



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 17, 2026 – 09:30 PM UTC

PDB ID : 5XEX / pdb_00005xex
Title : Crystal structure of S.aureus PNPase catalytic domain
Authors : Wang, X.; Zhang, X.; Zang, J.
Deposited on : 2017-04-06
Resolution : 2.20 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

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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

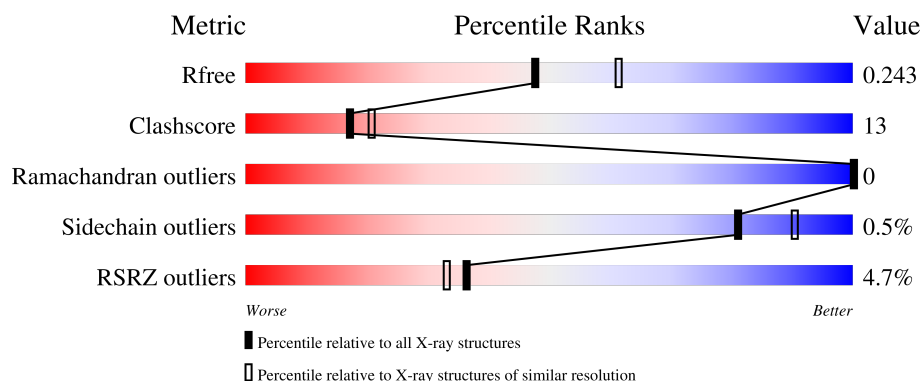
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	559	3% 68% 23% 9%
1	B	559	3% 69% 22% 9%
1	C	559	4% 69% 22% 9%
1	D	559	4% 69% 23% 8%
1	E	559	7% 69% 23% 9%

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Mol	Chain	Length	Quality of chain
1	F	559	

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	PPV	A	603[B]	-	-	X	-
4	PPV	B	603[A]	-	-	X	-
4	PPV	E	603[A]	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 24313 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 Polyribonucleotide nucleotidyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	511	Total	C	N	O	S	0	0	0
			3976	2497	684	777	18			
1	B	510	Total	C	N	O	S	0	0	0
			3970	2493	682	777	18			
1	C	511	Total	C	N	O	S	0	0	0
			3974	2495	683	778	18			
1	D	515	Total	C	N	O	S	0	0	0
			4007	2515	688	786	18			
1	E	511	Total	C	N	O	S	0	0	0
			3971	2493	683	777	18			
1	F	513	Total	C	N	O	S	0	0	0
			3987	2503	686	780	18			

There are 36 discrepancies between the modelled and reference sequences:

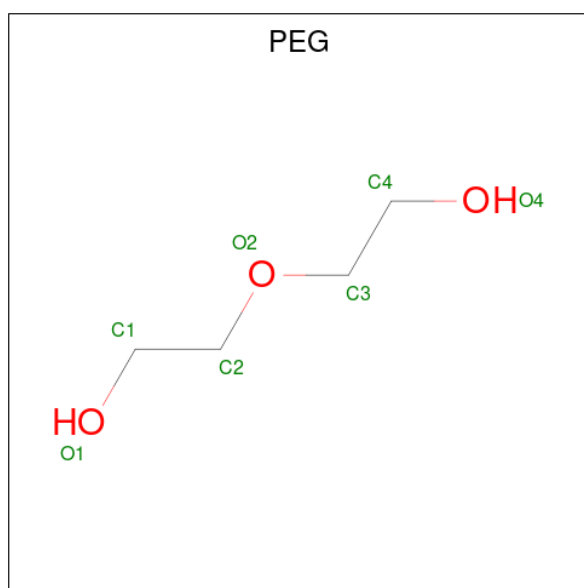
Chain	Residue	Modelled	Actual	Comment	Reference
A	554	HIS	-	expression tag	UNP Q2FZ20
A	555	HIS	-	expression tag	UNP Q2FZ20
A	556	HIS	-	expression tag	UNP Q2FZ20
A	557	HIS	-	expression tag	UNP Q2FZ20
A	558	HIS	-	expression tag	UNP Q2FZ20
A	559	HIS	-	expression tag	UNP Q2FZ20
B	554	HIS	-	expression tag	UNP Q2FZ20
B	555	HIS	-	expression tag	UNP Q2FZ20
B	556	HIS	-	expression tag	UNP Q2FZ20
B	557	HIS	-	expression tag	UNP Q2FZ20
B	558	HIS	-	expression tag	UNP Q2FZ20
B	559	HIS	-	expression tag	UNP Q2FZ20
C	554	HIS	-	expression tag	UNP Q2FZ20
C	555	HIS	-	expression tag	UNP Q2FZ20
C	556	HIS	-	expression tag	UNP Q2FZ20
C	557	HIS	-	expression tag	UNP Q2FZ20
C	558	HIS	-	expression tag	UNP Q2FZ20

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Chain	Residue	Modelled	Actual	Comment	Reference
C	559	HIS	-	expression tag	UNP Q2FZ20
D	554	HIS	-	expression tag	UNP Q2FZ20
D	555	HIS	-	expression tag	UNP Q2FZ20
D	556	HIS	-	expression tag	UNP Q2FZ20
D	557	HIS	-	expression tag	UNP Q2FZ20
D	558	HIS	-	expression tag	UNP Q2FZ20
D	559	HIS	-	expression tag	UNP Q2FZ20
E	554	HIS	-	expression tag	UNP Q2FZ20
E	555	HIS	-	expression tag	UNP Q2FZ20
E	556	HIS	-	expression tag	UNP Q2FZ20
E	557	HIS	-	expression tag	UNP Q2FZ20
E	558	HIS	-	expression tag	UNP Q2FZ20
E	559	HIS	-	expression tag	UNP Q2FZ20
F	554	HIS	-	expression tag	UNP Q2FZ20
F	555	HIS	-	expression tag	UNP Q2FZ20
F	556	HIS	-	expression tag	UNP Q2FZ20
F	557	HIS	-	expression tag	UNP Q2FZ20
F	558	HIS	-	expression tag	UNP Q2FZ20
F	559	HIS	-	expression tag	UNP Q2FZ20

- Molecule 2 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



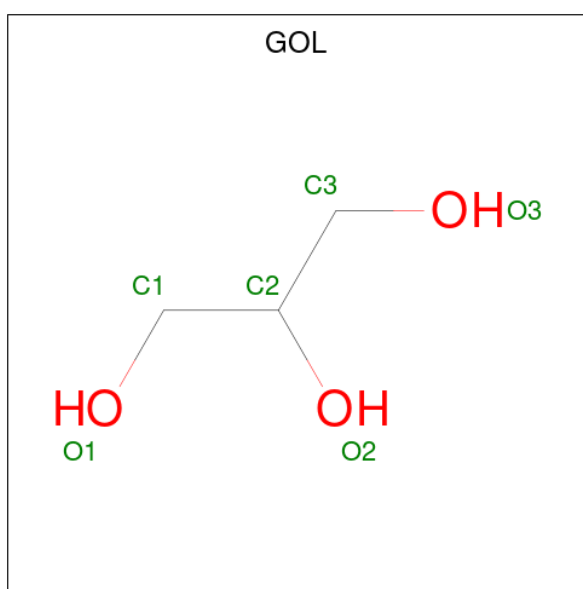
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		

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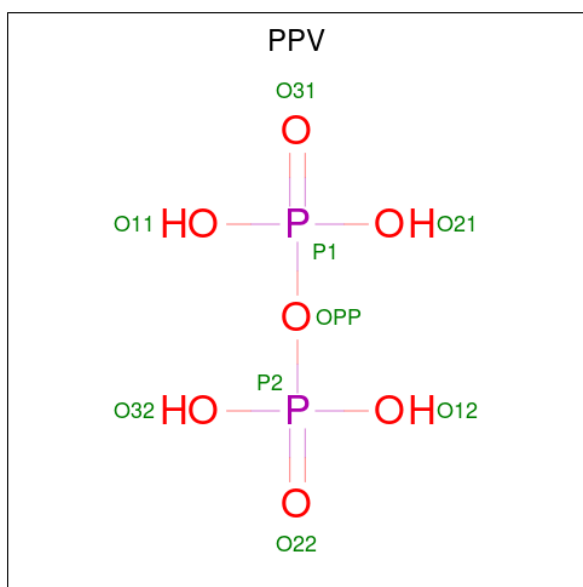
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	C	1	Total	C	O	0	0
			7	4	3		
2	D	1	Total	C	O	0	0
			7	4	3		
2	E	1	Total	C	O	0	0
			7	4	3		
2	F	1	Total	C	O	0	0
			7	4	3		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	C	1	Total	C	O	0	0
			6	3	3		
3	D	1	Total	C	O	0	0
			6	3	3		
3	E	1	Total	C	O	0	0
			6	3	3		
3	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is PYROPHOSPHATE (CCD ID: PPV) (formula: $H_4O_7P_2$).

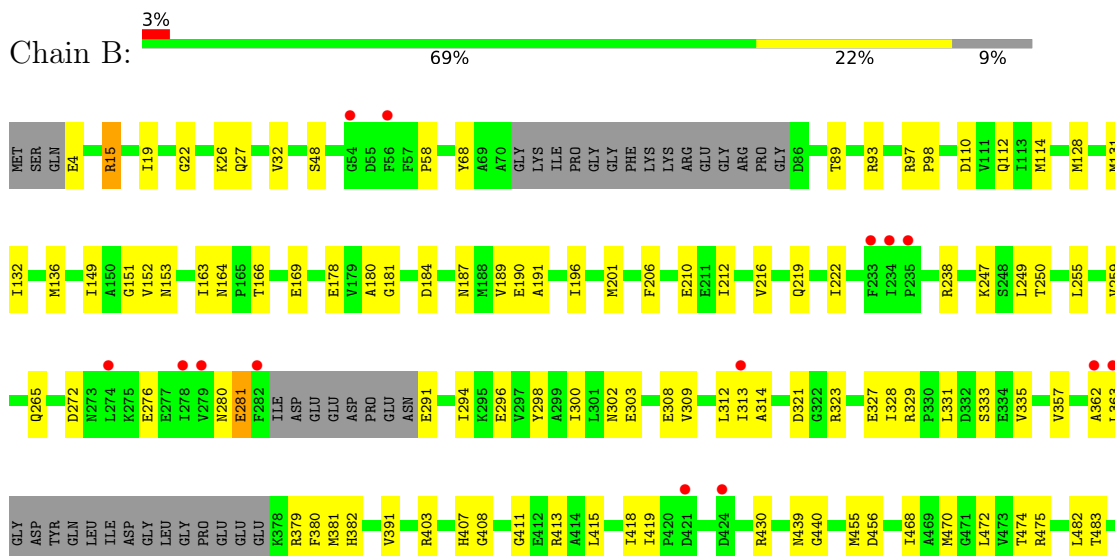


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	P	0	1
			18	14	4		
4	B	1	Total	O	P	0	1
			18	14	4		
4	C	1	Total	O	P	0	1
			18	14	4		
4	D	1	Total	O	P	0	1
			18	14	4		
4	E	1	Total	O	P	0	1
			18	14	4		
4	F	1	Total	O	P	0	1
			18	14	4		

- Molecule 5 is water.

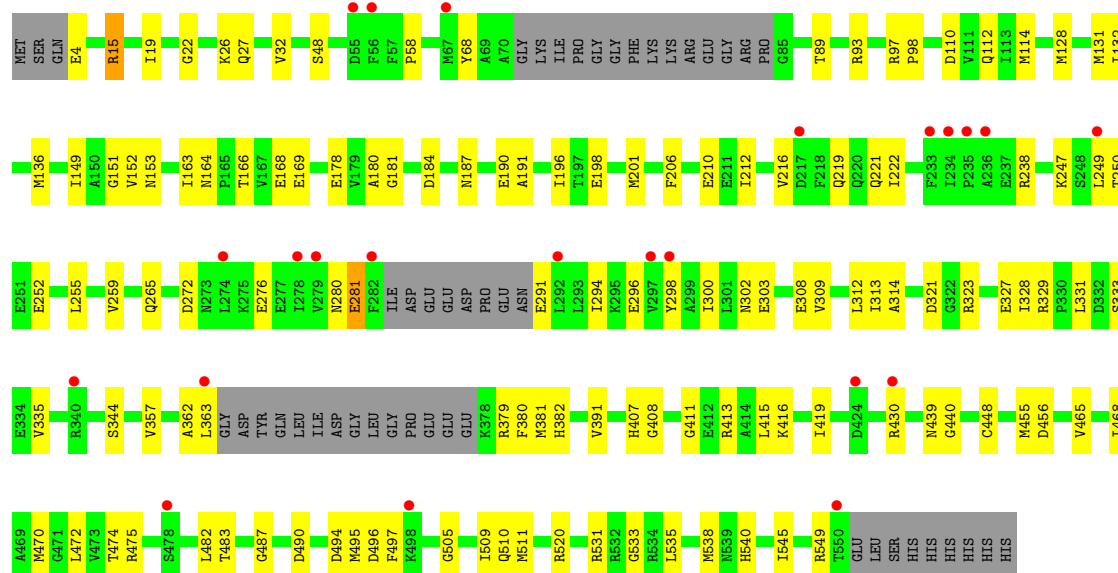
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	29	Total	O	0	0
			29	29		
5	B	17	Total	O	0	0
			17	17		
5	C	44	Total	O	0	0
			44	44		
5	D	42	Total	O	0	0
			42	42		
5	E	51	Total	O	0	0
			51	51		
5	F	59	Total	O	0	0
			59	59		

- Molecule 1: Polyrribonucleotide nucleotidyltransferase

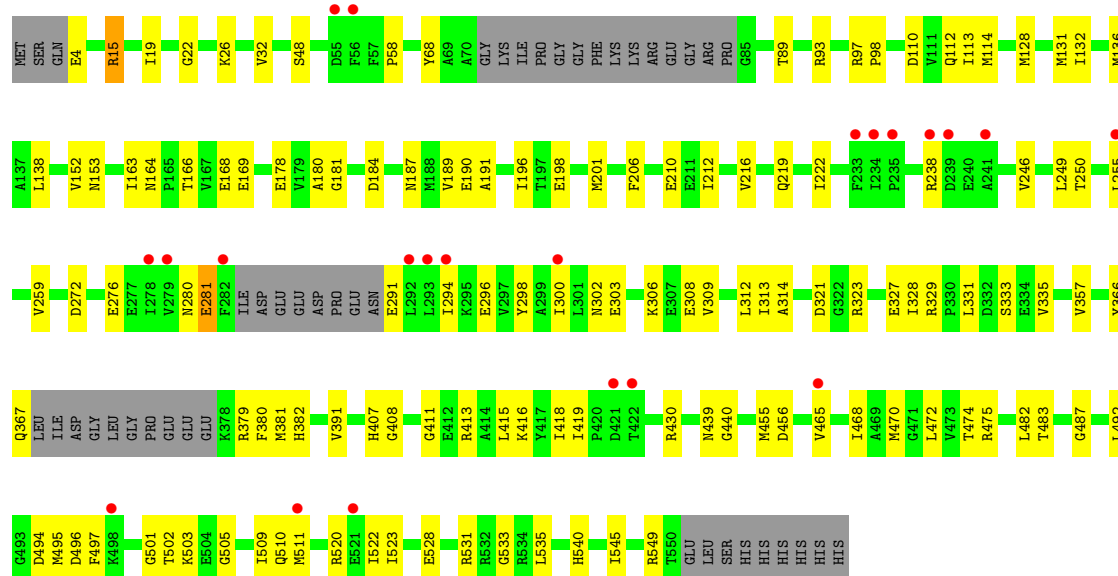




• Molecule 1: Polyribonucleotide nucleotidyltransferase



• Molecule 1: Polyribonucleotide nucleotidyltransferase



• Molecule 1: Polyribonucleotide nucleotidyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	93.70Å 93.77Å 130.24Å 98.22° 95.34° 120.01°	Depositor
Resolution (Å)	49.24 – 2.20 49.24 – 2.20	Depositor EDS
% Data completeness (in resolution range)	84.0 (49.24-2.20) 84.0 (49.24-2.20)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.01 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.223 , 0.249 0.223 , 0.243	Depositor DCC
R_{free} test set	7966 reflections (4.21%)	wwPDB-VP
Wilson B-factor (Å ²)	43.3	Xtriage
Anisotropy	0.521	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 33.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.085 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	24313	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.24% 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: PEG, PPV, GOL

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	0.81	1/4035 (0.0%)	0.93	4/5447 (0.1%)
1	B	0.81	1/4029 (0.0%)	0.91	5/5441 (0.1%)
1	C	0.80	2/4033 (0.0%)	0.91	5/5446 (0.1%)
1	D	0.79	2/4067 (0.0%)	0.93	5/5492 (0.1%)
1	E	0.76	0/4030	0.93	6/5441 (0.1%)
1	F	0.78	1/4046 (0.0%)	0.94	6/5462 (0.1%)
All	All	0.79	7/24240 (0.0%)	0.93	31/32729 (0.1%)

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	1

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	58	PRO	N-CD	9.37	1.60	1.47
1	B	58	PRO	N-CD	7.99	1.58	1.47
1	F	58	PRO	N-CD	7.18	1.57	1.47
1	D	58	PRO	N-CD	7.09	1.57	1.47
1	A	58	PRO	N-CD	5.67	1.55	1.47

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	523	ILE	N-CA-C	-18.17	94.55	111.45
1	D	523	ILE	N-CA-C	-11.34	99.82	110.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	523	ILE	N-CA-C	-10.38	100.75	110.82
1	A	222	ILE	N-CA-C	-8.37	102.66	110.53
1	D	222	ILE	N-CA-C	-8.11	102.91	110.53

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	15	ARG	Sidechain

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	3976	0	3991	106	0
1	B	3970	0	3982	103	0
1	C	3974	0	3985	103	1
1	D	4007	0	4009	97	1
1	E	3971	0	3981	96	0
1	F	3987	0	4001	102	0
2	A	7	0	10	0	0
2	B	7	0	10	0	0
2	C	7	0	10	0	0
2	D	7	0	10	0	0
2	E	7	0	10	0	0
2	F	7	0	10	0	0
3	A	6	0	8	0	0
3	B	6	0	8	0	0
3	C	6	0	8	0	0
3	D	6	0	8	0	0
3	E	6	0	8	0	0
3	F	6	0	8	0	0
4	A	18	0	0	7	0
4	B	18	0	0	7	0
4	C	18	0	0	6	0
4	D	18	0	0	5	0
4	E	18	0	0	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	F	18	0	0	5	0
5	A	29	0	0	1	0
5	B	17	0	0	2	0
5	C	44	0	0	6	0
5	D	42	0	0	3	0
5	E	51	0	0	1	0
5	F	59	0	0	9	0
All	All	24313	0	24057	607	1

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 13.

The worst 5 of 607 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:C:531:ARG:O	1:C:535:LEU:HD13	1.39	1.22
1:E:246:VAL:O	1:E:250:THR:HG23	1.39	1.20
1:A:531:ARG:O	1:A:535:LEU:HD13	1.38	1.20
1:B:531:ARG:O	1:B:535:LEU:HD13	1.42	1.18
1:D:246:VAL:O	1:D:250:THR:HG23	1.43	1.15

All (1) 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:C:168:GLU:OE2	1:D:168:GLU:OE1[1_454]	1.70	0.50

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	503/559 (90%)	480 (95%)	23 (5%)	0	100	100
1	B	502/559 (90%)	478 (95%)	24 (5%)	0	100	100
1	C	503/559 (90%)	480 (95%)	23 (5%)	0	100	100
1	D	507/559 (91%)	484 (96%)	23 (4%)	0	100	100
1	E	503/559 (90%)	482 (96%)	21 (4%)	0	100	100
1	F	505/559 (90%)	483 (96%)	22 (4%)	0	100	100
All	All	3023/3354 (90%)	2887 (96%)	136 (4%)	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	431/472 (91%)	430 (100%)	1 (0%)	87	94
1	B	431/472 (91%)	429 (100%)	2 (0%)	81	90
1	C	431/472 (91%)	429 (100%)	2 (0%)	81	90
1	D	434/472 (92%)	432 (100%)	2 (0%)	81	90
1	E	430/472 (91%)	428 (100%)	2 (0%)	81	90
1	F	432/472 (92%)	428 (99%)	4 (1%)	70	84
All	All	2589/2832 (91%)	2576 (100%)	13 (0%)	81	90

5 of 13 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	4	GLU
1	E	15	ARG
1	F	550	THR
1	F	226	ILE
1	F	250	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 45 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	407	HIS
1	E	529	GLN
1	D	529	GLN
1	E	280	ASN
1	F	23	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

24 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	PEG	D	601	-	6,6,6	0.67	0	5,5,5	0.47	0
4	PPV	C	603[B]	-	6,8,8	1.71	1 (16%)	12,13,13	1.56	1 (8%)
4	PPV	F	603[A]	-	6,8,8	1.02	0	12,13,13	1.32	2 (16%)
4	PPV	E	603[A]	-	6,8,8	1.10	0	12,13,13	1.30	1 (8%)
2	PEG	F	601	-	6,6,6	0.63	0	5,5,5	0.29	0
3	GOL	A	602	-	5,5,5	0.37	0	5,5,5	0.27	0
2	PEG	E	601	-	6,6,6	0.65	0	5,5,5	0.38	0
4	PPV	B	603[B]	-	6,8,8	1.69	1 (16%)	12,13,13	1.49	1 (8%)
3	GOL	C	602	-	5,5,5	0.36	0	5,5,5	0.32	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PPV	A	603[A]	-	6,8,8	1.67	1 (16%)	12,13,13	1.76	4 (33%)
2	PEG	B	601	-	6,6,6	0.58	0	5,5,5	0.31	0
3	GOL	D	602	-	5,5,5	0.32	0	5,5,5	0.50	0
4	PPV	D	603[A]	-	6,8,8	1.07	0	12,13,13	1.42	2 (16%)
4	PPV	F	603[B]	-	6,8,8	0.99	0	12,13,13	1.00	1 (8%)
4	PPV	E	603[B]	-	6,8,8	1.00	1 (16%)	12,13,13	1.12	1 (8%)
2	PEG	C	601	-	6,6,6	0.63	0	5,5,5	0.40	0
3	GOL	E	602	-	5,5,5	0.23	0	5,5,5	0.58	0
4	PPV	C	603[A]	-	6,8,8	1.64	1 (16%)	12,13,13	1.58	2 (16%)
3	GOL	B	602	-	5,5,5	0.24	0	5,5,5	0.42	0
4	PPV	A	603[B]	-	6,8,8	1.71	1 (16%)	12,13,13	1.64	1 (8%)
3	GOL	F	602	-	5,5,5	0.29	0	5,5,5	0.21	0
2	PEG	A	601	-	6,6,6	0.55	0	5,5,5	0.41	0
4	PPV	D	603[B]	-	6,8,8	0.99	0	12,13,13	1.10	1 (8%)
4	PPV	B	603[A]	-	6,8,8	1.64	1 (16%)	12,13,13	1.68	2 (16%)

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	PEG	D	601	-	-	3/4/4/4	-
4	PPV	C	603[B]	-	-	0/6/6/6	-
4	PPV	F	603[A]	-	-	3/6/6/6	-
4	PPV	E	603[A]	-	-	2/6/6/6	-
2	PEG	F	601	-	-	1/4/4/4	-
3	GOL	A	602	-	-	0/4/4/4	-
2	PEG	E	601	-	-	3/4/4/4	-
4	PPV	B	603[B]	-	-	0/6/6/6	-
3	GOL	C	602	-	-	0/4/4/4	-
4	PPV	A	603[A]	-	-	3/6/6/6	-
2	PEG	B	601	-	-	3/4/4/4	-
3	GOL	D	602	-	-	0/4/4/4	-
4	PPV	D	603[A]	-	-	2/6/6/6	-
4	PPV	F	603[B]	-	-	0/6/6/6	-
4	PPV	E	603[B]	-	-	2/6/6/6	-
2	PEG	C	601	-	-	2/4/4/4	-
3	GOL	E	602	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PPV	C	603[A]	-	-	3/6/6/6	-
3	GOL	B	602	-	-	0/4/4/4	-
4	PPV	A	603[B]	-	-	0/6/6/6	-
3	GOL	F	602	-	-	1/4/4/4	-
2	PEG	A	601	-	-	3/4/4/4	-
4	PPV	D	603[B]	-	-	0/6/6/6	-
4	PPV	B	603[A]	-	-	3/6/6/6	-

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	603[B]	PPV	P1-O31	3.76	1.62	1.50
4	C	603[B]	PPV	P1-O31	3.72	1.62	1.50
4	A	603[B]	PPV	P1-O31	3.71	1.62	1.50
4	A	603[A]	PPV	P1-O31	3.65	1.61	1.50
4	B	603[A]	PPV	P1-O31	3.59	1.61	1.50

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	603[B]	PPV	O21-P1-O11	3.65	121.49	107.80
4	A	603[B]	PPV	O21-P1-O11	3.62	121.38	107.80
4	B	603[B]	PPV	O21-P1-O11	3.31	120.20	107.80
4	C	603[A]	PPV	O21-P1-O11	3.21	119.84	107.80
4	A	603[A]	PPV	O21-P1-O11	3.10	119.42	107.80

There are no chirality outliers.

5 of 34 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	603[A]	PPV	P1-OPP-P2-O32
4	B	603[A]	PPV	P1-OPP-P2-O32
4	C	603[A]	PPV	P1-OPP-P2-O32
4	D	603[A]	PPV	P1-OPP-P2-O32
4	E	603[A]	PPV	P1-OPP-P2-O32

There are no ring outliers.

12 monomers are involved in 36 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	603[B]	PPV	3	0
4	F	603[A]	PPV	3	0
4	E	603[A]	PPV	4	0
4	B	603[B]	PPV	3	0
4	A	603[A]	PPV	3	0
4	D	603[A]	PPV	3	0
4	F	603[B]	PPV	2	0
4	E	603[B]	PPV	2	0
4	C	603[A]	PPV	3	0
4	A	603[B]	PPV	4	0
4	D	603[B]	PPV	2	0
4	B	603[A]	PPV	4	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 [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	511/559 (91%)	0.24	17 (3%)	49	46	19, 45, 87, 102	1 (0%)
1	B	510/559 (91%)	0.31	15 (2%)	53	50	17, 45, 87, 127	1 (0%)
1	C	511/559 (91%)	0.29	23 (4%)	38	35	19, 46, 92, 124	1 (0%)
1	D	515/559 (92%)	0.44	22 (4%)	40	36	21, 48, 105, 135	1 (0%)
1	E	511/559 (91%)	0.48	38 (7%)	20	18	19, 49, 107, 145	1 (0%)
1	F	513/559 (91%)	0.45	28 (5%)	30	27	21, 49, 102, 143	1 (0%)
All	All	3071/3354 (91%)	0.37	143 (4%)	36	33	17, 47, 97, 145	6 (0%)

The worst 5 of 143 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	498	LYS	5.2
1	D	293	LEU	5.1
1	F	293	LEU	5.0
1	C	282	PHE	4.8
1	F	498	LYS	4.6

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

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
3	GOL	E	602	6/6	0.75	0.16	57,60,63,68	0
4	PPV	B	603[A]	9/9	0.77	0.22	31,35,45,49	9
4	PPV	B	603[B]	9/9	0.77	0.22	46,51,62,62	9
4	PPV	D	603[A]	9/9	0.77	0.20	30,37,48,50	9
4	PPV	D	603[B]	9/9	0.77	0.20	56,60,66,69	9
4	PPV	C	603[A]	9/9	0.78	0.20	29,36,53,53	9
4	PPV	C	603[B]	9/9	0.78	0.20	49,54,62,63	9
4	PPV	A	603[A]	9/9	0.80	0.19	29,33,46,48	9
4	PPV	A	603[B]	9/9	0.80	0.19	43,51,60,61	9
3	GOL	C	602	6/6	0.81	0.16	47,48,52,54	0
3	GOL	B	602	6/6	0.81	0.14	52,55,56,59	0
3	GOL	F	602	6/6	0.84	0.11	57,59,60,60	0
2	PEG	E	601	7/7	0.85	0.16	54,58,61,62	0
2	PEG	D	601	7/7	0.86	0.12	52,53,57,58	0
3	GOL	A	602	6/6	0.86	0.11	53,56,59,62	0
4	PPV	F	603[A]	9/9	0.87	0.15	34,39,55,57	9
4	PPV	F	603[B]	9/9	0.87	0.15	53,61,68,70	9
2	PEG	F	601	7/7	0.88	0.14	51,56,59,61	0
2	PEG	B	601	7/7	0.88	0.11	52,53,55,56	0
4	PPV	E	603[A]	9/9	0.89	0.13	34,39,51,54	9
4	PPV	E	603[B]	9/9	0.89	0.13	58,63,68,68	9
2	PEG	C	601	7/7	0.89	0.12	47,52,55,55	0
3	GOL	D	602	6/6	0.89	0.10	55,57,60,61	0
2	PEG	A	601	7/7	0.90	0.11	48,49,53,54	0

6.5 Other polymers ⓘ

There are no such residues in this entry.