



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:16 AM UTC

PDB ID : 4D0V / pdb_00004d0v
Title : Crystal structure of the fiber head domain of the Atadenovirus snake adenovirus 1, native, I213 crystal form
Authors : Singh, A.K.; van Raaij, M.J.
Deposited on : 2014-04-30
Resolution : 1.70 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
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
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

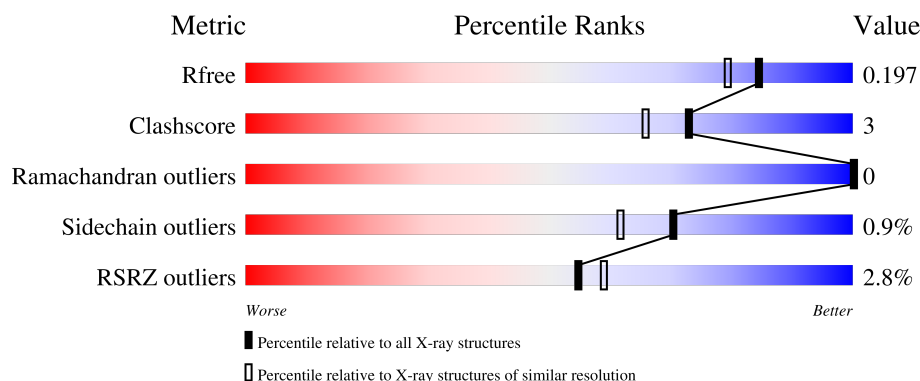
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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	145	2% 73% 26%
1	B	145	% 71% 28%
1	C	145	70% 27%
1	D	145	5% 76% 20%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 4006 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 FIBER PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	108	Total	C	N	O		0	4	0
			827	531	131	165				
1	B	105	Total	C	N	O		0	6	0
			820	524	133	163				
1	C	106	Total	C	N	O		0	3	0
			812	522	129	161				
1	D	116	Total	C	N	O	S	0	8	0
			910	580	150	179	1			

There are 156 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	201	MET	-	expression tag	UNP A9CB96
A	202	GLY	-	expression tag	UNP A9CB96
A	203	SER	-	expression tag	UNP A9CB96
A	204	SER	-	expression tag	UNP A9CB96
A	205	HIS	-	expression tag	UNP A9CB96
A	206	HIS	-	expression tag	UNP A9CB96
A	207	HIS	-	expression tag	UNP A9CB96
A	208	HIS	-	expression tag	UNP A9CB96
A	209	HIS	-	expression tag	UNP A9CB96
A	210	HIS	-	expression tag	UNP A9CB96
A	211	SER	-	expression tag	UNP A9CB96
A	212	SER	-	expression tag	UNP A9CB96
A	213	GLY	-	expression tag	UNP A9CB96
A	214	LEU	-	expression tag	UNP A9CB96
A	215	VAL	-	expression tag	UNP A9CB96
A	216	PRO	-	expression tag	UNP A9CB96
A	217	ARG	-	expression tag	UNP A9CB96
A	218	GLY	-	expression tag	UNP A9CB96
A	219	SER	-	expression tag	UNP A9CB96
A	220	HIS	-	expression tag	UNP A9CB96
A	221	MET	-	expression tag	UNP A9CB96

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Chain	Residue	Modelled	Actual	Comment	Reference
A	222	ALA	-	expression tag	UNP A9CB96
A	223	SER	-	expression tag	UNP A9CB96
A	224	MET	-	expression tag	UNP A9CB96
A	225	THR	-	expression tag	UNP A9CB96
A	226	GLY	-	expression tag	UNP A9CB96
A	227	GLY	-	expression tag	UNP A9CB96
A	228	GLN	-	expression tag	UNP A9CB96
A	229	GLN	-	expression tag	UNP A9CB96
A	230	MET	-	expression tag	UNP A9CB96
A	231	GLY	-	expression tag	UNP A9CB96
A	232	ARG	-	expression tag	UNP A9CB96
A	233	ILE	-	expression tag	UNP A9CB96
A	340	PHE	-	SEE REMARK 999	UNP A9CB96
A	341	TYR	-	SEE REMARK 999	UNP A9CB96
A	342	LEU	-	SEE REMARK 999	UNP A9CB96
A	343	THR	-	SEE REMARK 999	UNP A9CB96
A	344	GLU	-	SEE REMARK 999	UNP A9CB96
A	345	LYS	-	SEE REMARK 999	UNP A9CB96
B	201	MET	-	expression tag	UNP A9CB96
B	202	GLY	-	expression tag	UNP A9CB96
B	203	SER	-	expression tag	UNP A9CB96
B	204	SER	-	expression tag	UNP A9CB96
B	205	HIS	-	expression tag	UNP A9CB96
B	206	HIS	-	expression tag	UNP A9CB96
B	207	HIS	-	expression tag	UNP A9CB96
B	208	HIS	-	expression tag	UNP A9CB96
B	209	HIS	-	expression tag	UNP A9CB96
B	210	HIS	-	expression tag	UNP A9CB96
B	211	SER	-	expression tag	UNP A9CB96
B	212	SER	-	expression tag	UNP A9CB96
B	213	GLY	-	expression tag	UNP A9CB96
B	214	LEU	-	expression tag	UNP A9CB96
B	215	VAL	-	expression tag	UNP A9CB96
B	216	PRO	-	expression tag	UNP A9CB96
B	217	ARG	-	expression tag	UNP A9CB96
B	218	GLY	-	expression tag	UNP A9CB96
B	219	SER	-	expression tag	UNP A9CB96
B	220	HIS	-	expression tag	UNP A9CB96
B	221	MET	-	expression tag	UNP A9CB96
B	222	ALA	-	expression tag	UNP A9CB96
B	223	SER	-	expression tag	UNP A9CB96
B	224	MET	-	expression tag	UNP A9CB96

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Chain	Residue	Modelled	Actual	Comment	Reference
B	225	THR	-	expression tag	UNP A9CB96
B	226	GLY	-	expression tag	UNP A9CB96
B	227	GLY	-	expression tag	UNP A9CB96
B	228	GLN	-	expression tag	UNP A9CB96
B	229	GLN	-	expression tag	UNP A9CB96
B	230	MET	-	expression tag	UNP A9CB96
B	231	GLY	-	expression tag	UNP A9CB96
B	232	ARG	-	expression tag	UNP A9CB96
B	233	ILE	-	expression tag	UNP A9CB96
B	340	PHE	-	SEE REMARK 999	UNP A9CB96
B	341	TYR	-	SEE REMARK 999	UNP A9CB96
B	342	LEU	-	SEE REMARK 999	UNP A9CB96
B	343	THR	-	SEE REMARK 999	UNP A9CB96
B	344	GLU	-	SEE REMARK 999	UNP A9CB96
B	345	LYS	-	SEE REMARK 999	UNP A9CB96
C	201	MET	-	expression tag	UNP A9CB96
C	202	GLY	-	expression tag	UNP A9CB96
C	203	SER	-	expression tag	UNP A9CB96
C	204	SER	-	expression tag	UNP A9CB96
C	205	HIS	-	expression tag	UNP A9CB96
C	206	HIS	-	expression tag	UNP A9CB96
C	207	HIS	-	expression tag	UNP A9CB96
C	208	HIS	-	expression tag	UNP A9CB96
C	209	HIS	-	expression tag	UNP A9CB96
C	210	HIS	-	expression tag	UNP A9CB96
C	211	SER	-	expression tag	UNP A9CB96
C	212	SER	-	expression tag	UNP A9CB96
C	213	GLY	-	expression tag	UNP A9CB96
C	214	LEU	-	expression tag	UNP A9CB96
C	215	VAL	-	expression tag	UNP A9CB96
C	216	PRO	-	expression tag	UNP A9CB96
C	217	ARG	-	expression tag	UNP A9CB96
C	218	GLY	-	expression tag	UNP A9CB96
C	219	SER	-	expression tag	UNP A9CB96
C	220	HIS	-	expression tag	UNP A9CB96
C	221	MET	-	expression tag	UNP A9CB96
C	222	ALA	-	expression tag	UNP A9CB96
C	223	SER	-	expression tag	UNP A9CB96
C	224	MET	-	expression tag	UNP A9CB96
C	225	THR	-	expression tag	UNP A9CB96
C	226	GLY	-	expression tag	UNP A9CB96
C	227	GLY	-	expression tag	UNP A9CB96

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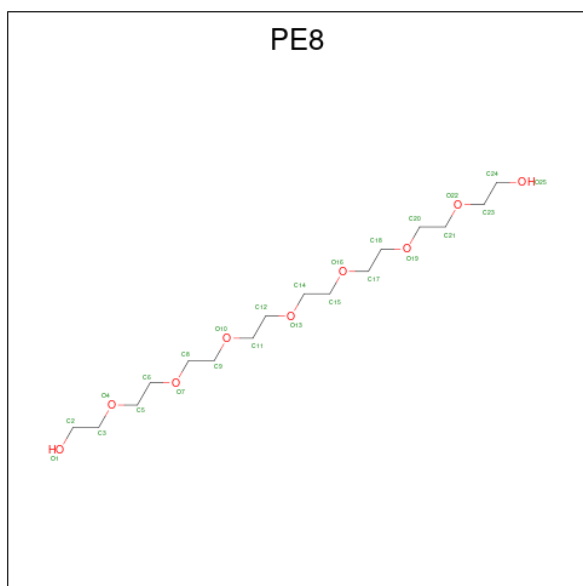
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C	228	GLN	-	expression tag	UNP A9CB96
C	229	GLN	-	expression tag	UNP A9CB96
C	230	MET	-	expression tag	UNP A9CB96
C	231	GLY	-	expression tag	UNP A9CB96
C	232	ARG	-	expression tag	UNP A9CB96
C	233	ILE	-	expression tag	UNP A9CB96
C	340	PHE	-	SEE REMARK 999	UNP A9CB96
C	341	TYR	-	SEE REMARK 999	UNP A9CB96
C	342	LEU	-	SEE REMARK 999	UNP A9CB96
C	343	THR	-	SEE REMARK 999	UNP A9CB96
C	344	GLU	-	SEE REMARK 999	UNP A9CB96
C	345	LYS	-	SEE REMARK 999	UNP A9CB96
D	201	MET	-	expression tag	UNP A9CB96
D	202	GLY	-	expression tag	UNP A9CB96
D	203	SER	-	expression tag	UNP A9CB96
D	204	SER	-	expression tag	UNP A9CB96
D	205	HIS	-	expression tag	UNP A9CB96
D	206	HIS	-	expression tag	UNP A9CB96
D	207	HIS	-	expression tag	UNP A9CB96
D	208	HIS	-	expression tag	UNP A9CB96
D	209	HIS	-	expression tag	UNP A9CB96
D	210	HIS	-	expression tag	UNP A9CB96
D	211	SER	-	expression tag	UNP A9CB96
D	212	SER	-	expression tag	UNP A9CB96
D	213	GLY	-	expression tag	UNP A9CB96
D	214	LEU	-	expression tag	UNP A9CB96
D	215	VAL	-	expression tag	UNP A9CB96
D	216	PRO	-	expression tag	UNP A9CB96
D	217	ARG	-	expression tag	UNP A9CB96
D	218	GLY	-	expression tag	UNP A9CB96
D	219	SER	-	expression tag	UNP A9CB96
D	220	HIS	-	expression tag	UNP A9CB96
D	221	MET	-	expression tag	UNP A9CB96
D	222	ALA	-	expression tag	UNP A9CB96
D	223	SER	-	expression tag	UNP A9CB96
D	224	MET	-	expression tag	UNP A9CB96
D	225	THR	-	expression tag	UNP A9CB96
D	226	GLY	-	expression tag	UNP A9CB96
D	227	GLY	-	expression tag	UNP A9CB96
D	228	GLN	-	expression tag	UNP A9CB96
D	229	GLN	-	expression tag	UNP A9CB96
D	230	MET	-	expression tag	UNP A9CB96

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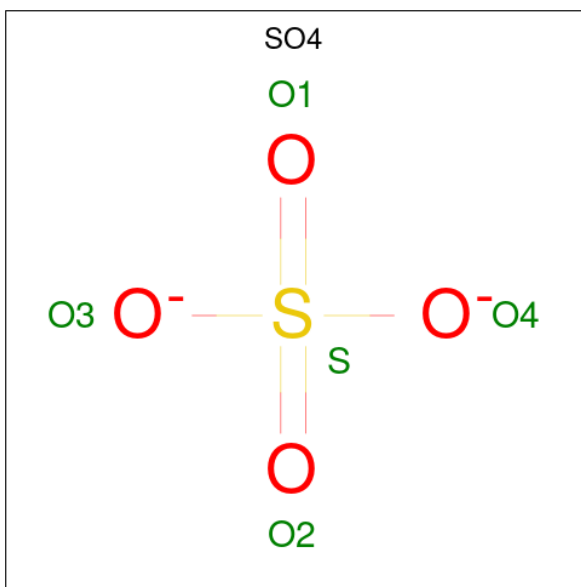
Chain	Residue	Modelled	Actual	Comment	Reference
D	231	GLY	-	expression tag	UNP A9CB96
D	232	ARG	-	expression tag	UNP A9CB96
D	233	ILE	-	expression tag	UNP A9CB96
D	340	PHE	-	SEE REMARK 999	UNP A9CB96
D	341	TYR	-	SEE REMARK 999	UNP A9CB96
D	342	LEU	-	SEE REMARK 999	UNP A9CB96
D	343	THR	-	SEE REMARK 999	UNP A9CB96
D	344	GLU	-	SEE REMARK 999	UNP A9CB96
D	345	LYS	-	SEE REMARK 999	UNP A9CB96

- Molecule 2 is 3,6,9,12,15,18,21-HEPTAOXATRICOSANE-1,23-DIOL (CCD ID: PE8) (formula: C₁₆H₃₄O₉).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			25	16	9		
2	C	1	Total	C	O	0	0
			25	16	9		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



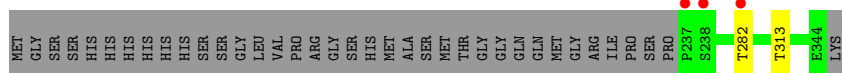
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

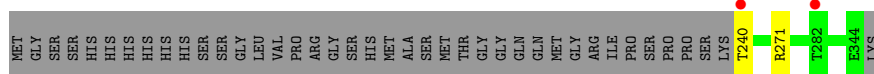
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	163	Total	O	0	0
			163	163		
4	B	139	Total	O	0	0
			139	139		
4	C	124	Total	O	0	0
			124	124		
4	D	146	Total	O	0	0
			146	146		

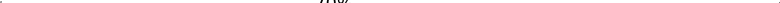
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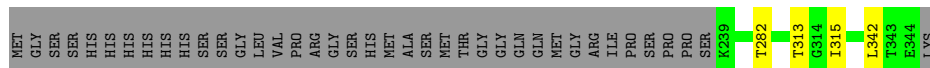
- Molecule 1: FIBER PROTEIN

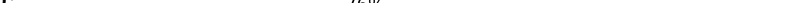


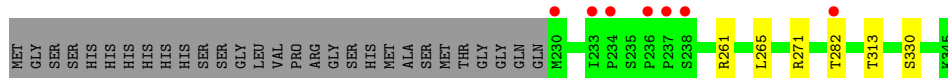
Chain B:  71% 28% 1%



Chain C:  70% . 27%



Chain D:  5% 76% 20%



4 Data and refinement statistics

Property	Value	Source
Space group	I 21 3	Depositor
Cell constants a, b, c, α , β , γ	149.62Å 149.62Å 149.62Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.70 20.00 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (20.00-1.70) 99.8 (20.00-1.70)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.24 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.167 , 0.201 (Not available) , 0.197	Depositor DCC
R_{free} test set	1609 reflections (2.64%)	wwPDB-VP
Wilson B-factor (Å ²)	15.1	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 53.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.023 for -l,-k,-h	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4006	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 3.48% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, PE8

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	0.72	0/860	0.81	0/1164
1	B	0.70	0/860	0.81	0/1163
1	C	0.72	0/840	0.77	1/1137 (0.1%)
1	D	0.73	0/957	0.77	0/1292
All	All	0.72	0/3517	0.79	1/4756 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	282	THR	N-CA-C	-5.07	105.41	112.45

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	827	0	818	4	0
1	B	820	0	805	1	0
1	C	812	0	804	4	0
1	D	910	0	903	6	1
2	A	25	0	34	7	0
2	C	25	0	34	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	5	0	0	0	0
3	C	10	0	0	0	0
4	A	163	0	0	5	1
4	B	139	0	0	1	1
4	C	124	0	0	0	0
4	D	146	0	0	3	1
All	All	4006	0	3398	22	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 3.

All (22) 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)
4:A:2108:HOH:O	1:C:313[B]:THR:HG22	1.12	1.26
1:A:313[B]:THR:CG2	4:A:2110:HOH:O	1.78	1.24
1:A:313[B]:THR:HG22	4:A:2110:HOH:O	1.38	1.07
4:A:2108:HOH:O	1:C:313[B]:THR:CG2	1.76	1.01
2:A:1345:PE8:H22	2:A:1345:PE8:H171	1.43	0.97
1:D:271[B]:ARG:HD2	4:D:2052:HOH:O	1.68	0.93
2:A:1345:PE8:H92	2:A:1345:PE8:H242	1.58	0.86
2:C:1345:PE8:H21	2:C:1345:PE8:H151	1.64	0.78
1:D:282:THR:HG22	1:D:330[B]:SER:OG	1.84	0.78
2:A:1345:PE8:H242	2:A:1345:PE8:C9	2.21	0.71
1:D:271[B]:ARG:CD	4:D:2052:HOH:O	2.35	0.65
2:A:1345:PE8:H171	2:A:1345:PE8:C2	2.24	0.65
1:D:313[B]:THR:HB	4:D:2099:HOH:O	2.03	0.57
1:C:315:ILE:HD12	2:C:1345:PE8:H121	1.89	0.54
2:C:1345:PE8:H201	1:D:313[B]:THR:HG23	1.90	0.54
1:A:313[B]:THR:HG23	4:A:2110:HOH:O	1.73	0.52
2:A:1345:PE8:H22	2:A:1345:PE8:C17	2.31	0.47
1:C:315:ILE:CD1	2:C:1345:PE8:H141	2.45	0.46
2:A:1345:PE8:H242	2:A:1345:PE8:H112	1.98	0.46
1:B:271[B]:ARG:NH1	4:B:2042:HOH:O	2.53	0.42
2:A:1345:PE8:H112	2:A:1345:PE8:C24	2.51	0.40
1:A:282:THR:HG22	1:D:282:THR:CB	2.52	0.40

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)
4:A:2010:HOH:O	4:B:2105:HOH:O[7_555]	2.16	0.04
1:D:261:ARG:NH2	4:D:2045:HOH:O[7_555]	2.19	0.01

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	110/145 (76%)	108 (98%)	2 (2%)	0	100	100
1	B	109/145 (75%)	108 (99%)	1 (1%)	0	100	100
1	C	107/145 (74%)	106 (99%)	1 (1%)	0	100	100
1	D	122/145 (84%)	122 (100%)	0	0	100	100
All	All	448/580 (77%)	444 (99%)	4 (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	91/117 (78%)	91 (100%)	0	100	100
1	B	90/117 (77%)	89 (99%)	1 (1%)	65	54
1	C	88/117 (75%)	87 (99%)	1 (1%)	65	54
1	D	101/117 (86%)	100 (99%)	1 (1%)	68	58
All	All	370/468 (79%)	367 (99%)	3 (1%)	70	65

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	240	THR
1	C	342	LEU
1	D	265	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

5 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	PE8	A	1345	-	24,24,24	0.70	0	23,23,23	0.87	2 (8%)
3	SO4	B	1345	-	4,4,4	0.32	0	6,6,6	0.08	0
3	SO4	C	1347	-	4,4,4	0.26	0	6,6,6	0.60	0
2	PE8	C	1345	-	24,24,24	0.60	0	23,23,23	0.63	0
3	SO4	C	1346	-	4,4,4	0.52	0	6,6,6	0.53	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	PE8	A	1345	-	-	3/22/22/22	-
2	PE8	C	1345	-	-	7/22/22/22	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1345	PE8	C11-O10-C9	2.19	122.85	113.26
2	A	1345	PE8	C14-O13-C12	2.13	122.59	113.26

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	1345	PE8	O22-C23-C24-O25
2	A	1345	PE8	O1-C2-C3-O4
2	A	1345	PE8	O10-C11-C12-O13
2	C	1345	PE8	O4-C5-C6-O7
2	C	1345	PE8	O13-C14-C15-O16
2	C	1345	PE8	C9-C8-O7-C6
2	C	1345	PE8	O1-C2-C3-O4
2	C	1345	PE8	C21-C20-O19-C18
2	A	1345	PE8	C15-C14-O13-C12
2	C	1345	PE8	O16-C17-C18-O19

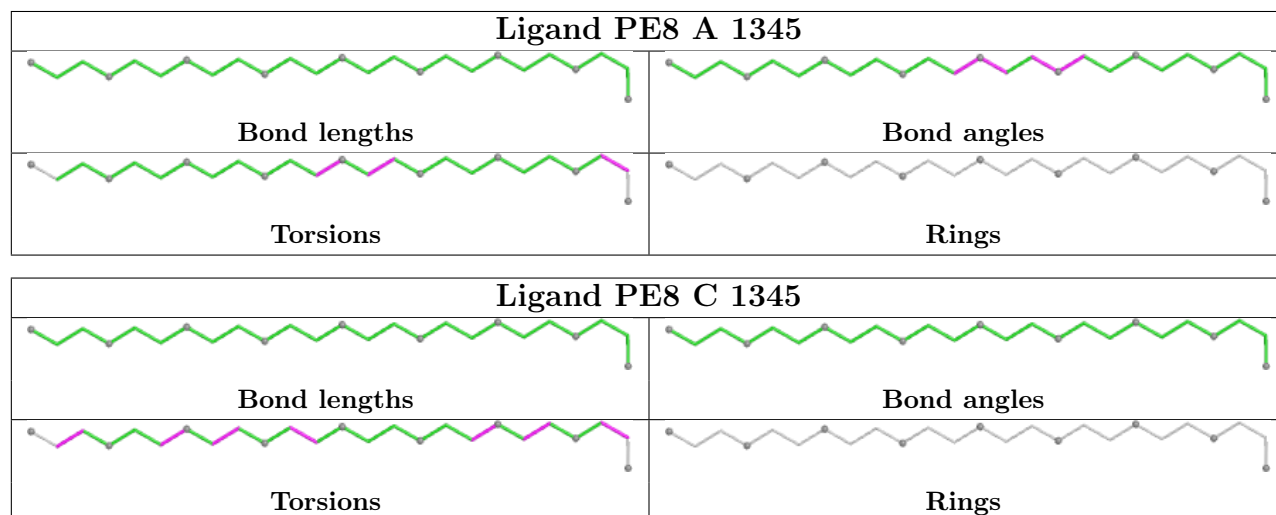
There are no ring outliers.

2 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1345	PE8	7	0
2	C	1345	PE8	4	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 than 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.



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	108/145 (74%)	-0.18	3 (2%) 55 59	7, 17, 32, 47	4 (3%)
1	B	105/145 (72%)	-0.39	2 (1%) 66 71	5, 14, 27, 33	7 (6%)
1	C	106/145 (73%)	-0.39	0 100 100	6, 14, 30, 40	4 (3%)
1	D	116/145 (80%)	-0.25	7 (6%) 27 30	6, 13, 44, 53	9 (7%)
All	All	435/580 (75%)	-0.30	12 (2%) 55 59	5, 14, 32, 53	24 (5%)

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	230	MET	4.1
1	D	236	PRO	3.5
1	A	237	PRO	3.4
1	D	233	ILE	3.2
1	D	282	THR	2.9
1	D	234	PRO	2.8
1	B	240	THR	2.8
1	A	282	THR	2.7
1	A	238	SER	2.6
1	D	237	PRO	2.2
1	B	282	THR	2.2
1	D	238	SER	2.0

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](#)

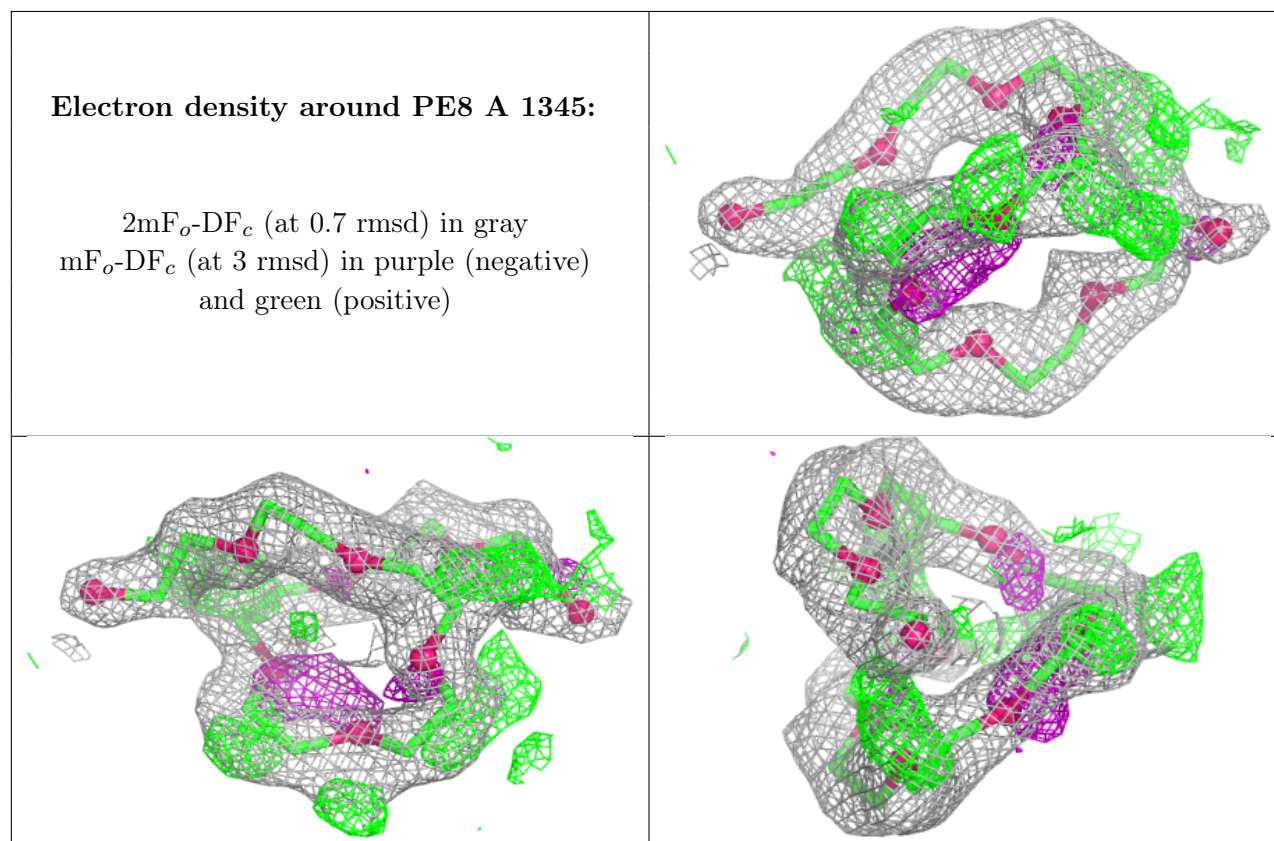
There are no oligosaccharides in this entry.

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.

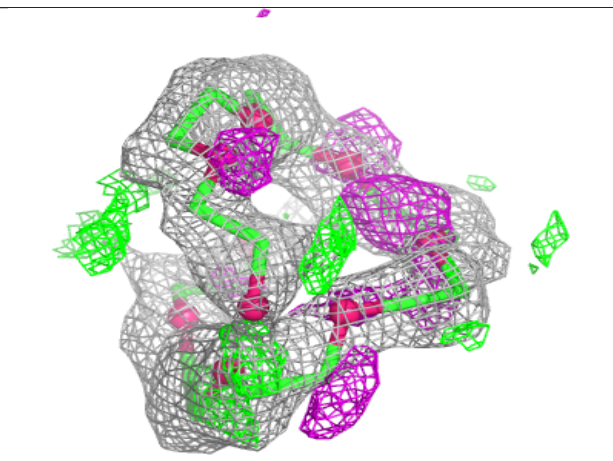
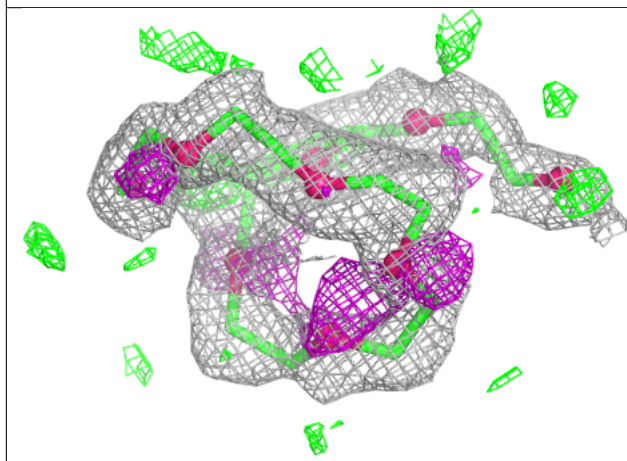
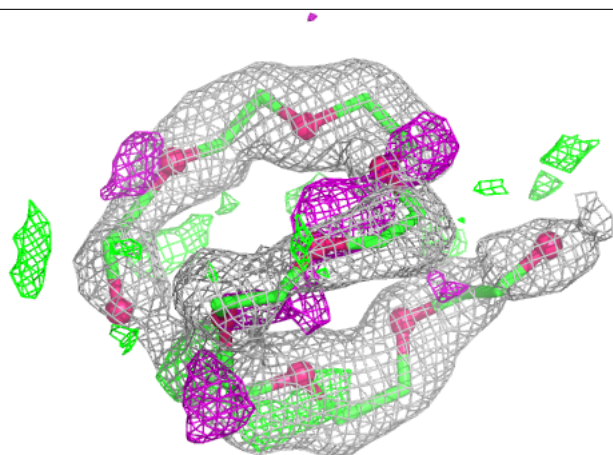
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	PE8	A	1345	25/25	0.81	0.15	21,30,36,38	0
2	PE8	C	1345	25/25	0.82	0.15	23,35,42,46	0
3	SO4	C	1346	5/5	0.85	0.23	15,20,22,23	5
3	SO4	C	1347	5/5	0.96	0.13	12,15,15,20	5
3	SO4	B	1345	5/5	0.99	0.07	12,13,13,13	5

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 PE8 C 1345:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.