49,49	0
1	XCP	B	15	8/9	0.93	0.07	29,30,31,32	0
1	B3E	A	29	7/11	0.94	0.10	41,42,43,43	2
1	B3E	B	26	10/11	0.94	0.07	23,27,41,42	0
1	XPC	C	36	8/9	0.94	0.07	40,41,41,41	0
1	B3E	C	26	10/11	0.95	0.08	29,31,44,44	0
1	XCP	A	15	8/9	0.95	0.07	22,22,24,25	0
1	XCP	C	33	8/9	0.95	0.08	35,36,37,38	0
1	B3E	B	12	10/11	0.95	0.06	26,27,37,38	0
1	XCP	B	19	8/9	0.95	0.06	24,24,25,26	0
1	XCP	C	19	8/9	0.95	0.07	21,23,25,26	0
1	XCP	A	5	8/9	0.96	0.06	35,36,37,38	0
1	B3E	A	12	10/11	0.96	0.06	21,22,33,34	0
1	XCP	C	5	8/9	0.96	0.06	25,27,29,29	0
1	XCP	A	19	8/9	0.96	0.06	24,26,27,28	0
1	B3E	C	12	10/11	0.97	0.04	21,22,30,31	0
1	XPC	A	8	8/9	0.97	0.05	26,28,30,30	0
1	XPC	A	22	8/9	0.97	0.06	25,26,27,27	0
1	XPC	B	22	8/9	0.98	0.06	23,23,24,24	0
1	XPC	C	22	8/9	0.98	0.05	22,23,24,24	0
1	XPC	C	8	8/9	0.98	0.04	21,24,25,26	0
1	XCP	C	15	8/9	0.98	0.04	21,22,23,24	0

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
2	MPD	B	40	8/8	0.64	0.25	83,85,94,95	11
2	MPD	A	42	8/8	0.70	0.23	63,65,66,67	11

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	MPD	A	43	8/8	0.72	0.23	60,60,67,68	11
2	MPD	C	40	8/8	0.74	0.29	74,81,86,87	11
2	MPD	A	40	8/8	0.77	0.19	68,72,95,95	11
2	MPD	B	41	8/8	0.78	0.20	73,75,80,80	11
2	MPD	A	41	8/8	0.78	0.20	75,77,82,82	11
2	MPD	B	42	8/8	0.83	0.16	60,60,68,69	11

6.5 Other polymers [i](#)

There are no such residues in this entry.