



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:47 PM UTC

PDB ID : 4X90 / pdb_00004x90
Title : Crystal structure of Lysosomal Phospholipase A2
Authors : Glukhova, A.; Tesmer, J.J.G.
Deposited on : 2014-12-11
Resolution : 1.84 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

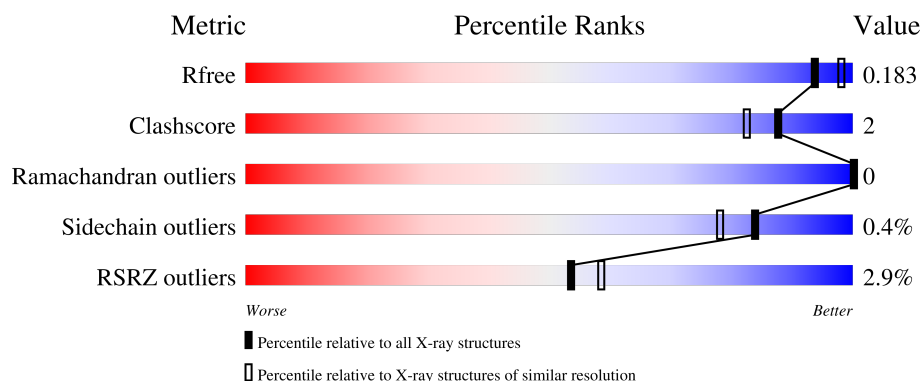
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.84 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	1296 (1.84-1.84)
Clashscore	190562	1329 (1.84-1.84)
Ramachandran outliers	187476	1318 (1.84-1.84)
Sidechain outliers	187428	1318 (1.84-1.84)
RSRZ outliers	180081	1296 (1.84-1.84)

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	380	2% 93% 6%
1	B	380	4% 96%
1	C	380	3% 96%
1	D	380	2% 94%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 14133 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 Group XV phospholipase A2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	376	Total	C	N	O	S	0	19	0
			3158	2040	529	573	16			
1	B	376	Total	C	N	O	S	0	18	0
			3142	2034	526	566	16			
1	C	376	Total	C	N	O	S	0	16	0
			3133	2026	526	565	16			
1	D	376	Total	C	N	O	S	0	19	0
			3159	2039	529	575	16			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	cloning artifact	UNP Q8NCC3
B	0	GLY	-	cloning artifact	UNP Q8NCC3
C	0	GLY	-	cloning artifact	UNP Q8NCC3
D	0	GLY	-	cloning artifact	UNP Q8NCC3

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



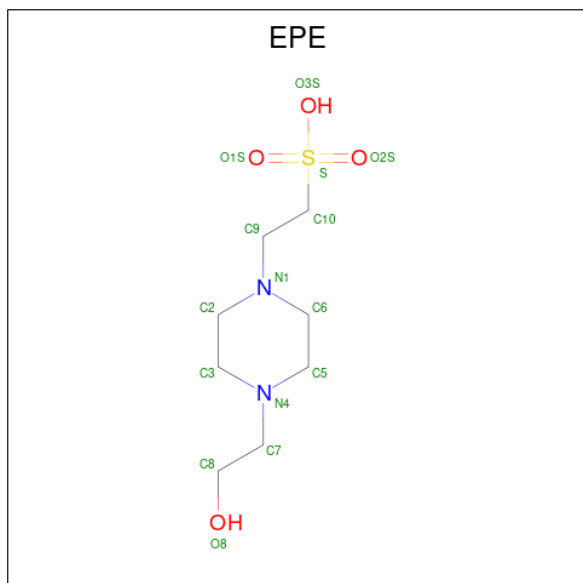
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	1
			28	16	2	10		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	1
			28	16	2	10		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	1
			28	16	2	10		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	D	1	Total	C	N	O	0	1
			28	16	2	10		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (CCD ID: EPE) (formula: $C_8H_{18}N_2O_4S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
3	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
3	C	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
3	D	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total 1 Cl	0	0
4	B	1	Total 1 Cl	0	0
4	C	1	Total 1 Cl	0	0

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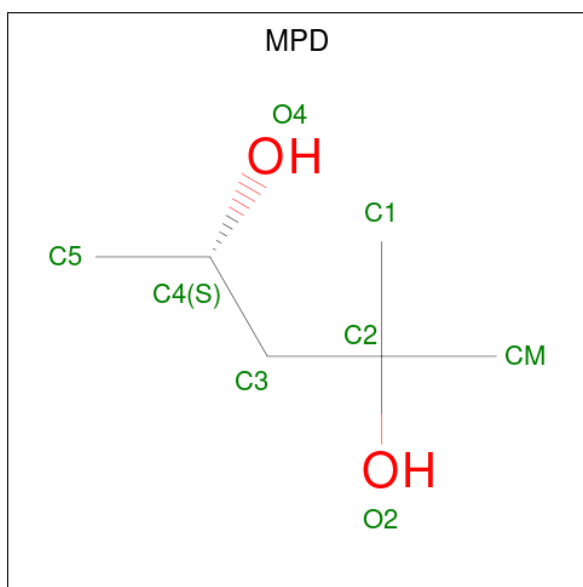
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	1	Total	Cl	0	0
			1	1		

- Molecule 5 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total	O	P	0	0
			5	4	1		
5	D	1	Total	O	P	0	0
			5	4	1		

- Molecule 6 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: $C_6H_{14}O_2$).

[illegible]

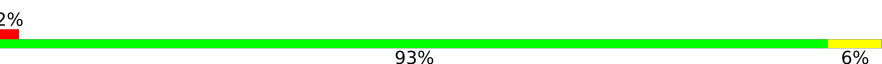
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	280	Total 280	O 280	0	0
7	B	235	Total 235	O 235	0	0
7	C	274	Total 274	O 274	0	0
7	D	276	Total 276	O 276	0	0

3 Residue-property plots [i](#)

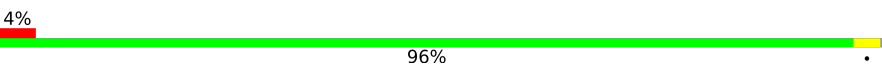
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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.

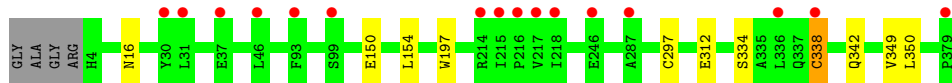
- Molecule 1: Group XV phospholipase A2

Chain A: 

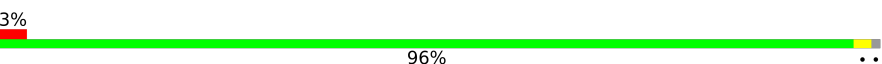


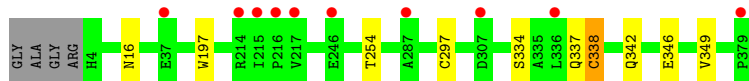
- Molecule 1: Group XV phospholipase A2

Chain B: 

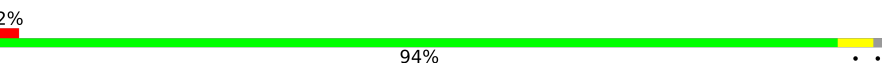


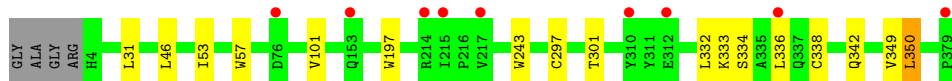
- Molecule 1: Group XV phospholipase A2

Chain C: 



- Molecule 1: Group XV phospholipase A2

Chain D: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	62.81Å 91.15Å 100.27Å 78.13° 88.46° 88.50°	Depositor
Resolution (Å)	30.00 – 1.84 30.00 – 1.84	Depositor EDS
% Data completeness (in resolution range)	96.8 (30.00-1.84) 97.1 (30.00-1.84)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.92 (at 1.84Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.154 , 0.173 0.165 , 0.183	Depositor DCC
R_{free} test set	9229 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å ²)	21.4	Xtriage
Anisotropy	0.439	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 50.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.199 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	14133	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.78% 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: PO4, CL, EPE, NAG, MPD

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	0/3270	0.78	0/4457
1	B	0.64	0/3260	0.76	0/4444
1	C	0.65	0/3245	0.77	0/4423
1	D	0.65	0/3271	0.76	0/4458
All	All	0.65	0/13046	0.77	0/17782

There are no bond length outliers.

There are no bond angle outliers.

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	3158	0	3085	15	0
1	B	3142	0	3089	8	0
1	C	3133	0	3069	8	0
1	D	3159	0	3080	12	0
2	A	70	0	65	1	0
2	B	70	0	65	1	0
2	C	70	0	65	1	0
2	D	70	0	65	0	0
3	A	15	0	18	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	15	0	17	0	0
3	C	15	0	18	0	0
3	D	15	0	18	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	5	0	0	0	0
5	B	5	0	0	0	0
5	C	5	0	0	0	0
5	D	5	0	0	0	0
6	A	40	0	70	4	0
6	B	16	0	28	1	0
6	C	16	0	28	2	0
6	D	40	0	70	1	0
7	A	280	0	0	4	1
7	B	235	0	0	4	0
7	C	274	0	0	3	2
7	D	276	0	0	0	0
All	All	14133	0	12850	52	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 2.

All (52) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:297[A]:CYS:SG	1:B:338[A]:CYS:SG	2.40	1.11
1:C:297[B]:CYS:SG	7:C:737:HOH:O	2.18	0.99
2:B:402:NAG:H83	7:B:518:HOH:O	1.70	0.90
2:A:402:NAG:H83	7:A:515:HOH:O	1.74	0.86
1:D:297[A]:CYS:SG	1:D:338[A]:CYS:SG	2.44	0.82
1:A:197[B]:TRP:HB2	1:A:334[B]:SER:O	1.80	0.80
1:B:297[B]:CYS:SG	1:B:338[B]:CYS:SG	2.39	0.77
6:B:408:MPD:HM2	6:B:409:MPD:H13	1.67	0.75
1:A:297[A]:CYS:SG	1:A:338[A]:CYS:SG	2.45	0.74
1:A:297[B]:CYS:SG	7:A:702:HOH:O	2.47	0.73
1:A:338[B]:CYS:HB2	1:A:351:LEU:HD11	1.76	0.68
1:D:197[B]:TRP:HB2	1:D:334[B]:SER:O	1.93	0.68
6:C:408:MPD:HM2	6:C:409:MPD:H13	1.76	0.66
6:A:409:MPD:O4	6:A:409:MPD:HM1	1.95	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:408:MPD:HM2	6:A:409:MPD:HM3	1.81	0.62
1:C:297[A]:CYS:SG	1:C:338[A]:CYS:HB3	2.40	0.62
6:C:409:MPD:O4	6:C:409:MPD:H11	2.04	0.58
1:C:297[A]:CYS:SG	1:C:338[A]:CYS:CB	2.92	0.58
1:A:46:LEU:HD11	1:A:101:VAL:HG11	1.86	0.57
1:D:46:LEU:HD11	1:D:101:VAL:HG11	1.87	0.56
1:D:57:TRP:HH2	6:D:412:MPD:H53	1.72	0.55
1:A:335[B]:ALA:O	1:A:338[B]:CYS:SG	2.66	0.54
6:A:411:MPD:H52	6:A:411:MPD:HM2	1.89	0.53
1:A:177:ARG:NH2	1:A:284:LEU:O	2.42	0.52
1:B:197[B]:TRP:HB2	1:B:334[B]:SER:O	2.11	0.51
1:D:342:GLN:HG2	1:D:349:VAL:HB	1.94	0.50
1:B:350[A]:LEU:HD22	1:B:350[A]:LEU:N	2.28	0.49
1:A:342:GLN:HG2	1:A:349:VAL:HB	1.95	0.49
1:C:254:THR:C	2:C:403[A]:NAG:H82	2.38	0.48
1:B:342:GLN:HG2	1:B:349:VAL:HB	1.95	0.47
1:A:205:ARG:NH2	7:A:651:HOH:O	2.48	0.47
6:A:409:MPD:O4	6:A:409:MPD:CM	2.64	0.46
1:D:350[A]:LEU:HD23	1:D:350[A]:LEU:N	2.31	0.46
1:A:350[A]:LEU:HD22	1:A:350[A]:LEU:N	2.30	0.46
1:C:197[B]:TRP:HB2	1:C:334[B]:SER:O	2.17	0.45
1:A:243[B]:TRP:NE1	1:A:333:LYS:HD2	2.32	0.45
1:D:243[B]:TRP:NE1	1:D:333:LYS:HD2	2.32	0.45
1:C:342:GLN:HG2	1:C:349:VAL:HB	1.98	0.44
1:D:31:LEU:HD13	1:D:53:ILE:HD12	1.99	0.44
1:A:243[B]:TRP:CD1	1:A:333:LYS:HD2	2.53	0.43
1:A:337[A]:GLN:HE21	1:A:341:TRP:NE1	2.17	0.43
1:A:301:THR:HG22	1:A:332:LEU:HD13	2.02	0.42
1:B:150[B]:GLU:HG3	7:B:572:HOH:O	2.19	0.42
1:D:301:THR:HG22	1:D:332:LEU:HD13	2.02	0.42
1:D:349:VAL:C	1:D:350[A]:LEU:HD23	2.44	0.42
1:B:154:LEU:HG	7:B:714:HOH:O	2.20	0.41
1:D:336[B]:LEU:HD23	1:D:336[B]:LEU:HA	1.87	0.41
1:C:346:GLU:HG3	7:C:531:HOH:O	2.21	0.41
1:A:367[A]:THR:HG23	7:A:761:HOH:O	2.20	0.41
1:B:312:GLU:HG2	7:B:527:HOH:O	2.20	0.40
1:C:337[B]:GLN:HB2	7:C:684:HOH:O	2.21	0.40
1:D:31:LEU:HD13	1:D:53:ILE:CD1	2.50	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)
7:A:528:HOH:O	7:C:534:HOH:O[1_556]	2.02	0.18
7:C:533:HOH:O	7:C:537:HOH:O[1_655]	2.08	0.12

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	393/380 (103%)	383 (98%)	10 (2%)	0	100	100
1	B	392/380 (103%)	385 (98%)	7 (2%)	0	100	100
1	C	390/380 (103%)	383 (98%)	7 (2%)	0	100	100
1	D	393/380 (103%)	385 (98%)	8 (2%)	0	100	100
All	All	1568/1520 (103%)	1536 (98%)	32 (2%)	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	345/329 (105%)	345 (100%)	0	100	100
1	B	344/329 (105%)	341 (99%)	3 (1%)	70	60
1	C	342/329 (104%)	339 (99%)	3 (1%)	70	60
1	D	345/329 (105%)	343 (99%)	2 (1%)	78	72
All	All	1376/1316 (105%)	1368 (99%)	8 (1%)	84	72

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	16	ASN
1	B	338[A]	CYS
1	B	338[B]	CYS
1	C	16	ASN
1	C	338[A]	CYS
1	C	338[B]	CYS
1	D	350[A]	LEU
1	D	350[B]	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	153	GLN
1	A	226	GLN
1	A	251	GLN
1	A	279	GLN
1	A	348	GLN
1	B	180	GLN
1	B	279	GLN
1	B	348	GLN
1	B	352	GLN
1	C	180	GLN
1	C	251	GLN
1	C	279	GLN
1	C	352	GLN
1	D	153	GLN
1	D	226	GLN
1	D	279	GLN
1	D	352	GLN

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 [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 46 ligands modelled in this entry, 4 are monoatomic - leaving 42 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	$\# Z > 2$
6	MPD	B	409	-	7,7,7	0.32	0	9,10,10	0.49	0
2	NAG	B	401	1	14,14,15	0.53	0	17,19,21	0.92	1 (5%)
2	NAG	A	403[B]	1	14,14,15	0.69	0	17,19,21	0.78	0
6	MPD	D	411	-	7,7,7	0.22	0	9,10,10	0.41	0
3	EPE	C	405	-	15,15,15	1.73	1 (6%)	19,20,20	1.27	3 (15%)
6	MPD	B	408	-	7,7,7	0.26	0	9,10,10	0.52	0
6	MPD	D	410	-	7,7,7	0.22	0	9,10,10	0.39	0
2	NAG	D	404[A]	1	14,14,15	0.87	0	17,19,21	1.25	2 (11%)
6	MPD	A	410	-	7,7,7	0.27	0	9,10,10	0.25	0
2	NAG	C	404	1	14,14,15	0.63	0	17,19,21	1.14	2 (11%)
2	NAG	D	403	1	14,14,15	0.54	0	17,19,21	1.13	1 (5%)
2	NAG	C	403[B]	1	14,14,15	0.63	0	17,19,21	1.35	2 (11%)
2	NAG	A	401	1	14,14,15	0.61	0	17,19,21	1.24	1 (5%)
2	NAG	C	401	1	14,14,15	0.34	0	17,19,21	1.68	4 (23%)
6	MPD	C	409	-	7,7,7	0.27	0	9,10,10	0.46	0
6	MPD	D	401	-	7,7,7	0.34	0	9,10,10	0.33	0
2	NAG	B	402	1	14,14,15	0.57	0	17,19,21	2.19	5 (29%)
3	EPE	A	405	-	15,15,15	1.80	1 (6%)	19,20,20	0.93	0
5	PO4	D	408	-	4,4,4	0.97	0	6,6,6	0.79	0
5	PO4	C	407	-	4,4,4	0.80	0	6,6,6	1.08	1 (16%)
2	NAG	B	403[A]	1	14,14,15	0.68	0	17,19,21	1.50	3 (17%)
2	NAG	A	402	1	14,14,15	0.67	0	17,19,21	1.71	4 (23%)
2	NAG	D	405	1	14,14,15	0.45	0	17,19,21	0.92	0
6	MPD	C	408	-	7,7,7	0.21	0	9,10,10	0.53	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	MPD	D	412	-	7,7,7	0.32	0	9,10,10	0.48	0
2	NAG	A	404	1	14,14,15	0.58	0	17,19,21	1.08	1 (5%)
6	MPD	A	409	-	7,7,7	0.29	0	9,10,10	0.41	0
2	NAG	D	404[B]	1	14,14,15	0.62	0	17,19,21	0.98	1 (5%)
6	MPD	A	408	-	7,7,7	0.29	0	9,10,10	0.38	0
2	NAG	D	402	1	14,14,15	0.64	0	17,19,21	1.31	3 (17%)
2	NAG	A	403[A]	1	14,14,15	0.54	0	17,19,21	0.89	1 (5%)
6	MPD	D	409	-	7,7,7	0.32	0	9,10,10	0.44	0
3	EPE	D	406	-	15,15,15	1.99	1 (6%)	19,20,20	1.12	1 (5%)
3	EPE	B	405	-	15,15,15	2.06	1 (6%)	19,20,20	1.23	2 (10%)
2	NAG	C	402	1	14,14,15	0.81	1 (7%)	17,19,21	1.49	5 (29%)
2	NAG	B	403[B]	1	14,14,15	0.57	0	17,19,21	1.32	1 (5%)
5	PO4	B	407	-	4,4,4	0.94	0	6,6,6	0.60	0
6	MPD	A	412	-	7,7,7	0.40	0	9,10,10	0.48	0
6	MPD	A	411	-	7,7,7	0.28	0	9,10,10	0.55	0
5	PO4	A	407	-	4,4,4	0.53	0	6,6,6	1.07	0
2	NAG	B	404	1	14,14,15	0.67	0	17,19,21	1.32	3 (17%)
2	NAG	C	403[A]	1	14,14,15	0.61	0	17,19,21	1.31	2 (11%)

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
6	MPD	B	409	-	-	2/5/5/5	-
2	NAG	B	401	1	-	0/6/23/26	0/1/1/1
2	NAG	A	403[B]	1	-	2/6/23/26	0/1/1/1
6	MPD	D	411	-	-	0/5/5/5	-
3	EPE	C	405	-	-	2/9/19/19	0/1/1/1
6	MPD	B	408	-	-	1/5/5/5	-
6	MPD	D	410	-	-	0/5/5/5	-
2	NAG	D	404[A]	1	-	2/6/23/26	0/1/1/1
6	MPD	A	410	-	-	0/5/5/5	-
2	NAG	C	404	1	-	0/6/23/26	0/1/1/1
2	NAG	D	403	1	-	0/6/23/26	0/1/1/1
2	NAG	C	403[B]	1	-	0/6/23/26	0/1/1/1
2	NAG	A	401	1	-	0/6/23/26	0/1/1/1
2	NAG	C	401	1	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	MPD	C	409	-	-	1/5/5/5	-
6	MPD	D	401	-	-	0/5/5/5	-
2	NAG	B	402	1	-	2/6/23/26	0/1/1/1
3	EPE	A	405	-	-	1/9/19/19	0/1/1/1
6	MPD	D	412	-	-	3/5/5/5	-
2	NAG	B	403[A]	1	-	2/6/23/26	0/1/1/1
2	NAG	A	402	1	-	2/6/23/26	0/1/1/1
2	NAG	D	405	1	-	0/6/23/26	0/1/1/1
6	MPD	C	408	-	-	1/5/5/5	-
2	NAG	A	404	1	-	0/6/23/26	0/1/1/1
6	MPD	A	409	-	-	0/5/5/5	-
2	NAG	D	404[B]	1	-	2/6/23/26	0/1/1/1
6	MPD	A	408	-	-	0/5/5/5	-
2	NAG	D	402	1	-	0/6/23/26	0/1/1/1
2	NAG	A	403[A]	1	-	0/6/23/26	0/1/1/1
6	MPD	D	409	-	-	0/5/5/5	-
3	EPE	D	406	-	-	1/9/19/19	0/1/1/1
3	EPE	B	405	-	-	1/9/19/19	0/1/1/1
2	NAG	C	402	1	-	0/6/23/26	0/1/1/1
2	NAG	B	403[B]	1	-	2/6/23/26	0/1/1/1
6	MPD	A	412	-	-	0/5/5/5	-
6	MPD	A	411	-	-	1/5/5/5	-
2	NAG	B	404	1	-	1/6/23/26	0/1/1/1
2	NAG	C	403[A]	1	-	0/6/23/26	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	405	EPE	C10-S	-7.71	1.66	1.77
3	D	406	EPE	C10-S	-7.36	1.67	1.77
3	A	405	EPE	C10-S	-6.61	1.68	1.77
3	C	405	EPE	C10-S	-6.45	1.68	1.77
2	C	402	NAG	C1-C2	2.48	1.55	1.52

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	402	NAG	C8-C7-N2	5.09	124.57	116.12
2	C	401	NAG	C1-O5-C5	4.53	118.26	112.19
2	B	402	NAG	O7-C7-C8	-4.17	114.62	122.05
2	C	403[B]	NAG	C1-O5-C5	4.03	117.59	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	403[B]	NAG	C1-O5-C5	3.84	117.34	112.19
2	A	402	NAG	C8-C7-N2	3.82	122.45	116.12
2	A	401	NAG	O5-C1-C2	-3.57	105.76	111.29
2	B	402	NAG	C2-N2-C7	3.51	127.61	122.90
2	B	403[A]	NAG	O5-C1-C2	-3.42	106.01	111.29
3	B	405	EPE	O1S-S-C10	3.35	111.80	106.73
2	B	402	NAG	C1-O5-C5	3.35	116.67	112.19
2	D	403	NAG	C1-O5-C5	3.22	116.50	112.19
2	C	402	NAG	C1-O5-C5	3.11	116.36	112.19
2	C	401	NAG	C6-C5-C4	-3.07	105.47	113.02
2	D	404[A]	NAG	O5-C1-C2	-2.87	106.85	111.29
2	A	402	NAG	C2-N2-C7	2.85	126.73	122.90
2	A	402	NAG	O7-C7-C8	-2.85	116.98	122.05
3	D	406	EPE	O2S-S-C10	2.78	110.94	106.73
2	D	402	NAG	O5-C1-C2	-2.71	107.10	111.29
2	C	404	NAG	C1-C2-N2	-2.70	106.18	110.43
2	B	404	NAG	C1-O5-C5	2.65	115.74	112.19
3	C	405	EPE	O1S-S-C10	2.58	110.63	106.73
2	A	402	NAG	C1-O5-C5	2.56	115.62	112.19
2	B	403[A]	NAG	C1-O5-C5	2.51	115.55	112.19
3	C	405	EPE	O3S-S-O1S	-2.46	105.24	111.40
2	C	402	NAG	C2-N2-C7	2.37	126.08	122.90
2	C	401	NAG	C3-C4-C5	2.35	114.49	110.23
2	B	404	NAG	C1-C2-N2	-2.34	106.74	110.43
2	B	403[A]	NAG	C1-C2-N2	2.34	114.11	110.43
2	C	402	NAG	O7-C7-C8	-2.33	117.91	122.05
2	B	401	NAG	C1-C2-N2	-2.31	106.79	110.43
2	C	402	NAG	C1-C2-N2	2.29	114.05	110.43
2	B	402	NAG	C1-C2-N2	2.20	113.90	110.43
2	D	402	NAG	C1-C2-N2	-2.18	107.00	110.43
2	D	404[B]	NAG	O5-C1-C2	-2.17	107.93	111.29
2	D	402	NAG	O5-C5-C4	-2.15	105.61	110.83
2	C	402	NAG	O7-C7-N2	2.13	125.75	121.98
2	B	404	NAG	C6-C5-C4	-2.13	107.80	113.02
2	C	403[A]	NAG	C1-C2-N2	2.10	113.74	110.43
2	D	404[A]	NAG	O4-C4-C3	-2.09	105.45	110.38
5	C	407	PO4	O3-P-O1	-2.08	103.61	110.95
2	C	404	NAG	O5-C1-C2	-2.07	108.08	111.29
2	C	403[A]	NAG	C1-O5-C5	2.07	114.97	112.19
2	A	403[A]	NAG	O7-C7-C8	-2.07	118.37	122.05
2	C	403[B]	NAG	C1-C2-N2	2.06	113.69	110.43
2	A	404	NAG	C1-C2-N2	-2.05	107.20	110.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	NAG	O5-C1-C2	-2.04	108.13	111.29
3	C	405	EPE	O2S-S-C10	2.02	109.78	106.73
3	B	405	EPE	O2S-S-O1S	-2.01	107.27	113.82

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	403[B]	NAG	O5-C5-C6-O6
2	D	404[A]	NAG	O5-C5-C6-O6
2	D	404[A]	NAG	C4-C5-C6-O6
2	A	403[B]	NAG	C4-C5-C6-O6
2	A	402	NAG	C8-C7-N2-C2
2	A	402	NAG	O7-C7-N2-C2
2	B	402	NAG	C8-C7-N2-C2
2	B	402	NAG	O7-C7-N2-C2
2	B	403[A]	NAG	C8-C7-N2-C2
2	B	403[A]	NAG	O7-C7-N2-C2
2	B	403[B]	NAG	C8-C7-N2-C2
2	B	403[B]	NAG	O7-C7-N2-C2
3	D	406	EPE	N4-C7-C8-O8
2	D	404[B]	NAG	O5-C5-C6-O6
3	C	405	EPE	C8-C7-N4-C3
3	C	405	EPE	C8-C7-N4-C5
6	C	409	MPD	O2-C2-C3-C4
6	D	412	MPD	CM-C2-C3-C4
6	A	411	MPD	C2-C3-C4-C5
3	A	405	EPE	N4-C7-C8-O8
2	B	404	NAG	C4-C5-C6-O6
3	B	405	EPE	C8-C7-N4-C3
6	B	409	MPD	O2-C2-C3-C4
6	D	412	MPD	O2-C2-C3-C4
6	B	408	MPD	C2-C3-C4-O4
6	C	408	MPD	C2-C3-C4-O4
6	B	409	MPD	C1-C2-C3-C4
6	D	412	MPD	C1-C2-C3-C4
2	D	404[B]	NAG	C4-C5-C6-O6

There are no ring outliers.

11 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	409	MPD	1	0
6	B	408	MPD	1	0
6	C	409	MPD	2	0
2	B	402	NAG	1	0
2	A	402	NAG	1	0
6	C	408	MPD	1	0
6	D	412	MPD	1	0
6	A	409	MPD	3	0
6	A	408	MPD	1	0
6	A	411	MPD	1	0
2	C	403[A]	NAG	1	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	376/380 (98%)	-0.19	9 (2%) 59 66	9, 22, 38, 65	19 (5%)
1	B	376/380 (98%)	0.04	16 (4%) 40 42	10, 25, 50, 82	18 (4%)
1	C	376/380 (98%)	-0.13	10 (2%) 56 61	9, 22, 41, 76	16 (4%)
1	D	376/380 (98%)	-0.16	9 (2%) 59 66	9, 22, 39, 68	19 (5%)
All	All	1504/1520 (98%)	-0.11	44 (2%) 53 58	9, 22, 43, 82	72 (4%)

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	215	ILE	6.5
1	C	215	ILE	4.9
1	C	379	PRO	4.4
1	C	336[A]	LEU	4.3
1	B	30	TYR	4.0
1	D	379	PRO	4.0
1	C	216	PRO	3.9
1	B	216	PRO	3.8
1	A	379	PRO	3.7
1	B	379	PRO	3.7
1	D	336[A]	LEU	3.5
1	C	214	ARG	3.4
1	B	217	VAL	3.2
1	A	336[A]	LEU	3.0
1	B	214	ARG	3.0
1	A	215	ILE	3.0
1	B	99	SER	2.8
1	B	287	ALA	2.7
1	B	336[A]	LEU	2.6
1	A	217	VAL	2.5
1	A	312	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
1	C	246	GLU	2.5
1	B	31	LEU	2.5
1	D	215	ILE	2.4
1	D	214	ARG	2.4
1	B	46	LEU	2.4
1	D	76	ASP	2.4
1	B	218	ILE	2.4
1	D	153	GLN	2.4
1	A	153	GLN	2.3
1	C	287	ALA	2.3
1	C	217	VAL	2.3
1	B	37	GLU	2.3
1	A	214	ARG	2.2
1	A	254	THR	2.2
1	B	338[A]	CYS	2.2
1	D	312	GLU	2.1
1	B	93	PHE	2.1
1	D	217	VAL	2.1
1	C	37	GLU	2.1
1	B	246	GLU	2.1
1	C	307	ASP	2.1
1	A	346	GLU	2.0
1	D	310	TYR	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 [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.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	PO4	A	407	5/5	0.73	0.23	32,43,44,46	5
6	MPD	B	409	8/8	0.83	0.20	52,53,54,54	0
6	MPD	C	409	8/8	0.83	0.19	47,49,51,53	0
6	MPD	B	408	8/8	0.84	0.17	36,42,51,53	0
6	MPD	A	409	8/8	0.84	0.14	39,42,43,45	0
6	MPD	A	411	8/8	0.84	0.29	58,60,63,70	0
6	MPD	D	412	8/8	0.85	0.18	47,50,51,54	0
6	MPD	D	411	8/8	0.86	0.16	51,54,55,56	0
6	MPD	D	410	8/8	0.86	0.13	39,41,41,42	0
3	EPE	B	405	15/15	0.87	0.17	61,66,77,81	0
2	NAG	C	401	14/15	0.88	0.10	41,46,50,54	0
6	MPD	A	408	8/8	0.89	0.13	41,43,44,45	0
6	MPD	C	408	8/8	0.89	0.14	34,42,47,49	0
2	NAG	B	402	14/15	0.89	0.10	35,40,44,51	0
6	MPD	A	412	8/8	0.90	0.15	45,47,48,49	0
6	MPD	D	401	8/8	0.90	0.14	44,47,49,50	0
2	NAG	D	402	14/15	0.90	0.09	34,39,41,41	0
6	MPD	A	410	8/8	0.90	0.13	53,55,58,58	0
2	NAG	C	402	14/15	0.90	0.10	34,39,42,43	0
2	NAG	A	402	14/15	0.91	0.09	29,35,38,45	0
2	NAG	B	401	14/15	0.91	0.09	45,51,52,56	0
2	NAG	A	401	14/15	0.91	0.10	37,41,43,45	0
2	NAG	D	403	14/15	0.91	0.09	32,37,39,40	0
6	MPD	D	409	8/8	0.91	0.14	45,47,50,51	0
2	NAG	D	404[A]	14/15	0.91	0.12	23,25,27,29	14
2	NAG	D	404[B]	14/15	0.91	0.12	21,22,23,23	14
2	NAG	B	404	14/15	0.91	0.10	35,40,47,48	0
2	NAG	A	403[A]	14/15	0.92	0.10	24,25,25,26	14
2	NAG	A	403[B]	14/15	0.92	0.10	22,24,27,27	14
2	NAG	B	403[A]	14/15	0.92	0.13	27,30,31,32	14
2	NAG	B	403[B]	14/15	0.92	0.13	24,28,29,30	14
3	EPE	D	406	15/15	0.92	0.13	40,44,58,63	0
2	NAG	C	403[B]	14/15	0.93	0.11	28,29,31,31	14
2	NAG	D	405	14/15	0.93	0.08	29,34,40,41	0
5	PO4	B	407	5/5	0.93	0.10	31,33,34,35	5
5	PO4	C	407	5/5	0.93	0.09	25,29,30,30	5
3	EPE	A	405	15/15	0.93	0.11	36,40,53,59	0
2	NAG	C	403[A]	14/15	0.93	0.11	27,28,30,31	14
5	PO4	D	408	5/5	0.94	0.10	27,30,31,34	5
2	NAG	C	404	14/15	0.94	0.07	30,34,41,41	0
2	NAG	A	404	14/15	0.94	0.08	29,34,41,41	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EPE	C	405	15/15	0.95	0.11	40,49,60,62	0
4	CL	A	406	1/1	0.96	0.07	41,41,41,41	0
4	CL	B	406	1/1	0.98	0.04	40,40,40,40	0
4	CL	D	407	1/1	0.98	0.08	47,47,47,47	0
4	CL	C	406	1/1	0.99	0.03	32,32,32,32	0

6.5 Other polymers [i](#)

There are no such residues in this entry.