



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 28, 2026 – 10:18 AM EDT

PDB ID : 37BV / pdb_000037bv
Title : Crystal Structure of Thermomyces lanuginosa Lipase With Bound 1,3 Diacylglycerol and Fatty Acid Acyl Intermediates: Space Group H32
Authors : McPherson, A.
Deposited on : 2026-07-12
Resolution : 1.30 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	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

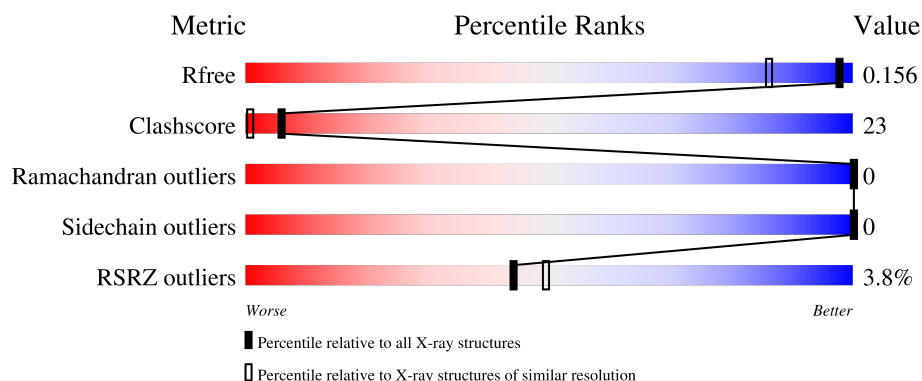
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

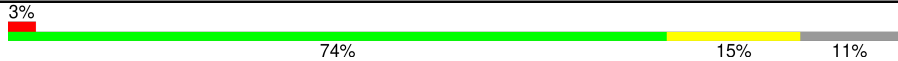
The reported resolution of this entry is 1.30 Å.

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	1553 (1.30-1.30)
Clashscore	190562	1595 (1.30-1.30)
Ramachandran outliers	187476	1551 (1.30-1.30)
Sidechain outliers	187428	1551 (1.30-1.30)
RSRZ outliers	180081	1549 (1.30-1.30)

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	291	

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	NAG	A	301	-	-	X	-

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	PG4	A	307	-	-	X	-
3	PG4	A	308	-	-	X	-
3	PG4	A	314	-	-	X	-
6	PEG	A	310	-	-	X	-
6	PEG	A	327	-	-	X	-

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 5420 atoms, of which 2546 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.

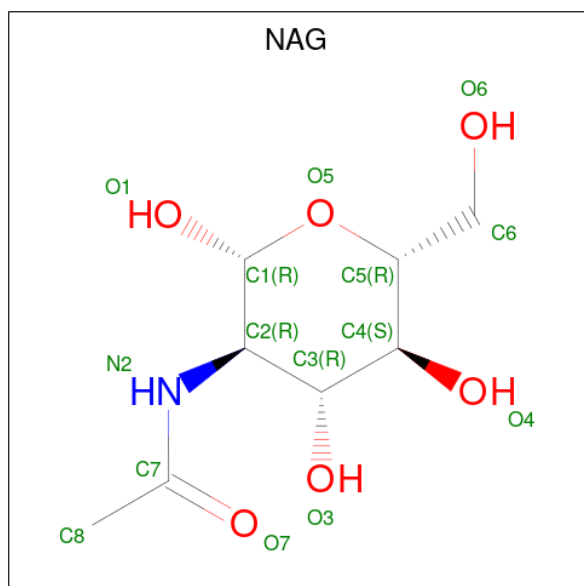
- Molecule 1 is a protein called Lipase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	260	4085	1321	1996	360	402	6	2	17	0

There is a discrepancy between the modelled and reference sequences:

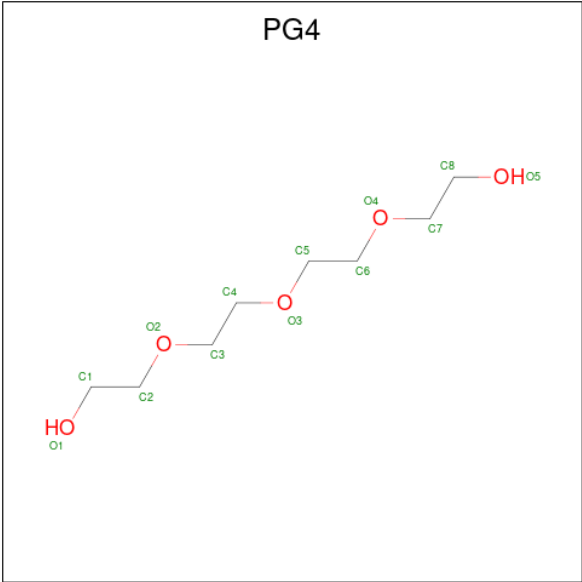
Chain	Residue	Modelled	Actual	Comment	Reference
A	86	LEU	ILE	conflict	UNP O59952

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



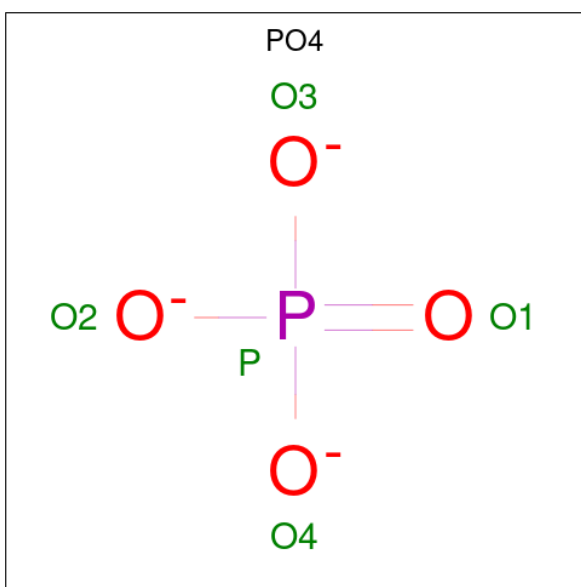
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
2	A	1	27	8	13	1	5	0	0

- Molecule 3 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: $C_8H_{18}O_5$).



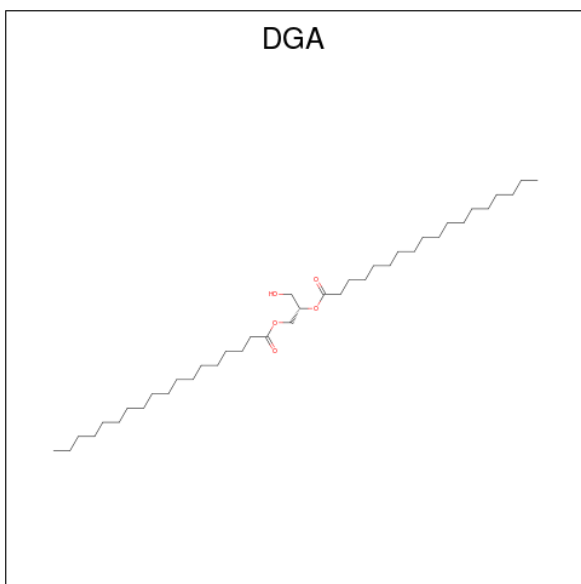
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			31	8	18	5		
3	A	1	Total	C	H	O	0	0
			30	8	17	5		
3	A	1	Total	C	H	O	0	0
			30	8	17	5		
3	A	1	Total	C	H	O	0	0
			31	8	18	5		
3	A	1	Total	C	H	O	0	0
			26	7	15	4		
3	A	1	Total	C	H	O	0	0
			31	8	18	5		
3	A	1	Total	C	H	O	0	0
			31	8	18	5		

- Molecule 4 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



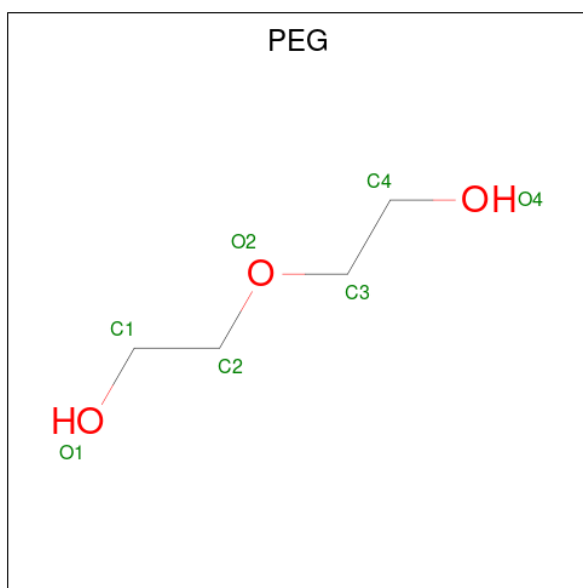
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	P	0	0
			5	4	1		
4	A	1	Total	O	P	0	0
			5	4	1		

- Molecule 5 is DIACYL GLYCEROL (CCD ID: DGA) (formula: $C_{39}H_{76}O_5$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			79	26	49	4		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



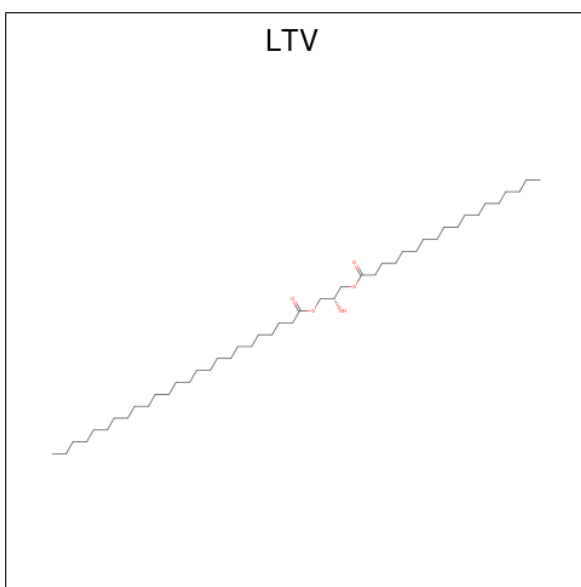
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	1
			34	8	20	6		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		

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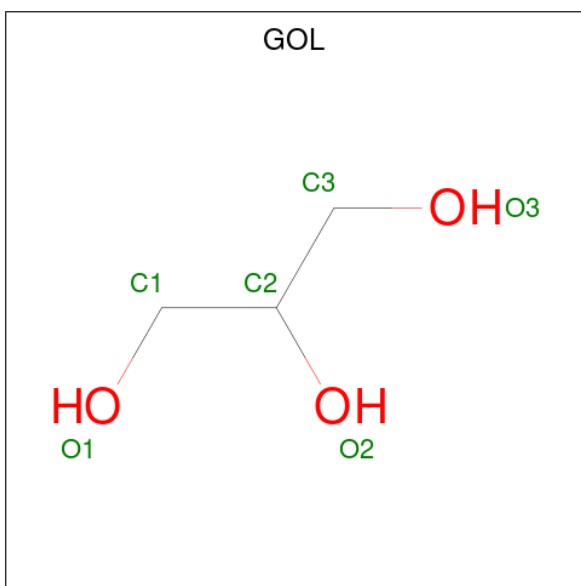
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			15	4	9	2		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		
6	A	1	Total	C	H	O	0	0
			17	4	10	3		

- Molecule 7 is 2-hydroxy-3-(octadecanoyloxy)propyl pentacosanoate (CCD ID: LTV) (formula: C₄₆H₉₀O₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	A	1	Total	C	H	O	0	0
			141	46	90	5		

- Molecule 8 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	H	O	0	0
			14	3	8	3		

- Molecule 9 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	3	Total 3	Ca 3	0	0

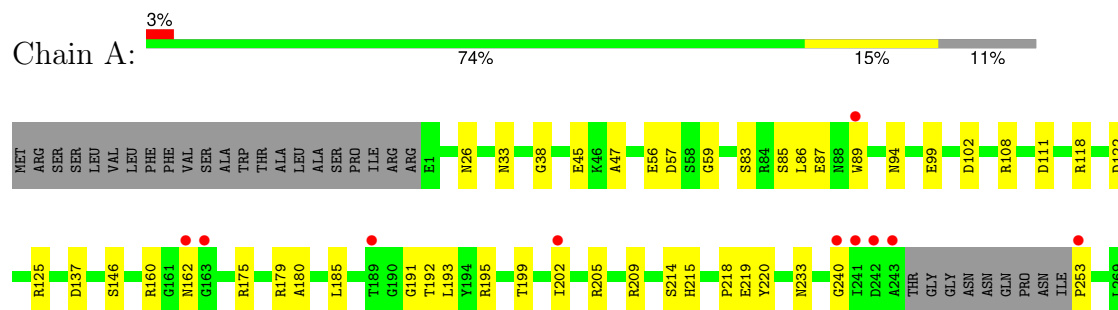
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	384	Total 394	O 394	0	11

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: Lipase



4 Data and refinement statistics

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α , β , γ	76.37Å 76.37Å 241.55Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	80.52 – 1.30 80.52 – 1.30	Depositor EDS
% Data completeness (in resolution range)	87.9 (80.52-1.30) 87.9 (80.52-1.30)	Depositor EDS
R_{merge}	0.49	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.28 (at 1.31Å)	Xtriage
Refinement program	PHENIX 1.21.1_5286	Depositor
R, R_{free}	0.123 , 0.157 0.123 , 0.156	Depositor DCC
R_{free} test set	2865 reflections (4.32%)	wwPDB-VP
Wilson B-factor (Å ²)	13.9	Xtriage
Anisotropy	0.144	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.43 , 88.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	5420	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.56% 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: NAG, DGA, PO4, CA, LTV, GOL, PEG, PG4

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	0.48	0/2184	0.69	0/2970

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

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	2089	1996	1982	84	0
2	A	14	13	13	8	0
3	A	89	121	121	50	0
4	A	10	0	0	0	0
5	A	30	49	44	4	0
6	A	188	269	266	31	0
7	A	51	90	0	0	0
8	A	6	8	8	0	0
9	A	3	0	0	0	0
10	A	394	0	0	39	3
All	All	2874	2546	2434	113	3

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 23.

All (113) 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:A:33:ASN:HD21	2:A:301:NAG:C1	1.32	1.41
1:A:137:ASP:OD1	10:A:401:HOH:O	1.54	1.25
6:A:310:PEG:O4	10:A:402:HOH:O	1.61	1.16
1:A:86[A]:LEU:HD12	3:A:314:PG4:H12	1.26	1.14
1:A:33:ASN:ND2	2:A:301:NAG:C1	2.17	1.07
1:A:102:ASP:OD1	10:A:403:HOH:O	1.78	1.00
1:A:233[A]:ASN:ND2	10:A:409:HOH:O	1.97	0.96
3:A:306:PG4:O3	10:A:404:HOH:O	1.88	0.91
2:A:301:NAG:C1	6:A:310:PEG:H42	2.02	0.90
1:A:86[A]:LEU:CD1	3:A:314:PG4:H12	2.03	0.88
1:A:108[B]:ARG:HH12	3:A:302:PG4:H52	1.41	0.85
1:A:122:ASP:OD1	10:A:407:HOH:O	1.96	0.84
6:A:309:PEG:O4	10:A:406:HOH:O	1.95	0.83
1:A:86[B]:LEU:HD23	3:A:314:PG4:H32	1.62	0.81
1:A:33:ASN:HD21	2:A:301:NAG:C2	1.95	0.79
5:A:304:DGA:OG1	5:A:304:DGA:OXT	2.02	0.76
1:A:175:ARG:HH21	3:A:307:PG4:C4	2.00	0.75
6:A:327:PEG:O1	10:A:411:HOH:O	2.05	0.74
1:A:192:THR:HA	3:A:308:PG4:H62	1.69	0.73
3:A:318:PG4:O2	10:A:412:HOH:O	2.07	0.72
1:A:160:ARG:HH12	3:A:308:PG4:C8	2.03	0.71
1:A:185:LEU:O	3:A:308:PG4:H82	1.91	0.71
6:A:332:PEG:O1	10:A:413:HOH:O	2.11	0.69
1:A:86[A]:LEU:HD12	3:A:314:PG4:C1	2.14	0.67
1:A:175:ARG:HH21	3:A:307:PG4:H41	1.60	0.65
1:A:192:THR:HG23	3:A:308:PG4:O3	1.96	0.64
6:A:316[B]:PEG:O1	10:A:410:HOH:O	2.04	0.64
1:A:215:HIS:H	3:A:307:PG4:H51	1.63	0.62
1:A:192:THR:HA	3:A:308:PG4:C6	2.29	0.62
6:A:325:PEG:O1	10:A:414:HOH:O	2.13	0.62
1:A:102:ASP:CG	10:A:403:HOH:O	2.31	0.61
1:A:57:ASP:HB2	6:A:327:PEG:C2	2.30	0.61
6:A:341:PEG:H31	10:A:680:HOH:O	2.00	0.61
1:A:215:HIS:H	3:A:307:PG4:H62	1.66	0.61
6:A:327:PEG:O4	10:A:415:HOH:O	2.15	0.60
1:A:179:ARG:HB3	6:A:325:PEG:H11	1.84	0.59
1:A:199[B]:THR:HG21	10:A:665:HOH:O	2.02	0.59
3:A:308:PG4:H42	10:A:716:HOH:O	2.03	0.59
1:A:83[B]:SER:HB2	10:A:405:HOH:O	2.03	0.59
1:A:205:ARG:HG3	10:A:609:HOH:O	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:175:ARG:HH12	1:A:205:ARG:HD2	1.68	0.59
1:A:179:ARG:NH1	10:A:426:HOH:O	2.36	0.58
1:A:33:ASN:ND2	2:A:301:NAG:C2	2.62	0.58
1:A:219:GLU:CD	3:A:307:PG4:C1	2.78	0.57
1:A:47:ALA:O	10:A:416:HOH:O	2.17	0.57
1:A:240[A]:GLY:HA2	3:A:306:PG4:C8	2.34	0.56
1:A:193:LEU:O	3:A:308:PG4:H31	2.06	0.55
1:A:220:TYR:OH	3:A:308:PG4:H21	2.05	0.55
1:A:85:SER:O	1:A:89[B]:TRP:HD1	1.90	0.55
1:A:193:LEU:H	3:A:308:PG4:C5	2.21	0.54
1:A:219:GLU:CD	3:A:307:PG4:H11	2.32	0.54
1:A:146[B]:SER:OG	10:A:405:HOH:O	1.92	0.53
1:A:59:GLY:HA2	5:A:304:DGA:HA32	1.91	0.53
1:A:86[B]:LEU:HD23	3:A:314:PG4:C3	2.36	0.52
1:A:205:ARG:HH12	1:A:209:ARG:H	1.58	0.52
1:A:57:ASP:HB2	6:A:327:PEG:H21	1.92	0.52
1:A:202[A]:ILE:HD12	1:A:253:PRO:HA	1.92	0.52
2:A:301:NAG:HN2	6:A:310:PEG:C3	2.23	0.51
1:A:185:LEU:O	3:A:308:PG4:C8	2.59	0.51
1:A:160:ARG:NH1	3:A:308:PG4:O5	2.35	0.51
5:A:304:DGA:HG32	10:A:487:HOH:O	2.11	0.50
1:A:86[B]:LEU:CD2	3:A:314:PG4:H32	2.38	0.50
1:A:215:HIS:H	3:A:307:PG4:C6	2.25	0.49
6:A:327:PEG:H11	10:A:584:HOH:O	2.11	0.49
1:A:215:HIS:H	3:A:307:PG4:C5	2.25	0.49
1:A:215:HIS:N	3:A:307:PG4:H51	2.26	0.49
1:A:179:ARG:CZ	10:A:426:HOH:O	2.60	0.48
1:A:94[B]:ASN:HD21	1:A:111:ASP:CG	2.21	0.47
6:A:324:PEG:H41	10:A:530:HOH:O	2.13	0.47
1:A:218:PRO:HD2	3:A:308:PG4:H41	1.96	0.47
1:A:162:ASN:ND2	10:A:431:HOH:O	2.47	0.47
1:A:219:GLU:OE1	3:A:307:PG4:C1	2.63	0.47
3:A:306:PG4:C5	10:A:404:HOH:O	2.53	0.47
1:A:191:GLY:O	6:A:309:PEG:H11	2.16	0.46
1:A:214[B]:SER:OG	3:A:307:PG4:H71	2.15	0.46
5:A:304:DGA:CG3	10:A:487:HOH:O	2.64	0.46
6:A:311:PEG:H12	10:A:560:HOH:O	2.15	0.46
1:A:99:GLU:HG3	3:A:302:PG4:H21	1.98	0.45
1:A:175:ARG:HE	3:A:307:PG4:H51	1.82	0.45
3:A:308:PG4:H12	10:A:457:HOH:O	2.16	0.45
1:A:240[A]:GLY:HA2	3:A:306:PG4:O5	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:45:GLU:OE1	6:A:339:PEG:H32	2.17	0.45
1:A:175:ARG:NH2	3:A:307:PG4:H41	2.30	0.45
1:A:57:ASP:HB2	6:A:327:PEG:H22	1.99	0.45
3:A:308:PG4:H52	10:A:486:HOH:O	2.17	0.45
1:A:219:GLU:CD	3:A:307:PG4:H12	2.41	0.44
1:A:87:GLU:OE1	3:A:314:PG4:H62	2.17	0.44
1:A:38:GLY:O	6:A:339:PEG:H12	2.16	0.44
1:A:125:ARG:HD3	6:A:312:PEG:H41	1.98	0.44
1:A:175:ARG:HE	3:A:307:PG4:C5	2.30	0.44
1:A:219:GLU:OE1	3:A:307:PG4:C2	2.66	0.44
1:A:125:ARG:CD	6:A:312:PEG:H41	2.48	0.44
6:A:327:PEG:H41	10:A:452:HOH:O	2.18	0.44
1:A:108[B]:ARG:HH22	3:A:302:PG4:H42	1.83	0.43
1:A:192:THR:CG2	3:A:308:PG4:O3	2.63	0.43
1:A:118[A]:ARG:HG3	10:A:641:HOH:O	2.18	0.43
6:A:311:PEG:H31	10:A:700:HOH:O	2.18	0.43
3:A:306:PG4:C4	10:A:404:HOH:O	2.58	0.43
1:A:57:ASP:CB	6:A:327:PEG:C2	2.96	0.43
1:A:220:TYR:OH	3:A:308:PG4:C2	2.67	0.43
1:A:26:ASN:HB3	1:A:56:GLU:HB3	2.00	0.43
2:A:301:NAG:HN2	6:A:310:PEG:H32	1.84	0.43
1:A:195:ARG:HH12	3:A:307:PG4:H12	1.83	0.42
6:A:327:PEG:H12	10:A:480:HOH:O	2.19	0.42
2:A:301:NAG:HN2	6:A:310:PEG:H42	1.83	0.42
1:A:175:ARG:HH22	1:A:205:ARG:CD	2.33	0.42
1:A:205:ARG:HB2	10:A:718[A]:HOH:O	2.19	0.42
6:A:327:PEG:C3	10:A:479:HOH:O	2.68	0.41
1:A:205:ARG:NH1	1:A:209:ARG:H	2.18	0.41
1:A:45:GLU:OE1	6:A:339:PEG:H21	2.21	0.41
1:A:180:ALA:HA	6:A:325:PEG:H42	2.03	0.40
1:A:202[B]:ILE:HD11	1:A:253:PRO:HB3	2.02	0.40
1:A:193:LEU:H	3:A:308:PG4:H62	1.87	0.40

All (3) 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)
10:A:507:HOH:O	10:A:625:HOH:O[3_655]	1.64	0.56
10:A:427:HOH:O	10:A:752:HOH:O[5_555]	2.16	0.04
10:A:435:HOH:O	10:A:693:HOH:O[2_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	272/291 (94%)	263 (97%)	9 (3%)	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	229/239 (96%)	229 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	ASN
1	A	33	ASN
1	A	92	ASN

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](#)

Of 43 ligands modelled in this entry, 3 are monoatomic - leaving 40 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	$\# Z > 2$
7	LTV	A	315	-	50,50,50	0.88	2 (4%)	52,52,52	1.14	4 (7%)
6	PEG	A	341	-	6,6,6	0.28	0	5,5,5	0.81	0
6	PEG	A	324	-	6,6,6	0.30	0	5,5,5	0.62	0
6	PEG	A	340	-	6,6,6	0.25	0	5,5,5	0.41	0
6	PEG	A	338	-	6,6,6	0.26	0	5,5,5	0.38	0
6	PEG	A	339	-	6,6,6	0.26	0	5,5,5	0.38	0
6	PEG	A	342	-	6,6,6	0.24	0	5,5,5	0.24	0
6	PEG	A	317	-	6,6,6	0.25	0	5,5,5	0.24	0
6	PEG	A	311	-	6,6,6	0.33	0	5,5,5	0.77	0
6	PEG	A	312	-	6,6,6	0.26	0	5,5,5	0.26	0
6	PEG	A	316[A]	-	6,6,6	0.26	0	5,5,5	0.29	0
3	PG4	A	313	-	10,10,12	0.32	0	9,9,11	0.36	0
6	PEG	A	335	-	6,6,6	0.26	0	5,5,5	0.22	0
6	PEG	A	334	9	6,6,6	0.26	0	5,5,5	0.27	0
6	PEG	A	332	-	6,6,6	0.24	0	5,5,5	0.47	0
6	PEG	A	328	-	6,6,6	0.24	0	5,5,5	0.19	0
6	PEG	A	310	-	6,6,6	0.24	0	5,5,5	1.28	0
6	PEG	A	331	-	6,6,6	0.26	0	5,5,5	0.24	0
3	PG4	A	318	-	12,12,12	0.34	0	11,11,11	0.67	0
6	PEG	A	330	-	6,6,6	0.26	0	5,5,5	0.39	0
8	GOL	A	319	-	5,5,5	0.41	0	5,5,5	0.63	0
5	DGA	A	304	-	28,28,43	0.37	0	28,28,45	0.65	1 (3%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PO4	A	305	-	4,4,4	1.57	1 (25%)	6,6,6	0.50	0
3	PG4	A	306	-	12,12,12	0.38	0	11,11,11	0.80	0
3	PG4	A	307	-	12,12,12	0.45	0	11,11,11	1.83	1 (9%)
6	PEG	A	326	-	6,6,6	0.26	0	5,5,5	0.24	0
6	PEG	A	333	-	6,6,6	0.26	0	5,5,5	0.31	0
3	PG4	A	308	-	12,12,12	0.50	0	11,11,11	1.45	2 (18%)
3	PG4	A	314	-	12,12,12	0.39	0	11,11,11	0.78	0
6	PEG	A	309	-	6,6,6	0.26	0	5,5,5	0.63	0
6	PEG	A	325	-	6,6,6	0.28	0	5,5,5	0.57	0
6	PEG	A	329	-	6,6,6	0.31	0	5,5,5	0.38	0
6	PEG	A	323	-	6,6,6	0.26	0	5,5,5	0.21	0
6	PEG	A	316[B]	-	6,6,6	0.26	0	5,5,5	0.24	0
6	PEG	A	327	-	6,6,6	0.32	0	5,5,5	0.70	0
3	PG4	A	302	-	12,12,12	0.31	0	11,11,11	0.50	0
2	NAG	A	301	-	14,14,15	1.52	2 (14%)	17,19,21	3.74	3 (17%)
6	PEG	A	337	-	6,6,6	0.24	0	5,5,5	0.27	0
4	PO4	A	303	-	4,4,4	1.56	1 (25%)	6,6,6	0.97	0
6	PEG	A	336	-	5,5,6	0.29	0	4,4,5	0.19	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
7	LTV	A	315	-	-	28/51/51/51	-
6	PEG	A	341	-	-	1/4/4/4	-
6	PEG	A	324	-	-	1/4/4/4	-
6	PEG	A	340	-	-	2/4/4/4	-
6	PEG	A	338	-	-	3/4/4/4	-
6	PEG	A	339	-	-	2/4/4/4	-
6	PEG	A	342	-	-	2/4/4/4	-
6	PEG	A	317	-	-	2/4/4/4	-
6	PEG	A	311	-	-	0/4/4/4	-
6	PEG	A	312	-	-	3/4/4/4	-
6	PEG	A	316[A]	-	-	1/4/4/4	-
3	PG4	A	313	-	-	4/8/8/10	-
6	PEG	A	335	-	-	3/4/4/4	-
6	PEG	A	334	9	-	1/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	PEG	A	332	-	-	2/4/4/4	-
6	PEG	A	328	-	-	1/4/4/4	-
6	PEG	A	310	-	-	2/4/4/4	-
6	PEG	A	331	-	-	2/4/4/4	-
3	PG4	A	318	-	-	5/10/10/10	-
6	PEG	A	330	-	-	2/4/4/4	-
8	GOL	A	319	-	-	0/4/4/4	-
5	DGA	A	304	-	-	9/26/26/45	-
3	PG4	A	306	-	-	5/10/10/10	-
3	PG4	A	307	-	-	5/10/10/10	-
6	PEG	A	326	-	-	2/4/4/4	-
6	PEG	A	333	-	-	2/4/4/4	-
3	PG4	A	308	-	-	4/10/10/10	-
3	PG4	A	314	-	-	2/10/10/10	-
6	PEG	A	309	-	-	1/4/4/4	-
6	PEG	A	325	-	-	1/4/4/4	-
6	PEG	A	329	-	-	3/4/4/4	-
6	PEG	A	323	-	-	2/4/4/4	-
6	PEG	A	316[B]	-	-	1/4/4/4	-
6	PEG	A	327	-	-	2/4/4/4	-
3	PG4	A	302	-	-	3/10/10/10	-
2	NAG	A	301	-	-	0/6/23/26	0/1/1/1
6	PEG	A	337	-	-	3/4/4/4	-
6	PEG	A	336	-	-	2/3/3/4	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	NAG	O5-C1	-4.06	1.36	1.43
4	A	303	PO4	P-O1	2.80	1.57	1.50
4	A	305	PO4	P-O1	2.73	1.57	1.50
7	A	315	LTV	O1-C17	2.53	1.40	1.33
2	A	301	NAG	C1-C2	2.29	1.55	1.52
7	A	315	LTV	O3-C21	2.17	1.39	1.33

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	NAG	C1-O5-C5	-14.51	92.74	112.19
3	A	307	PG4	C5-O3-C4	4.69	133.77	113.26
3	A	308	PG4	O3-C5-C6	3.64	126.93	110.35
2	A	301	NAG	C1-C2-N2	3.62	116.13	110.43
7	A	315	LTV	C18-O1-C17	-2.99	106.20	117.12
7	A	315	LTV	O3-C21-O4	-2.81	116.61	123.63
7	A	315	LTV	O3-C21-C22	2.65	119.92	111.83
2	A	301	NAG	C6-C5-C4	2.36	118.81	113.02
3	A	308	PG4	O3-C4-C3	2.36	121.11	110.35
5	A	304	DGA	CG1-CG2-CG3	-2.26	104.15	111.77
7	A	315	LTV	O1-C17-C16	2.06	118.12	111.83

There are no chirality outliers.

All (114) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	315	LTV	O4-C21-O3-C20
7	A	315	LTV	C22-C21-O3-C20
6	A	310	PEG	C1-C2-O2-C3
7	A	315	LTV	O-C17-O1-C18
7	A	315	LTV	C16-C17-O1-C18
3	A	313	PG4	O3-C5-C6-O4
6	A	316[A]	PEG	O1-C1-C2-O2
7	A	315	LTV	C23-C24-C25-C26
6	A	329	PEG	O2-C3-C4-O4
7	A	315	LTV	C21-C22-C23-C24
7	A	315	LTV	C25-C26-C27-C28
3	A	318	PG4	O3-C5-C6-O4
7	A	315	LTV	O1-C18-C19-O2
3	A	308	PG4	O1-C1-C2-O2
3	A	318	PG4	O1-C1-C2-O2
6	A	309	PEG	O2-C3-C4-O4
6	A	310	PEG	O1-C1-C2-O2
6	A	312	PEG	O2-C3-C4-O4
6	A	317	PEG	O1-C1-C2-O2
6	A	324	PEG	O2-C3-C4-O4
6	A	327	PEG	O2-C3-C4-O4
6	A	329	PEG	O1-C1-C2-O2
6	A	337	PEG	O1-C1-C2-O2
6	A	341	PEG	O1-C1-C2-O2
7	A	315	LTV	O1-C18-C19-C20
3	A	307	PG4	O1-C1-C2-O2
3	A	314	PG4	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
6	A	335	PEG	O1-C1-C2-O2
6	A	335	PEG	O2-C3-C4-O4
5	A	304	DGA	CA1-CA2-CA3-CA4
6	A	330	PEG	O1-C1-C2-O2
5	A	304	DGA	CCB-CDB-CEB-CFB
5	A	304	DGA	CA2-CA3-CA4-CA5
7	A	315	LTV	C1-C2-C3-C4
7	A	315	LTV	C11-C10-C9-C8
3	A	313	PG4	O2-C3-C4-O3
3	A	306	PG4	O2-C3-C4-O3
3	A	307	PG4	O3-C5-C6-O4
5	A	304	DGA	CA9-CAA-CBA-CCA
3	A	306	PG4	O3-C5-C6-O4
5	A	304	DGA	CA8-CA9-CAA-CBA
3	A	307	PG4	O4-C7-C8-O5
6	A	323	PEG	O2-C3-C4-O4
6	A	331	PEG	O2-C3-C4-O4
6	A	332	PEG	O2-C3-C4-O4
6	A	333	PEG	O1-C1-C2-O2
6	A	336	PEG	O2-C3-C4-O4
6	A	337	PEG	O2-C3-C4-O4
6	A	342	PEG	O1-C1-C2-O2
6	A	326	PEG	O2-C3-C4-O4
6	A	342	PEG	O2-C3-C4-O4
3	A	306	PG4	C1-C2-O2-C3
3	A	302	PG4	O2-C3-C4-O3
6	A	326	PEG	O1-C1-C2-O2
7	A	315	LTV	C27-C28-C29-C30
7	A	315	LTV	C10-C11-C12-C13
7	A	315	LTV	C7-C8-C9-C10
7	A	315	LTV	C42-C43-C44-C45
6	A	317	PEG	O2-C3-C4-O4
6	A	338	PEG	O2-C3-C4-O4
7	A	315	LTV	C12-C13-C14-C15
6	A	330	PEG	O2-C3-C4-O4
3	A	313	PG4	O4-C7-C8-O5
5	A	304	DGA	CBA-CCA-CDA-CEA
6	A	316[B]	PEG	C1-C2-O2-C3
7	A	315	LTV	C36-C37-C38-C39
6	A	340	PEG	C4-C3-O2-C2
3	A	308	PG4	C5-C6-O4-C7
6	A	327	PEG	C4-C3-O2-C2

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Mol	Chain	Res	Type	Atoms
6	A	331	PEG	O1-C1-C2-O2
6	A	340	PEG	O2-C3-C4-O4
3	A	318	PG4	C1-C2-O2-C3
3	A	306	PG4	C6-C5-O3-C4
3	A	307	PG4	C5-C6-O4-C7
6	A	312	PEG	C4-C3-O2-C2
7	A	315	LTV	C-C1-C2-C3
6	A	335	PEG	C1-C2-O2-C3
7	A	315	LTV	C11-C12-C13-C14
3	A	307	PG4	C1-C2-O2-C3
7	A	315	LTV	C41-C42-C43-C44
7	A	315	LTV	C30-C31-C32-C33
6	A	339	PEG	O2-C3-C4-O4
6	A	329	PEG	C4-C3-O2-C2
6	A	334	PEG	C1-C2-O2-C3
3	A	308	PG4	C6-C5-O3-C4
6	A	325	PEG	C1-C2-O2-C3
6	A	339	PEG	C4-C3-O2-C2
7	A	315	LTV	C15-C16-C17-O1
3	A	313	PG4	C8-C7-O4-C6
3	A	302	PG4	C3-C4-O3-C5
3	A	302	PG4	C4-C3-O2-C2
3	A	306	PG4	O4-C7-C8-O5
3	A	318	PG4	C4-C3-O2-C2
6	A	332	PEG	C4-C3-O2-C2
6	A	336	PEG	C1-C2-O2-C3
3	A	314	PG4	C6-C5-O3-C4
6	A	337	PEG	C4-C3-O2-C2
7	A	315	LTV	C32-C33-C34-C35
3	A	318	PG4	C5-C6-O4-C7
6	A	323	PEG	C4-C3-O2-C2
5	A	304	DGA	CA4-CA5-CA6-CA7
5	A	304	DGA	CCA-CDA-CEA-CFA
5	A	304	DGA	CA5-CA6-CA7-CA8
6	A	333	PEG	C1-C2-O2-C3
6	A	338	PEG	O1-C1-C2-O2
6	A	338	PEG	C1-C2-O2-C3
7	A	315	LTV	O3-C21-C22-C23
6	A	312	PEG	C1-C2-O2-C3
7	A	315	LTV	C35-C36-C37-C38
6	A	328	PEG	C1-C2-O2-C3
7	A	315	LTV	C38-C39-C40-C41

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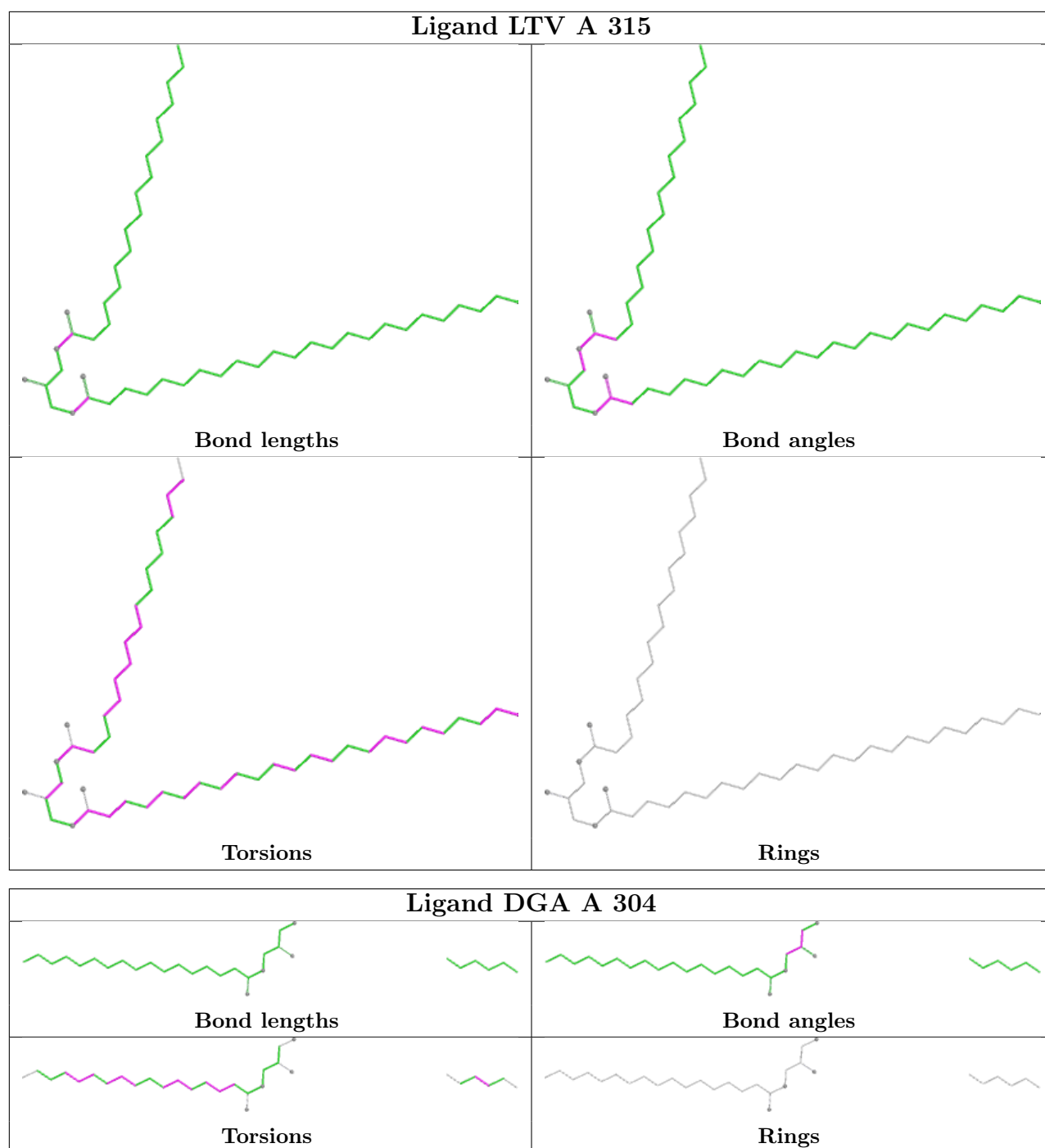
Mol	Chain	Res	Type	Atoms
7	A	315	LTV	C9-C10-C11-C12
7	A	315	LTV	O4-C21-C22-C23
3	A	308	PG4	C8-C7-O4-C6

There are no ring outliers.

19 monomers are involved in 89 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	341	PEG	1	0
6	A	324	PEG	1	0
6	A	339	PEG	3	0
6	A	311	PEG	2	0
6	A	312	PEG	2	0
6	A	332	PEG	1	0
6	A	310	PEG	5	0
3	A	318	PG4	1	0
5	A	304	DGA	4	0
3	A	306	PG4	5	0
3	A	307	PG4	17	0
3	A	308	PG4	17	0
3	A	314	PG4	7	0
6	A	309	PEG	2	0
6	A	325	PEG	3	0
6	A	316[B]	PEG	1	0
6	A	327	PEG	10	0
3	A	302	PG4	3	0
2	A	301	NAG	8	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	260/291 (89%)	-0.06	10 (3%)	44 49	12, 23, 37, 137	22 (8%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	202[A]	ILE	10.7
1	A	241	ILE	6.2
1	A	243	ALA	6.1
1	A	240[A]	GLY	4.9
1	A	242	ASP	3.8
1	A	89[A]	TRP	3.7
1	A	162	ASN	3.4
1	A	163	GLY	2.2
1	A	189	THR	2.1
1	A	253	PRO	2.1

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](#)

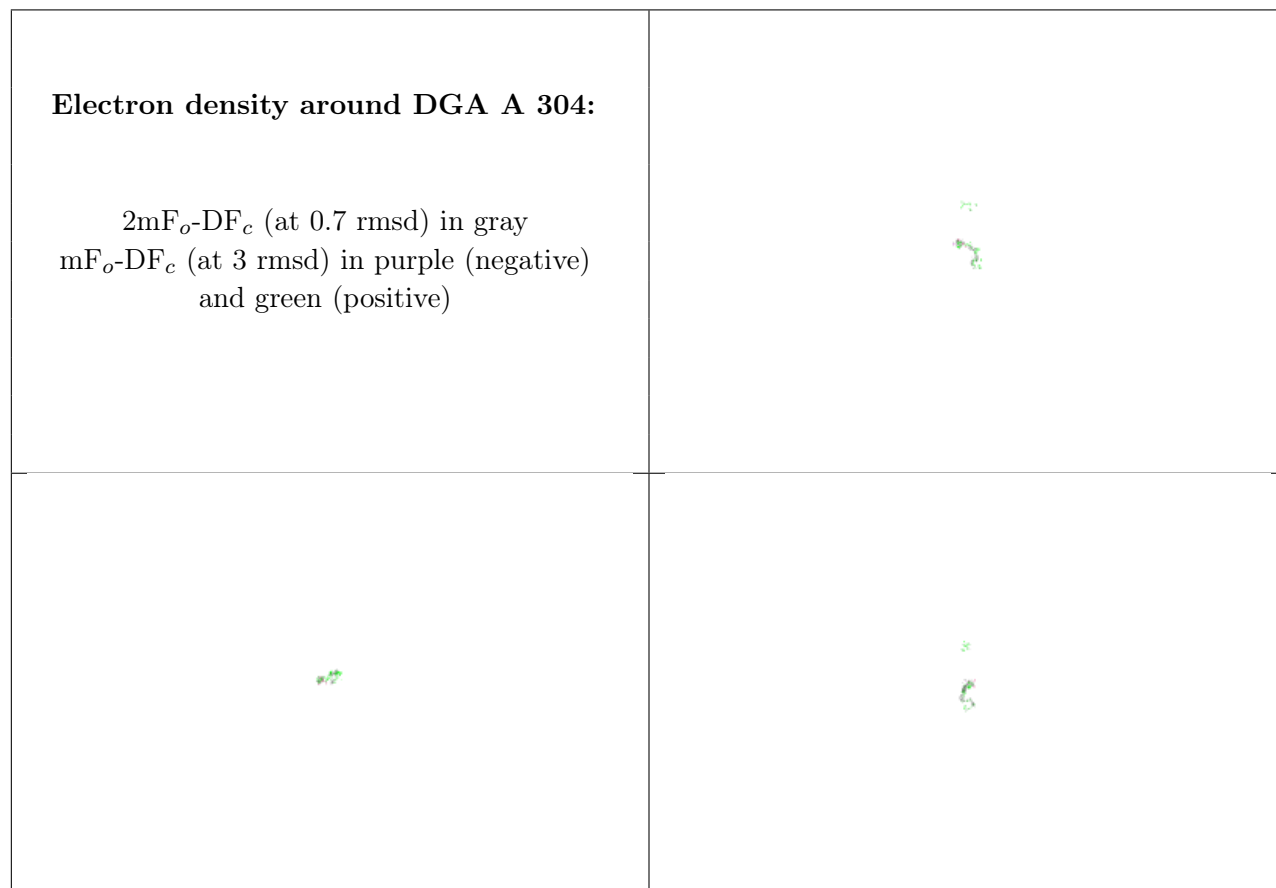
There are no oligosaccharides in this entry.

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.

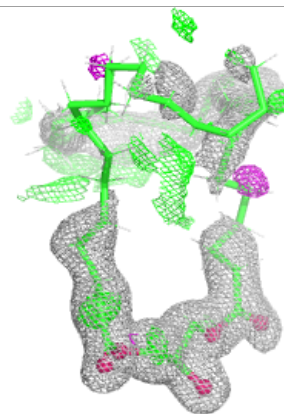
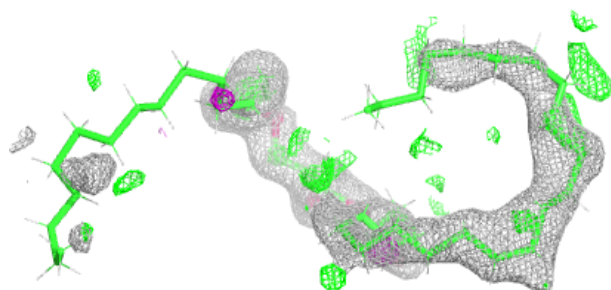
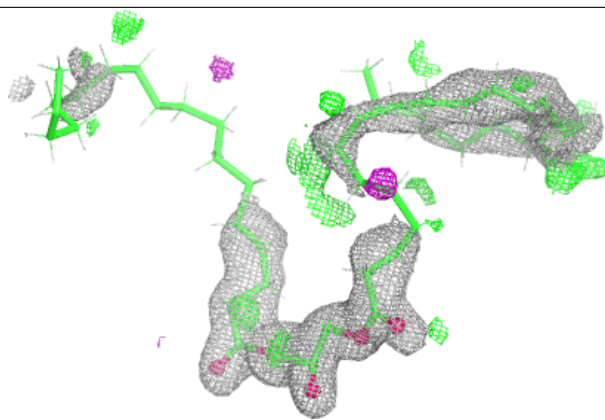
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
9	CA	A	322	1/1	0.01	0.16	133,133,133,133	1
9	CA	A	321	1/1	0.13	0.15	188,188,188,188	1
6	PEG	A	334	7/7	0.38	0.15	73,94,142,142	17
9	CA	A	320	1/1	0.47	0.12	95,95,95,95	1
6	PEG	A	337	7/7	0.48	0.14	71,88,106,109	17
6	PEG	A	323	7/7	0.48	0.14	78,102,133,137	0
6	PEG	A	331	7/7	0.50	0.14	74,129,160,160	0
6	PEG	A	328	7/7	0.56	0.11	99,130,164,164	0
6	PEG	A	335	7/7	0.57	0.16	75,91,129,148	0
6	PEG	A	342	7/7	0.59	0.16	83,107,143,143	0
6	PEG	A	336	6/7	0.61	0.14	61,75,99,99	15
4	PO4	A	305	5/5	0.61	0.11	85,133,151,183	5
6	PEG	A	317	7/7	0.63	0.13	72,109,150,175	0
6	PEG	A	326	7/7	0.67	0.15	56,68,73,82	17
5	DGA	A	304	30/44	0.68	0.23	0,92,135,148	51
3	PG4	A	306	13/13	0.68	0.24	26,58,91,97	30
3	PG4	A	313	11/13	0.70	0.25	22,78,120,198	26
6	PEG	A	333	7/7	0.71	0.22	47,62,111,113	17
6	PEG	A	338	7/7	0.72	0.19	57,87,112,123	17
3	PG4	A	302	13/13	0.73	0.17	68,85,102,103	0
6	PEG	A	325	7/7	0.74	0.21	36,57,74,74	17
6	PEG	A	340	7/7	0.75	0.21	30,61,110,110	17
6	PEG	A	311	7/7	0.76	0.24	36,87,132,137	0
3	PG4	A	307	13/13	0.79	0.26	27,62,133,136	30
6	PEG	A	309	7/7	0.79	0.20	44,85,165,165	0
3	PG4	A	314	13/13	0.80	0.22	30,94,137,163	0
6	PEG	A	330	7/7	0.80	0.21	31,84,168,168	17
7	LTV	A	315	51/51	0.82	0.19	43,81,114,115	0
6	PEG	A	339	7/7	0.82	0.25	27,65,121,121	17
6	PEG	A	316[B]	7/7	0.82	0.25	63,89,146,149	17
6	PEG	A	316[A]	7/7	0.82	0.25	39,101,130,134	17
6	PEG	A	341	7/7	0.83	0.20	36,67,117,117	17
6	PEG	A	312	7/7	0.83	0.22	36,124,164,164	0
8	GOL	A	319	6/6	0.84	0.12	39,63,81,82	0
6	PEG	A	332	7/7	0.84	0.24	31,122,181,181	0
6	PEG	A	310	7/7	0.84	0.24	21,77,203,203	0
3	PG4	A	318	13/13	0.84	0.20	27,82,101,123	31
6	PEG	A	327	7/7	0.85	0.17	26,53,78,78	17
6	PEG	A	324	7/7	0.85	0.22	30,45,83,83	17
3	PG4	A	308	13/13	0.86	0.31	19,37,143,172	31
6	PEG	A	329	7/7	0.86	0.18	34,77,128,128	17
4	PO4	A	303	5/5	0.89	0.13	43,48,50,51	5
2	NAG	A	301	14/15	0.95	0.08	22,27,36,36	0

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 LTV A 315:

$2mF_o-DF_c$ (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.