



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 05:49 PM UTC

PDB ID : 9BGR / pdb_00009bgr
Title : X-ray structure of the aminotransferase from *Vibrio vulnificus* responsible for the biosynthesis of 2,3-diacetamido-4-amino-2,3,4-trideoxy-arabinose in the presence of its external aldimine with 2,3-diacetamido-4-amino-2,3,4-trideoxy-L-arabinose
Authors : Fait, D.J.; Thoden, J.B.; Holden, H.M.
Deposited on : 2024-04-19
Resolution : 1.05 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](#) ①) 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

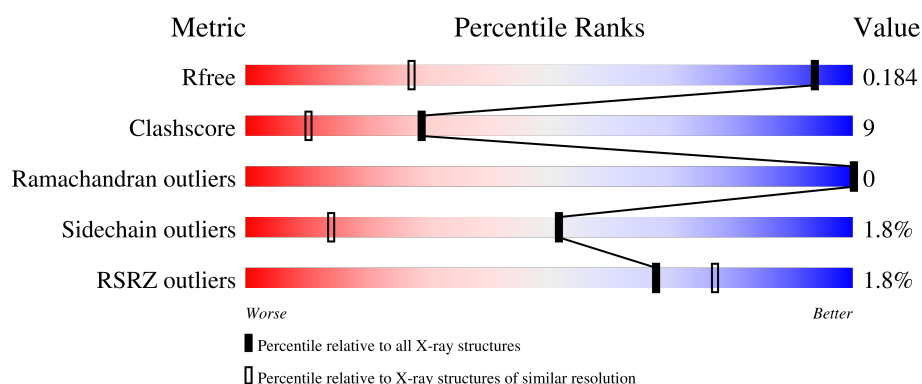
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.05 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	1182 (1.08-1.04)
Clashscore	190562	1204 (1.08-1.04)
Ramachandran outliers	187476	1175 (1.08-1.04)
Sidechain outliers	187428	1176 (1.08-1.04)
RSRZ outliers	180081	1181 (1.08-1.04)

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	382	2% 87% 8% • •
1	B	382	2% 89% 6% • •

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	EDO	A	406	-	-	X	-
4	EDO	A	411	-	-	X	-
4	EDO	B	404	-	-	X	-
5	PGE	A	412	-	-	X	-

2 Entry composition [i](#)

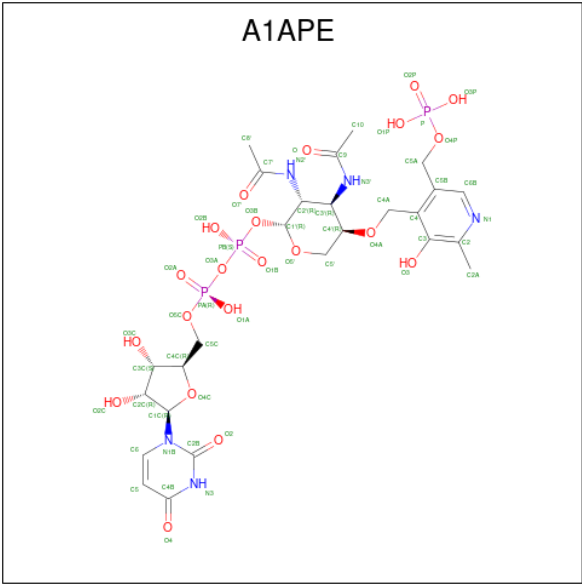
There are 6 unique types of molecules in this entry. The entry contains 7068 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 aminotransferase.

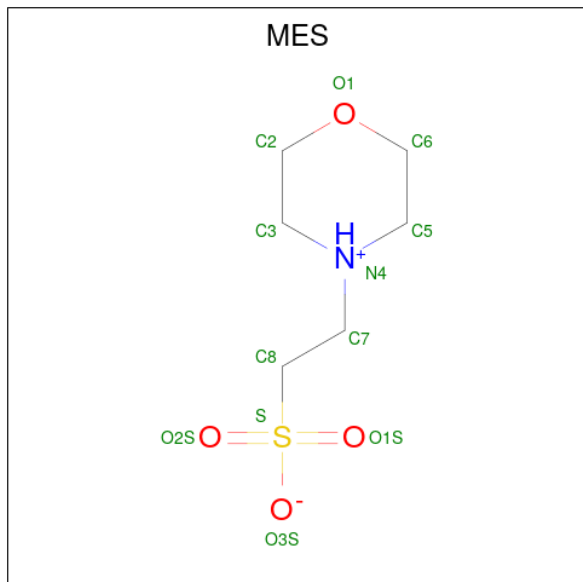
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	370	Total	C	N	O	S	0	17	0
			2933	1864	501	554	14			
1	B	371	Total	C	N	O	S	0	22	0
			2963	1882	507	560	14			

- Molecule 2 is (2R,3R,4R,5R)-3,4-diacetamido-5-({3-hydroxy-2-methyl-5-[(phosphonooxy)methyl]pyridin-4-yl}methoxy)oxan-2-yl [(2R,3S,4R,5R)-5-(2,4-dioxo-3,4-dihydropyrimidin-1(2H)-yl)-3,4-dihydroxyoxolan-2-yl]methyl dihydrogen diphosphate (non-preferred name) (CCD ID: A1APE) (formula: C₂₆H₃₈N₅O₂₁P₃) (labeled as "Ligand of Interest" by depositor).



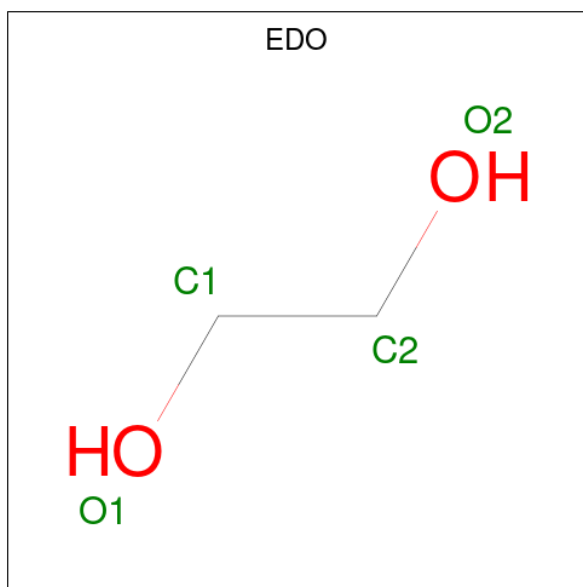
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			55	26	5	21	3		
2	B	1	Total	C	N	O	P	0	0
			55	26	5	21	3		

- Molecule 3 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



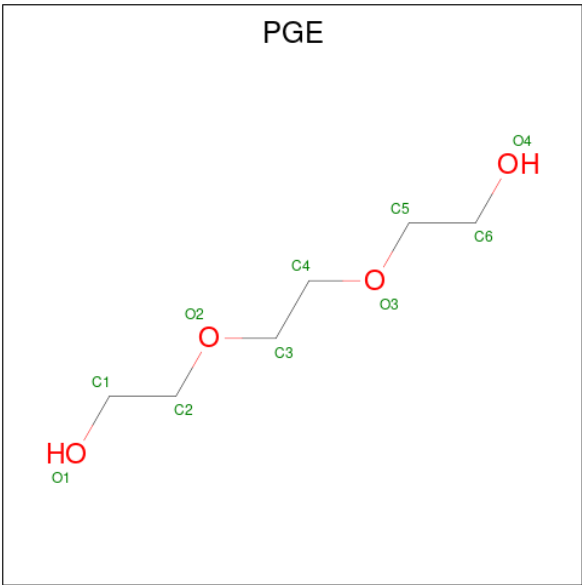
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
3	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 8 4 4	0	1
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	B	1	Total C O 8 4 4	0	1
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0

- Molecule 5 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: C₆H₁₄O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			10	6	4		

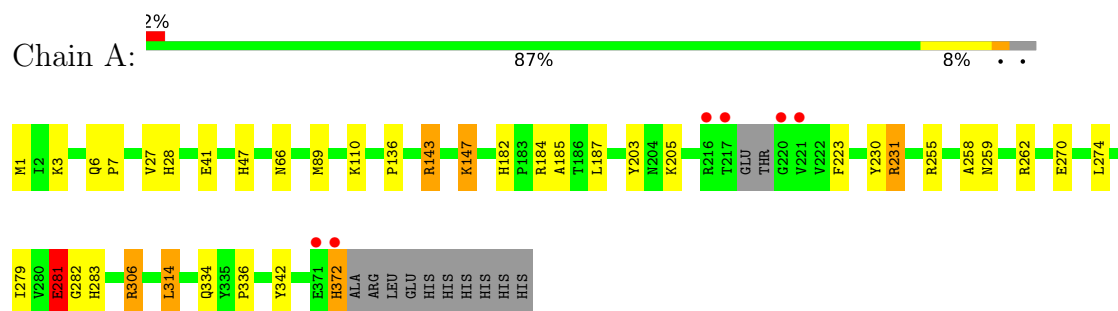
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	495	Total	O	0	0
			495	495		
6	B	461	Total	O	0	4
			465	465		

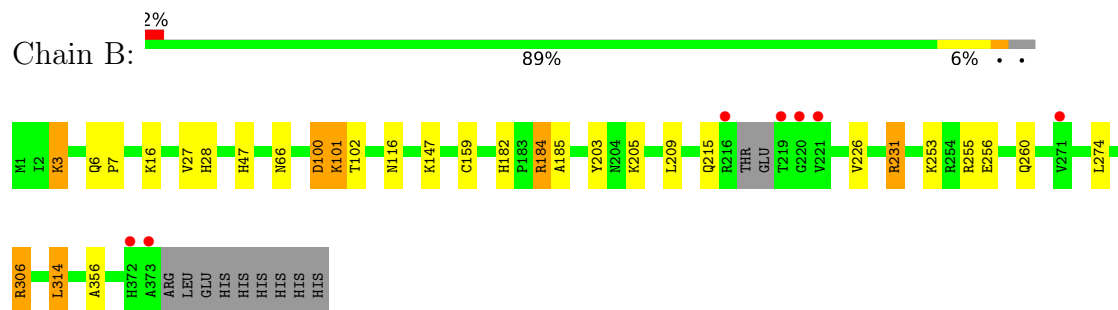
3 Residue-property plots

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: aminotransferase



- Molecule 1: aminotransferase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	52.96Å 53.05Å 70.27Å 83.00° 82.17° 74.36°	Depositor
Resolution (Å)	38.96 – 1.05 38.96 – 1.05	Depositor EDS
% Data completeness (in resolution range)	97.3 (38.96-1.05) 97.3 (38.96-1.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 1.05Å)	Xtriage
Refinement program	REFMAC 5.8.0405	Depositor
R, R_{free}	0.159 , 0.177 0.171 , 0.184	Depositor DCC
R_{free} test set	16781 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	5.1	Xtriage
Anisotropy	0.864	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 45.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.015 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7068	wwPDB-VP
Average B, all atoms (Å ²)	10.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.11% 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: PGE, A1APE, MES, EDO

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	0.53	0/3035	0.84	2/4112 (0.0%)
1	B	0.55	0/3077	0.84	2/4170 (0.0%)
All	All	0.54	0/6112	0.84	4/8282 (0.0%)

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	4
1	B	0	4
All	All	0	8

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	100[A]	ASP	CB-CA-C	6.88	121.15	109.53
1	B	100[B]	ASP	CB-CA-C	6.88	121.15	109.53
1	A	372	HIS	CA-CB-CG	6.22	120.02	113.80
1	A	281	GLU	CB-CG-CD	5.16	121.38	112.60

There are no chirality outliers.

All (8) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	143	ARG	Sidechain
1	A	230	TYR	Sidechain

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Mol	Chain	Res	Type	Group
1	A	231	ARG	Sidechain
1	A	306	ARG	Sidechain
1	B	231[A]	ARG	Sidechain
1	B	231[B]	ARG	Sidechain
1	B	306[A]	ARG	Sidechain
1	B	306[B]	ARG	Sidechain

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	2933	0	2985	60	0
1	B	2963	0	3017	36	1
2	A	55	0	0	3	0
2	B	55	0	0	1	0
3	A	12	0	13	0	0
3	B	12	0	13	1	0
4	A	40	0	60	19	0
4	B	28	0	42	11	0
5	A	10	0	14	14	0
6	A	495	0	0	24	0
6	B	465	0	0	27	1
All	All	7068	0	6144	107	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 9.

All (107) 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:231[A]:ARG:NH2	6:B:501:HOH:O	1.77	1.17
1:A:262:ARG:HB2	4:A:406:EDO:H11	1.39	1.05
1:B:100[B]:ASP:OD1	6:B:502:HOH:O	1.78	1.01
1:B:231[A]:ARG:CZ	6:B:501:HOH:O	2.06	0.99
1:B:116[B]:ASN:OD1	6:B:740[B]:HOH:O	1.80	0.98
1:B:185:ALA:HB2	4:B:403[B]:EDO:H11	1.46	0.97

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:231:ARG:NH1	6:A:501:HOH:O	1.84	0.96
4:A:411:EDO:H21	6:A:858:HOH:O	1.70	0.91
1:A:336:PRO:HG3	5:A:412:PGE:H4	1.50	0.90
1:A:336:PRO:HG3	5:A:412:PGE:H22	1.53	0.90
1:A:342:TYR:CZ	6:A:570:HOH:O	2.26	0.89
1:B:185:ALA:HB2	4:B:403[A]:EDO:H12	1.56	0.86
1:B:231[A]:ARG:NH2	6:B:507:HOH:O	2.08	0.85
1:B:116[B]:ASN:CG	6:B:740[B]:HOH:O	2.21	0.83
1:A:336:PRO:HB3	5:A:412:PGE:H62	1.62	0.81
1:B:116[B]:ASN:ND2	6:B:740[B]:HOH:O	2.13	0.81
2:B:401:A1APE:O1B	6:B:504:HOH:O	1.99	0.81
1:A:185:ALA:HB2	4:A:404:EDO:H12	1.61	0.81
1:B:215:GLN:NE2	6:B:506:HOH:O	2.04	0.81
1:A:7:PRO:HB3	6:A:556:HOH:O	1.80	0.80
1:A:231:ARG:NH2	6:A:505:HOH:O	2.12	0.80
1:B:184:ARG:NH2	6:B:652[B]:HOH:O	2.09	0.80
1:B:147:LYS:HE2	6:B:759:HOH:O	1.83	0.79
2:A:401:A1APE:O1A	6:A:502:HOH:O	2.02	0.78
2:A:401:A1APE:PA	6:A:502:HOH:O	2.42	0.78
1:B:66[B]:ASN:ND2	6:B:510:HOH:O	2.19	0.74
1:A:279:ILE:CG1	4:A:406:EDO:H22	2.17	0.74
2:A:401:A1APE:O1B	6:A:503:HOH:O	2.04	0.73
5:A:412:PGE:O1	6:A:504:HOH:O	2.07	0.72
1:A:89:MET:SD	1:B:226[B]:VAL:HG12	2.29	0.72
1:A:205[A]:LYS:NZ	6:A:508:HOH:O	2.22	0.71
4:B:408:EDO:C1	6:B:641:HOH:O	2.41	0.68
1:A:262:ARG:HB2	4:A:406:EDO:C1	2.22	0.68
1:B:101[B]:LYS:NZ	6:B:513:HOH:O	2.27	0.68
1:A:306:ARG:HD2	1:A:306:ARG:C	2.20	0.65
1:A:336:PRO:HG3	5:A:412:PGE:C2	2.26	0.65
1:B:253[B]:LYS:HE3	1:B:256[B]:GLU:OE1	1.96	0.65
1:A:258:ALA:HB1	4:A:406:EDO:H21	1.80	0.64
1:A:281:GLU:HB3	4:A:411:EDO:H12	1.81	0.62
4:B:408:EDO:H11	6:B:641:HOH:O	1.97	0.61
1:B:231[B]:ARG:NH2	6:B:509:HOH:O	2.18	0.60
1:A:262:ARG:CB	4:A:406:EDO:H11	2.24	0.60
1:B:102:THR:HA	6:B:503:HOH:O	2.02	0.59
4:B:404:EDO:C1	6:B:553:HOH:O	2.50	0.59
1:A:66[B]:ASN:ND2	6:A:513:HOH:O	2.36	0.58
1:A:281:GLU:HG2	6:A:806:HOH:O	2.02	0.58
1:A:270:GLU:OE2	4:A:409:EDO:H21	2.02	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:147:LYS:HE2	6:A:775:HOH:O	2.03	0.58
1:A:342:TYR:CE1	6:A:570:HOH:O	2.49	0.58
1:B:314:LEU:HD21	4:B:404:EDO:H21	1.86	0.57
1:A:259[B]:ASN:OD1	1:A:262:ARG:NH2	2.37	0.57
1:B:314:LEU:HD21	4:B:404:EDO:H12	1.86	0.56
1:A:336:PRO:CD	5:A:412:PGE:H2	2.36	0.56
4:B:404:EDO:H11	6:B:553:HOH:O	2.06	0.55
1:B:255[B]:ARG:NH2	6:B:515:HOH:O	2.37	0.55
1:B:314:LEU:C	1:B:314:LEU:HD12	2.33	0.54
1:A:336:PRO:CG	5:A:412:PGE:C2	2.87	0.53
1:A:336:PRO:CG	5:A:412:PGE:H22	2.33	0.53
1:A:6:GLN:O	1:A:6:GLN:HG3	2.08	0.53
1:B:185:ALA:CB	4:B:403[A]:EDO:H12	2.34	0.52
1:A:336:PRO:HD2	5:A:412:PGE:H2	1.91	0.52
1:B:7:PRO:HG3	6:B:534:HOH:O	2.10	0.52
1:A:184:ARG:HB2	4:A:404:EDO:O1	2.09	0.51
1:A:334:GLN:HB2	5:A:412:PGE:H5	1.92	0.50
3:B:402:MES:H32	6:B:571:HOH:O	2.12	0.50
1:A:279:ILE:HB	4:A:406:EDO:H22	1.94	0.49
1:B:102:THR:CA	6:B:503:HOH:O	2.59	0.49
1:B:205[B]:LYS:HE2	1:B:209:LEU:HG	1.95	0.48
1:A:47:HIS:HB3	1:A:203:TYR:CD1	2.48	0.48
1:B:159:CYS:HA	4:B:403[B]:EDO:O1	2.14	0.48
1:A:223:PHE:HE1	4:B:404:EDO:H22	1.79	0.48
1:A:306:ARG:HD3	6:A:789:HOH:O	2.14	0.48
1:A:182:HIS:HD2	6:B:507:HOH:O	1.96	0.48
1:A:314:LEU:C	1:A:314:LEU:HD12	2.39	0.47
1:A:274:LEU:HD12	1:A:274:LEU:C	2.40	0.47
1:A:279:ILE:HG13	4:A:406:EDO:H22	1.93	0.47
1:A:7:PRO:CB	6:A:556:HOH:O	2.51	0.47
1:A:281:GLU:C	4:A:411:EDO:H12	2.40	0.47
1:B:256[A]:GLU:CD	6:B:524:HOH:O	2.57	0.47
1:B:101[A]:LYS:HD2	6:B:780:HOH:O	2.15	0.47
1:A:110[B]:LYS:NZ	5:A:412:PGE:O1	2.46	0.46
1:B:47:HIS:HB3	1:B:203:TYR:CD1	2.49	0.46
1:A:306:ARG:HD3	6:A:862:HOH:O	2.14	0.46
1:A:1:MET:HE1	6:A:789:HOH:O	2.15	0.46
1:A:7:PRO:HG3	6:A:556:HOH:O	2.14	0.46
1:A:279:ILE:HG12	4:A:406:EDO:H22	1.95	0.45
1:A:7:PRO:CG	6:A:556:HOH:O	2.64	0.45
1:B:260[B]:GLN:OE1	1:B:356:ALA:HA	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:274:LEU:C	1:B:274:LEU:HD12	2.43	0.44
1:A:279:ILE:CB	4:A:406:EDO:H22	2.48	0.44
1:A:41[A]:GLU:HG3	6:A:645:HOH:O	2.16	0.44
1:A:282:GLY:HA3	4:A:411:EDO:H22	1.99	0.44
6:A:505:HOH:O	1:B:182:HIS:HD2	2.00	0.44
1:A:281:GLU:HB3	4:A:411:EDO:C1	2.48	0.43
1:B:27:VAL:O	1:B:28:HIS:C	2.61	0.43
1:A:147:LYS:HG2	6:A:772:HOH:O	2.18	0.43
5:A:412:PGE:H4	5:A:412:PGE:H22	1.50	0.42
1:A:334:GLN:HB2	5:A:412:PGE:C5	2.50	0.42
1:A:255[A]:ARG:NH2	6:A:521:HOH:O	2.48	0.42
1:A:136:PRO:HD3	1:A:283:HIS:HA	2.02	0.41
1:A:187:LEU:HD23	1:A:187:LEU:C	2.45	0.41
1:A:336:PRO:CG	5:A:412:PGE:H2	2.51	0.41
1:A:279:ILE:HG13	4:A:406:EDO:C2	2.51	0.41
1:B:3:LYS:HD3	1:B:6:GLN:NE2	2.35	0.41
1:A:27:VAL:O	1:A:28:HIS:C	2.62	0.41
1:B:231[B]:ARG:NH1	6:B:509:HOH:O	2.49	0.41
1:A:185:ALA:CB	4:A:404:EDO:H12	2.41	0.40

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:B:306[B]:ARG:NH1	6:B:597:HOH:O[1_565]	1.87	0.33

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	384/382 (100%)	373 (97%)	11 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	389/382 (102%)	378 (97%)	11 (3%)	0	100	100
All	All	773/764 (101%)	751 (97%)	22 (3%)	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	320/313 (102%)	313 (98%)	7 (2%)	45	9
1	B	324/313 (104%)	318 (98%)	6 (2%)	50	12
All	All	644/626 (103%)	631 (98%)	13 (2%)	51	11

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3[A]	LYS
1	A	3[B]	LYS
1	A	143	ARG
1	A	147	LYS
1	A	281	GLU
1	A	314	LEU
1	A	372	HIS
1	B	3	LYS
1	B	16	LYS
1	B	101[A]	LYS
1	B	101[B]	LYS
1	B	184	ARG
1	B	314	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	109	GLN
1	A	116	ASN
1	A	215	GLN
1	A	248	ASN
1	B	6	GLN
1	B	166	GLN
1	B	236	GLN
1	B	372	HIS

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](#)

22 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	$\# Z > 2$
4	EDO	A	404	-	3,3,3	0.33	0	2,2,2	0.18	0
4	EDO	B	404	-	3,3,3	0.29	0	2,2,2	0.44	0
4	EDO	A	406	-	3,3,3	0.74	0	2,2,2	1.61	0
4	EDO	A	408	-	3,3,3	0.37	0	2,2,2	0.24	0
3	MES	A	402	-	12,12,12	0.63	0	15,16,16	0.65	0
4	EDO	B	403[B]	-	3,3,3	0.23	0	2,2,2	0.26	0
4	EDO	A	409	-	3,3,3	0.24	0	2,2,2	0.31	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	EDO	B	403[A]	-	3,3,3	0.24	0	2,2,2	0.22	0
4	EDO	B	407	-	3,3,3	0.16	0	2,2,2	0.29	0
4	EDO	A	405[B]	-	3,3,3	0.15	0	2,2,2	0.14	0
4	EDO	A	411	-	3,3,3	0.52	0	2,2,2	0.66	0
4	EDO	A	405[A]	-	3,3,3	0.27	0	2,2,2	0.11	0
4	EDO	B	406	-	3,3,3	0.26	0	2,2,2	0.05	0
4	EDO	A	403	-	3,3,3	0.43	0	2,2,2	0.25	0
4	EDO	B	408	-	3,3,3	0.12	0	2,2,2	0.28	0
4	EDO	A	410	-	3,3,3	0.19	0	2,2,2	0.19	0
5	PGE	A	412	-	9,9,9	0.26	0	8,8,8	0.24	0
4	EDO	A	407	-	3,3,3	0.12	0	2,2,2	0.14	0
4	EDO	B	405	-	3,3,3	0.14	0	2,2,2	0.14	0
2	A1APE	A	401	-	56,58,58	1.32	4 (7%)	78,87,87	1.31	9 (11%)
3	MES	B	402	-	12,12,12	0.64	0	15,16,16	0.51	0
2	A1APE	B	401	-	56,58,58	1.27	3 (5%)	78,87,87	1.28	7 (8%)

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
4	EDO	A	404	-	-	0/1/1/1	-
4	EDO	B	404	-	-	1/1/1/1	-
4	EDO	A	406	-	-	1/1/1/1	-
4	EDO	A	408	-	-	0/1/1/1	-
3	MES	A	402	-	-	0/6/14/14	0/1/1/1
4	EDO	B	403[B]	-	-	0/1/1/1	-
4	EDO	A	409	-	-	1/1/1/1	-
4	EDO	B	403[A]	-	-	1/1/1/1	-
4	EDO	B	407	-	-	0/1/1/1	-
4	EDO	A	405[B]	-	-	1/1/1/1	-
4	EDO	A	411	-	-	0/1/1/1	-
4	EDO	A	405[A]	-	-	1/1/1/1	-
4	EDO	B	406	-	-	0/1/1/1	-
4	EDO	A	403	-	-	0/1/1/1	-
4	EDO	B	408	-	-	1/1/1/1	-
4	EDO	A	410	-	-	0/1/1/1	-
5	PGE	A	412	-	-	7/7/7/7	-
4	EDO	A	407	-	-	0/1/1/1	-
4	EDO	B	405	-	-	0/1/1/1	-
2	A1APE	A	401	-	-	5/39/73/73	0/4/4/4

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	MES	B	402	-	-	0/6/14/14	0/1/1/1
2	A1APE	B	401	-	-	4/39/73/73	0/4/4/4

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	A1APE	PB-O3A	-5.48	1.53	1.59
2	B	401	A1APE	PB-O3A	-5.35	1.53	1.59
2	B	401	A1APE	O-C9	4.14	1.32	1.23
2	A	401	A1APE	O-C9	4.07	1.32	1.23
2	A	401	A1APE	C5-C4B	-3.33	1.36	1.43
2	B	401	A1APE	C5-C4B	-3.32	1.36	1.43
2	A	401	A1APE	PA-O3A	-2.33	1.57	1.59

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	A1APE	O5'-C1'-O3B	-4.96	104.89	111.36
2	A	401	A1APE	C4B-N3-C2B	-4.15	121.46	126.61
2	A	401	A1APE	O5'-C1'-O3B	-4.11	105.99	111.36
2	B	401	A1APE	C5-C4B-N3	3.77	120.08	114.80
2	A	401	A1APE	N3-C2B-N1B	3.75	119.77	114.89
2	A	401	A1APE	C5-C4B-N3	3.62	119.88	114.80
2	B	401	A1APE	C4B-N3-C2B	-3.39	122.40	126.61
2	B	401	A1APE	O3B-C1'-C2'	2.65	113.19	108.40
2	B	401	A1APE	N3-C2B-N1B	2.41	118.02	114.89
2	A	401	A1APE	O4-C4B-C5	-2.32	121.17	125.16
2	A	401	A1APE	C1'-C2'-N2'	-2.14	107.33	110.92
2	A	401	A1APE	O4A-C4A-C4	2.14	115.15	109.15
2	B	401	A1APE	O4-C4B-C5	-2.12	121.51	125.16
2	A	401	A1APE	C6-N1B-C2B	-2.06	118.49	121.00
2	A	401	A1APE	O2-C2B-N1B	-2.06	120.11	122.80
2	B	401	A1APE	O4A-C4A-C4	2.04	114.86	109.15

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	A1APE	C5B-C4-C4A-O4A
2	A	401	A1APE	C5'-C4'-O4A-C4A
2	B	401	A1APE	C5B-C4-C4A-O4A

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Mol	Chain	Res	Type	Atoms
2	B	401	A1APE	C5'-C4'-O4A-C4A
5	A	412	PGE	C4-C3-O2-C2
5	A	412	PGE	C3-C4-O3-C5
4	B	404	EDO	O1-C1-C2-O2
4	A	405[B]	EDO	O1-C1-C2-O2
4	A	406	EDO	O1-C1-C2-O2
5	A	412	PGE	C6-C5-O3-C4
5	A	412	PGE	O3-C5-C6-O4
2	A	401	A1APE	C5C-O5C-PA-O2A
5	A	412	PGE	O2-C3-C4-O3
4	B	408	EDO	O1-C1-C2-O2
2	A	401	A1APE	C3-C4-C4A-O4A
2	B	401	A1APE	C3-C4-C4A-O4A
2	A	401	A1APE	O5'-C1'-O3B-PB
2	B	401	A1APE	O5'-C1'-O3B-PB
4	A	409	EDO	O1-C1-C2-O2
5	A	412	PGE	O1-C1-C2-O2
4	A	405[A]	EDO	O1-C1-C2-O2
4	B	403[A]	EDO	O1-C1-C2-O2
5	A	412	PGE	C1-C2-O2-C3

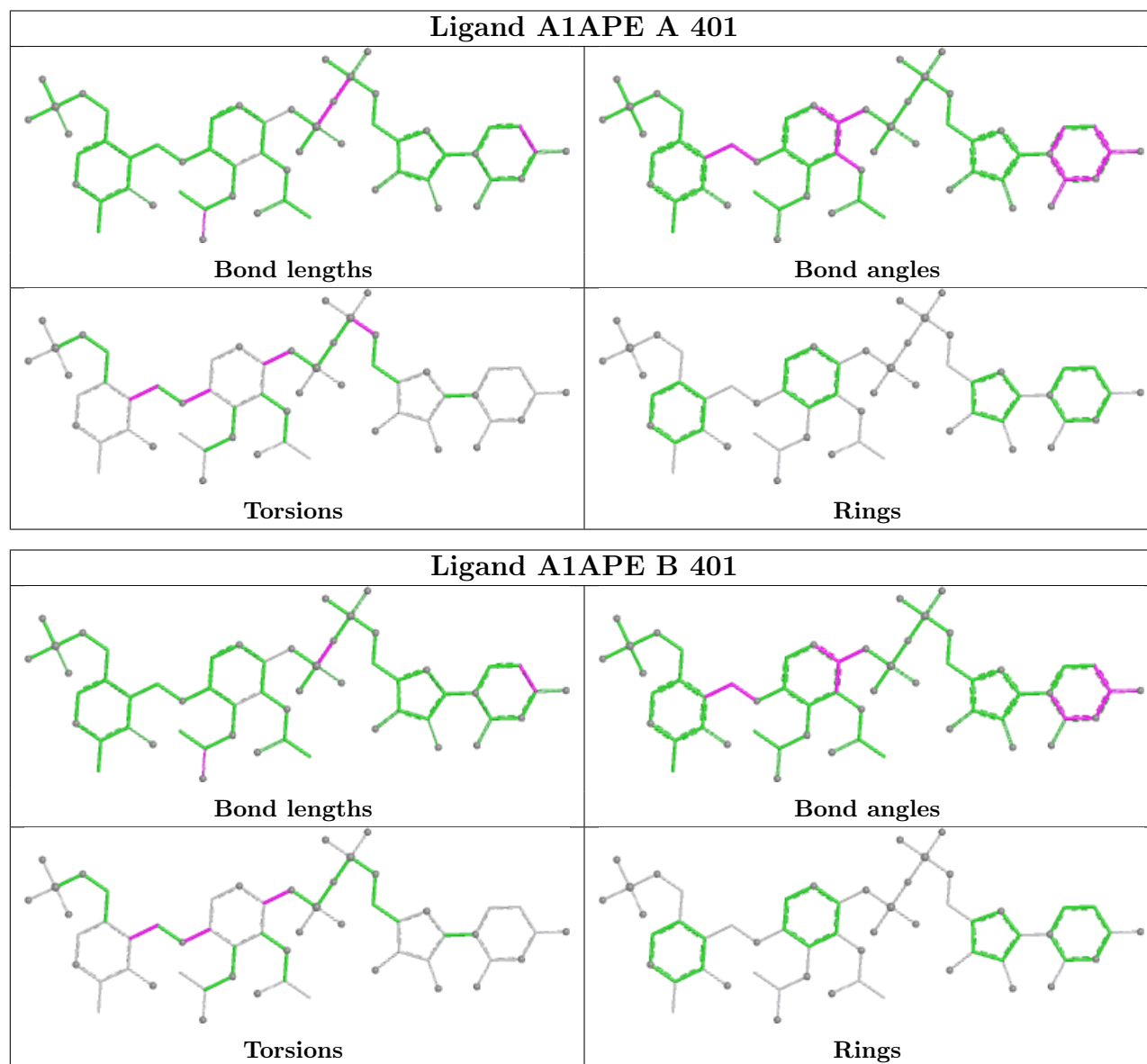
There are no ring outliers.

12 monomers are involved in 49 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	404	EDO	3	0
4	B	404	EDO	5	0
4	A	406	EDO	10	0
4	B	403[B]	EDO	2	0
4	A	409	EDO	1	0
4	B	403[A]	EDO	2	0
4	A	411	EDO	5	0
4	B	408	EDO	2	0
5	A	412	PGE	14	0
2	A	401	A1APE	3	0
3	B	402	MES	1	0
2	B	401	A1APE	1	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 ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	370/382 (96%)	-0.24	6 (1%) 70 79	3, 6, 16, 45	17 (4%)
1	B	371/382 (97%)	-0.26	7 (1%) 66 75	4, 6, 16, 60	22 (5%)
All	All	741/764 (96%)	-0.25	13 (1%) 67 77	3, 6, 16, 60	39 (5%)

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	372	HIS	5.6
1	B	219	THR	5.1
1	B	373	ALA	4.4
1	B	216	ARG	3.8
1	A	221	VAL	3.7
1	A	216	ARG	3.3
1	A	217	THR	3.3
1	B	221	VAL	2.9
1	B	271	VAL	2.7
1	A	371	GLU	2.6
1	A	220	GLY	2.4
1	B	220	GLY	2.4
1	B	372	HIS	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 ⓘ

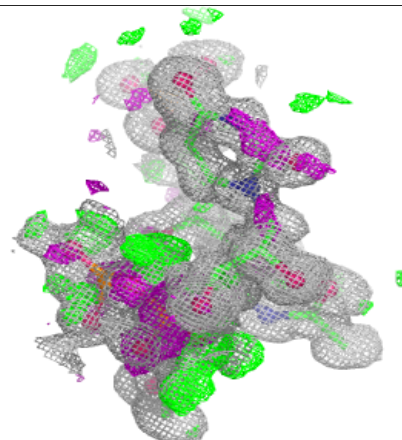
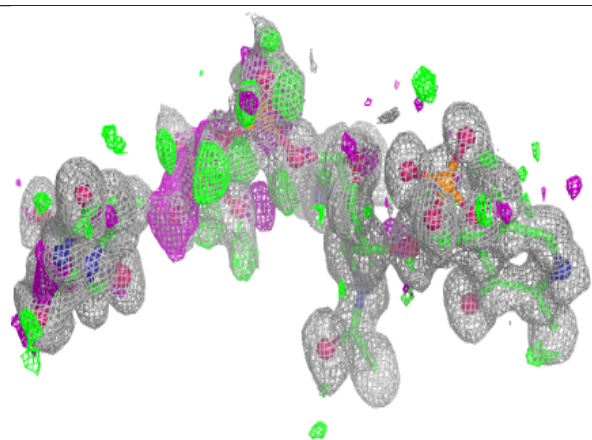
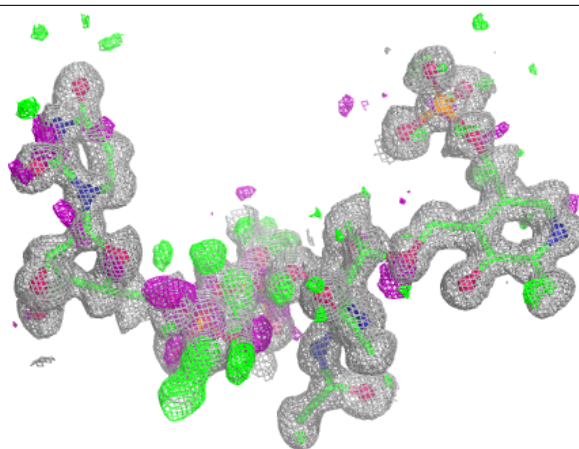
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	PGE	A	412	10/10	0.75	0.15	28,28,31,35	0
4	EDO	A	410	4/4	0.84	0.13	27,28,30,34	0
4	EDO	A	409	4/4	0.84	0.15	25,25,27,29	0
4	EDO	B	408	4/4	0.86	0.12	27,28,29,34	0
3	MES	A	402	12/12	0.86	0.13	19,22,33,34	0
4	EDO	A	411	4/4	0.90	0.11	16,20,20,22	0
4	EDO	B	404	4/4	0.90	0.12	16,21,23,27	0
4	EDO	A	404	4/4	0.91	0.11	17,18,21,21	0
3	MES	B	402	12/12	0.92	0.10	15,18,30,30	0
4	EDO	B	406	4/4	0.92	0.13	14,20,23,29	0
4	EDO	A	405[B]	4/4	0.94	0.12	16,18,20,22	4
4	EDO	A	405[A]	4/4	0.94	0.12	14,15,18,20	4
4	EDO	B	407	4/4	0.94	0.10	11,15,20,27	0
4	EDO	B	403[A]	4/4	0.94	0.10	12,15,15,16	4
4	EDO	B	403[B]	4/4	0.94	0.10	19,20,20,21	4
4	EDO	A	406	4/4	0.95	0.08	14,16,16,17	0
4	EDO	A	407	4/4	0.95	0.10	11,16,21,30	0
2	A1APE	B	401	55/55	0.97	0.07	4,8,18,20	0
2	A1APE	A	401	55/55	0.97	0.07	4,8,17,20	0
4	EDO	A	408	4/4	0.98	0.05	11,12,15,15	0
4	EDO	B	405	4/4	0.98	0.05	7,10,14,15	0
4	EDO	A	403	4/4	0.98	0.06	7,9,13,15	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.

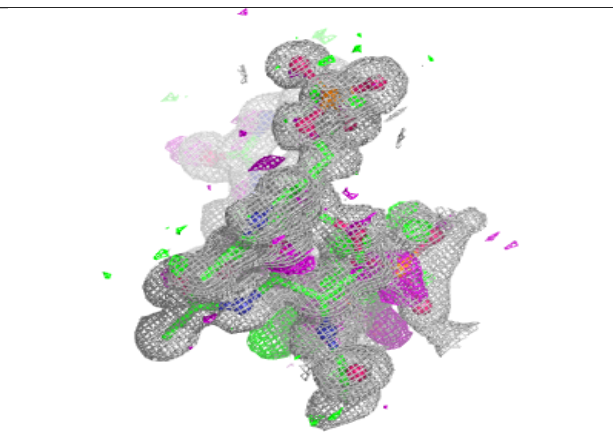
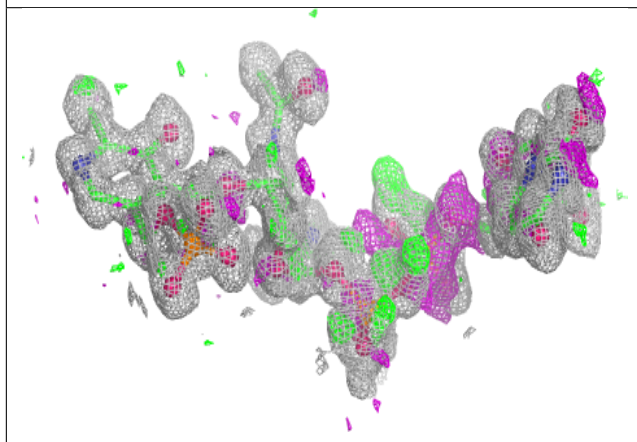
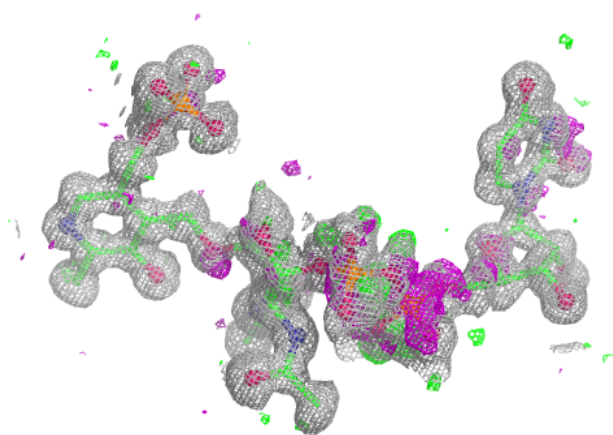
Electron density around A1APE B 401:

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



Electron density around A1APE A 401:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.