Full wwPDB X-ray Structure Validation Report (i)

Nov 19, 2024 – 04:38 PM EST

PDB ID	:	9D2A
Title	:	Crystal structure of (+)-sabinene synthase from Thuja plicata: condition 3
Authors	:	Gaynes, M.N.; Christianson, D.W.
Deposited on	:	2024-08-08
Resolution	:	2.21 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

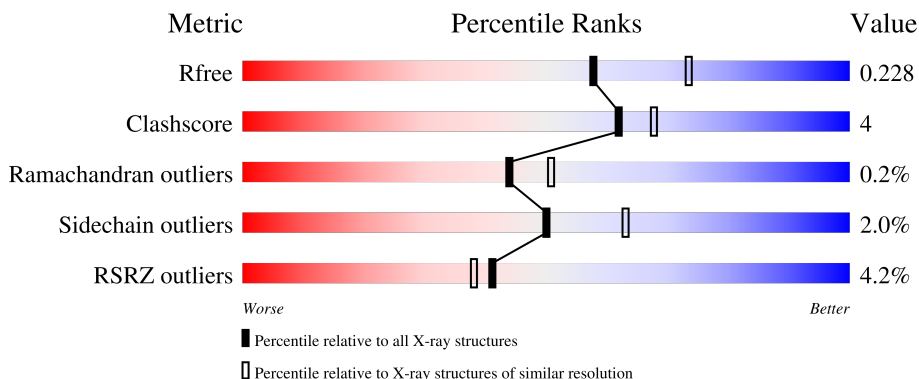|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.21 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	Percentile Ranks	Value
Rfree		0.228
Clashscore		4
Ramachandran outliers		0.2%
Sidechain outliers		2.0%
RSRZ outliers		4.2%

Worse ← → *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	7167 (2.24-2.20)
Clashscore	180529	8096 (2.24-2.20)
Ramachandran outliers	177936	8010 (2.24-2.20)
Sidechain outliers	177891	8011 (2.24-2.20)
RSRZ outliers	164620	7166 (2.24-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	554	5% / 84% / 8% / 7%
1	B	554	2% / 85% / 8% · 6%
1	C	554	4% / 83% / 9% / 8%
1	D	554	5% / 82% / 9% · 8%

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:

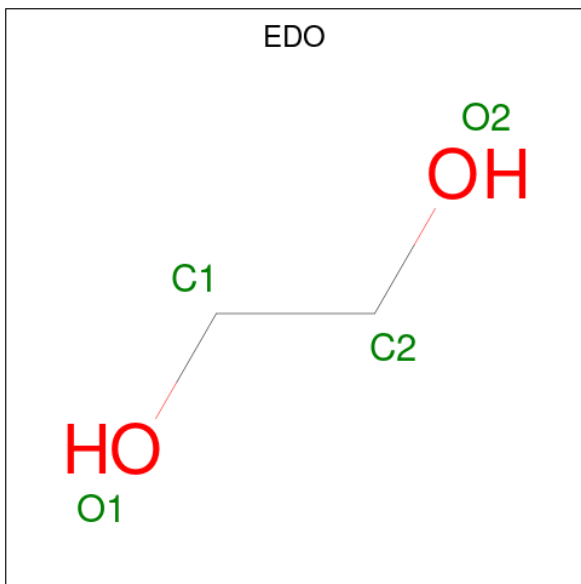| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	EDO	B	701	-	-	X	-
3	CO	B	704	-	-	X	-

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 16618 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 Sabinene synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	512	Total	C	N	O	S	0	0	0
			4015	2560	676	759	20			
1	D	512	Total	C	N	O	S	0	0	0
			4003	2553	670	760	20			
1	A	513	Total	C	N	O	S	0	0	0
			4031	2572	678	760	21			
1	B	522	Total	C	N	O	S	0	0	0
			4133	2631	697	784	21			

- Molecule 2 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	C	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	0
			4	2	2		

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

- Molecule 3 is COBALT (II) ION (three-letter code: CO) (formula: Co).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	C	3	Total 3	Co 3	0	0
3	D	3	Total 3	Co 3	0	0
3	A	3	Total 3	Co 3	0	0
3	B	4	Total 4	Co 4	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	68	Total 68	O 68	0	0
4	D	88	Total 88	O 88	0	0
4	A	109	Total 109	O 109	0	0
4	B	138	Total 138	O 138	0	0

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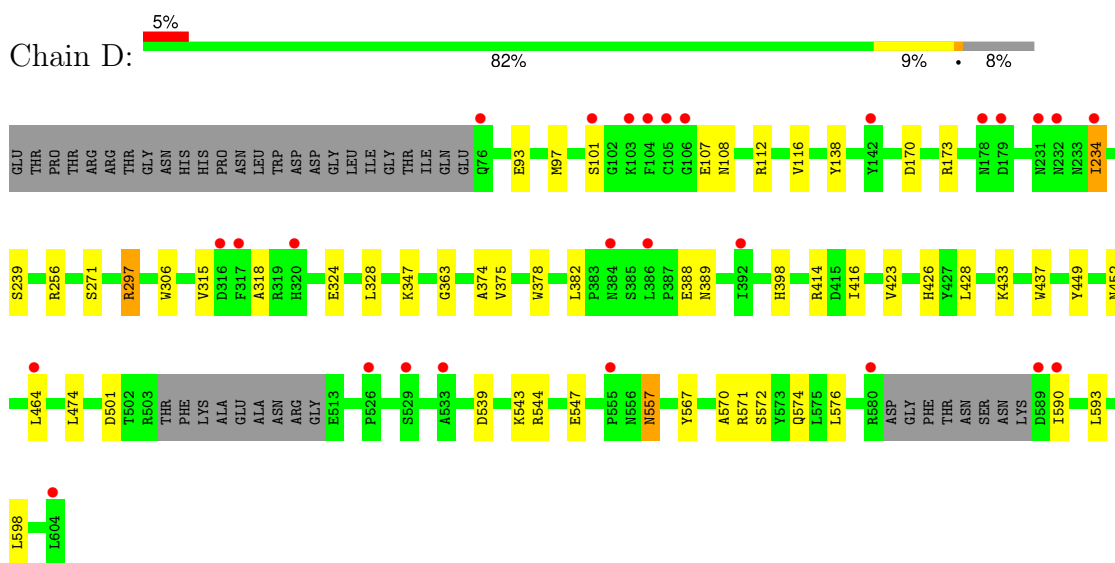 density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
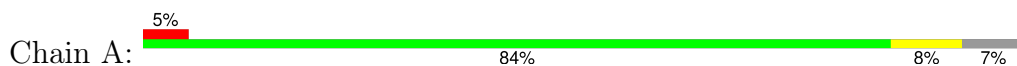
- Molecule 1: Sabinene synthase

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GLU THR PRO THR ARG ARG THR GLY ASN HIS HIS PRO ASN LEU TRP ASP ASP GLY LEU ILE GLY THR ILE GLN GLU Q76 S81 E85 S101 C105 N108 R112 L113 V114 N178 D179 N212 N231 N232 R260 S271 W306 D316 F317 H320

E324 K347 T361 Y362 I365 W378 P383 N384 S385 L386 P387 E388 N389 K395 H398 M399 A405 A408 I416 L417 R421 Y442 I443 P444 R460 L464 P475 I478 Y484 R487 L498 T504 PHE LYS ALA GLU ALA ASN ARG GLY

E513 L514 V515 Y521 G527 S528 S529 E532 A533 L534 K538 K543 R544 E547 V558 K563 Y567 R571 Q574 R580 ASP GLY PHE THR ASN SER ASN LYS D589 I590 K591 D592 I602 P603 L604

• Molecule 1: Sabinene synthase

Chain B:

2%

85%   8% • 6%

GLU THR PRO THR ARG ARG THR GLY ASN HIS HIS PRO ASN LEU TRP ASP ASP GLY LEU ILE GLY THR ILE GLN GLU Q76 H82 C83 C105 N108 R112 R121 R141 Y142 N178 D179 E191 N199 N233 L238 P255 S271 W306 D316 F317

R321 Y332 K347 L351 A352 T353 D357 Y362 I365 W378 L382 P383 N384 S385 L386 F397 A405 A408 I416 R421 Y459 L464 P475 D476 N477 I478 L479 L480 L492 K499 T504 F505 LYS ALA GLU ALA ASN ARG GLY E513

S519 H525 S528 L534 V558 K563 Y567 R571 Q574 G582 K588 L604

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	274.48Å 90.77Å 193.94Å 90.00° 134.79° 90.00°	Depositor
Resolution (Å)	34.41 – 2.21 34.41 – 2.21	Depositor EDS
% Data completeness (in resolution range)	83.5 (34.41-2.21) 83.5 (34.41-2.21)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.83 (at 2.22Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.198 , 0.227 0.199 , 0.228	Depositor DCC
R_{free} test set	167411 reflections (1.41%)	wwPDB-VP
Wilson B-factor (Å^2)	42.2	Xtriage
Anisotropy	0.029	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 43.8	EDS
L-test for twinning[2]	$< |L| > = 0.53$, $< L^2 > = 0.37$	Xtriage
Estimated twinning fraction	0.033 for h+2*l,k,-h-l 0.000 for h,-k,-h-l 0.000 for -h-2*l,-k,l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	16618	wwPDB-VP
Average B, all atoms (Å^2)	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 39.69 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.0587e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: CO, 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	0.40	0/4119	0.57	0/5597
1	B	0.43	0/4224	0.59	0/5734
1	C	0.40	0/4102	0.56	0/5576
1	D	0.39	0/4089	0.56	0/5559
All	All	0.41	0/16534	0.57	0/22466

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	4031	0	3805	26	0
1	B	4133	0	3930	33	0
1	C	4015	0	3791	34	0
1	D	4003	0	3775	31	0
2	A	4	0	6	0	0
2	B	8	0	12	5	0
2	C	4	0	6	0	0
2	D	4	0	6	0	0
3	A	3	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	4	0	0	2	0
3	C	3	0	0	0	0
3	D	3	0	0	0	0
4	A	109	0	0	2	0
4	B	138	0	0	5	0
4	C	68	0	0	1	0
4	D	88	0	0	3	0
All	All	16618	0	15331	125	0

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 4.

All (125) 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:D:423:VAL:HG21	1:D:464:LEU:HD22	1.41	1.01
1:B:82:HIS:HD2	4:B:801:HOH:O	1.42	1.00
1:B:83:CYS:HG	3:B:704:CO:CO	0.76	0.98
1:C:423:VAL:HG21	1:C:464:LEU:HD22	1.44	0.96
1:B:383:PRO:HG2	1:B:386:LEU:HD13	1.50	0.94
1:C:82:HIS:HD2	4:C:805:HOH:O	1.60	0.85
1:A:567:TYR:CE2	1:A:571:ARG:HD2	2.19	0.77
1:B:199:ASN:HD21	2:B:701:EDO:H11	1.51	0.76
1:A:574:GLN:NE2	4:A:801:HOH:O	2.20	0.74
1:D:101:SER:OG	1:D:112:ARG:HG2	1.88	0.74
1:D:315:VAL:HG12	1:D:318:ALA:H	1.55	0.71
1:C:364:THR:OG1	1:C:367:GLU:HG3	1.89	0.71
1:B:582:GLY:HA3	1:B:588:LYS:HD3	1.73	0.68
1:A:558:VAL:HB	1:A:563:LYS:HD2	1.74	0.67
1:B:405:ALA:HA	1:B:416:ILE:HD11	1.77	0.66
1:A:534:LEU:HD22	1:A:538:LYS:HE3	1.79	0.65
1:B:382:LEU:HB3	1:B:383:PRO:HD2	1.81	0.63
1:A:475:PRO:HG2	1:A:478:ILE:HD12	1.81	0.62
1:D:328:LEU:HD11	1:D:576:LEU:HD22	1.83	0.60
1:B:567:TYR:CE2	1:B:571:ARG:HD2	2.37	0.60
1:D:433:LYS:NZ	4:D:805:HOH:O	2.33	0.59
1:D:567:TYR:CE2	1:D:571:ARG:HD2	2.39	0.57
1:C:364:THR:HG23	1:C:367:GLU:CD	2.24	0.57
1:C:567:TYR:CE2	1:C:571:ARG:HD2	2.40	0.57
1:B:351:LEU:HD13	1:B:397:PHE:HA	1.86	0.57
1:B:83:CYS:SG	3:B:704:CO:CO	1.85	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:701:EDO:H21	4:B:826:HOH:O	2.05	0.55
1:A:378:TRP:CD2	1:A:421:ARG:HD3	2.41	0.55
1:A:108:ASN:O	1:A:112:ARG:HG3	2.07	0.55
1:B:199:ASN:HD21	2:B:701:EDO:C1	2.18	0.55
1:B:459:TYR:OH	1:B:492:LEU:HD13	2.07	0.54
1:B:321:ARG:HD3	1:B:353:THR:HG21	1.89	0.52
1:B:191:GLU:HG3	1:B:238:LEU:HD22	1.92	0.52
1:C:364:THR:N	1:C:367:GLU:OE1	2.36	0.52
1:B:563:LYS:NZ	4:B:806:HOH:O	2.44	0.51
1:D:107:GLU:HA	1:D:138:TYR:OH	2.11	0.51
1:B:306:TRP:CD2	1:B:347:LYS:HD2	2.45	0.51
1:B:475:PRO:HD2	1:B:478:ILE:HB	1.92	0.51
1:B:525:HIS:O	1:B:528:SER:OG	2.23	0.51
1:B:476:ASP:O	1:B:480:LEU:HD13	2.10	0.51
1:D:306:TRP:CE2	1:D:347:LYS:HD3	2.45	0.51
1:C:364:THR:HG23	1:C:367:GLU:OE1	2.10	0.51
1:C:570:ALA:O	1:C:574:GLN:HG2	2.10	0.51
1:C:367:GLU:HA	1:C:370:LEU:HD12	1.93	0.50
1:D:398:HIS:HD2	4:D:845:HOH:O	1.95	0.50
1:B:306:TRP:CE2	1:B:347:LYS:HD2	2.46	0.50
1:B:82:HIS:CD2	4:B:801:HOH:O	2.32	0.50
1:C:351:LEU:HD13	1:C:397:PHE:HA	1.93	0.50
1:D:170:ASP:HA	1:D:173:ARG:HG3	1.93	0.49
1:B:499:LYS:HB2	1:B:574:GLN:HE22	1.77	0.49
1:C:295:VAL:O	1:C:299:GLU:HG3	2.13	0.49
1:C:558:VAL:HB	1:C:563:LYS:HD2	1.94	0.49
1:A:543:LYS:O	1:A:547:GLU:HG3	2.12	0.49
1:D:328:LEU:HD22	1:D:572:SER:HB2	1.96	0.48
1:A:405:ALA:HA	1:A:416:ILE:HD11	1.96	0.48
1:D:433:LYS:HD3	1:D:437:TRP:CZ2	2.48	0.48
1:A:317:PHE:CE2	1:A:389:ASN:HB3	2.49	0.48
1:A:487:ARG:HG3	1:A:487:ARG:HH11	1.78	0.48
1:B:141:ARG:NH2	1:B:142:TYR:OH	2.47	0.47
1:D:414:ARG:NH2	1:D:474:LEU:O	2.47	0.47
1:B:558:VAL:HB	1:B:563:LYS:HD2	1.94	0.47
1:D:101:SER:HG	1:D:112:ARG:HG2	1.80	0.47
1:B:347:LYS:HE2	4:B:863:HOH:O	2.14	0.47
1:A:378:TRP:HB2	1:A:421:ARG:NH1	2.31	0.46
1:C:417:LEU:O	1:C:421:ARG:HG3	2.16	0.46
1:B:199:ASN:ND2	2:B:701:EDO:H11	2.26	0.46
1:A:317:PHE:HE2	1:A:389:ASN:HB3	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:543:LYS:O	1:D:547:GLU:HG3	2.15	0.46
1:C:357:ASP:HB3	1:C:362:TYR:CE1	2.52	0.45
1:B:378:TRP:CD2	1:B:421:ARG:HD2	2.52	0.45
1:C:419:TYR:HE1	1:C:464:LEU:CD1	2.30	0.45
1:D:93:GLU:O	1:D:97:MET:HG3	2.17	0.45
1:C:423:VAL:HG12	1:C:461:VAL:HG12	1.98	0.45
1:B:121:ARG:NH2	2:B:701:EDO:H12	2.32	0.45
1:D:375:VAL:HG21	1:D:428:LEU:HD11	1.99	0.44
1:B:588:LYS:HB2	1:B:588:LYS:HE3	1.57	0.44
1:A:324:GLU:HG2	1:A:590:ILE:CG2	2.47	0.44
1:A:398:HIS:HD2	4:A:841:HOH:O	2.01	0.44
1:C:408:ALA:HB3	1:C:416:ILE:HG12	1.99	0.44
1:C:419:TYR:CE1	1:C:464:LEU:HD11	2.53	0.44
1:C:357:ASP:HB3	1:C:362:TYR:HE1	1.82	0.44
1:A:417:LEU:O	1:A:421:ARG:HG3	2.17	0.43
1:C:312:LEU:HD23	1:C:392:ILE:HD12	2.00	0.43
1:C:303:ILE:HD11	1:C:343:ARG:HA	2.01	0.43
1:D:234:ILE:CG2	1:D:239:SER:HB2	2.49	0.43
1:A:306:TRP:CE2	1:A:347:LYS:HD3	2.53	0.43
1:D:374:ALA:O	1:D:378:TRP:N	2.52	0.43
1:B:255:PRO:HD2	1:B:332:TYR:HB3	2.01	0.43
1:C:94:ILE:HG23	1:C:97:MET:HE2	2.01	0.43
1:C:414:ARG:NH2	1:C:474:LEU:O	2.52	0.43
1:C:97:MET:HE2	1:C:97:MET:HB2	1.83	0.42
1:A:395:LYS:O	1:A:399:MET:HG3	2.19	0.42
1:D:297:ARG:HG2	1:D:598:LEU:O	2.18	0.42
1:D:570:ALA:O	1:D:574:GLN:HG2	2.19	0.42
1:C:433:LYS:HB2	1:C:433:LYS:HE3	1.45	0.42
1:D:112:ARG:O	1:D:116:VAL:HG23	2.19	0.42
1:B:357:ASP:HB3	1:B:362:TYR:CE2	2.54	0.42
1:C:150:LEU:HD11	1:C:200:LEU:HD13	2.02	0.42
1:C:329:ALA:HA	1:C:332:TYR:CE1	2.55	0.42
1:C:185:PRO:HB2	1:C:188:GLN:HG3	2.01	0.42
1:D:234:ILE:HD12	1:D:234:ILE:HA	1.66	0.42
1:B:408:ALA:HB3	1:B:416:ILE:HG12	2.01	0.41
1:D:449:TYR:OH	1:D:501:ASP:OD2	2.29	0.41
1:A:408:ALA:HB3	1:A:416:ILE:HG12	2.02	0.41
1:C:101:SER:OG	1:C:112:ARG:HG2	2.20	0.41
1:A:590:ILE:HD13	1:A:590:ILE:HA	1.72	0.41
1:A:442:TYR:HE1	1:A:444:PRO:HB3	1.84	0.41
1:C:107:GLU:HA	1:C:138:TYR:OH	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:382:LEU:HB3	1:C:383:PRO:HD2	2.01	0.41
1:D:382:LEU:HD23	1:D:382:LEU:HA	1.91	0.41
1:A:498:LEU:HD23	1:A:498:LEU:HA	1.93	0.41
1:C:487:ARG:HD2	1:C:487:ARG:HA	1.82	0.41
1:D:108:ASN:O	1:D:112:ARG:HG3	2.21	0.41
1:A:260:ARG:CZ	1:A:602:ILE:HD12	2.51	0.41
1:C:382:LEU:HD23	1:C:382:LEU:HA	1.85	0.41
1:A:81:SER:O	1:A:85:GLU:HG3	2.21	0.41
1:A:317:PHE:HB2	1:A:362:TYR:CZ	2.55	0.41
1:C:367:GLU:HG3	1:C:367:GLU:H	1.64	0.40
1:D:324:GLU:HG2	1:D:590:ILE:HG13	2.02	0.40
1:D:388:GLU:O	1:D:389:ASN:C	2.60	0.40
1:A:460:ARG:CZ	1:A:484:TYR:HB3	2.51	0.40
1:B:108:ASN:O	1:B:112:ARG:HG3	2.21	0.40
1:D:256:ARG:HG3	4:D:841:HOH:O	2.21	0.40
1:D:433:LYS:HD2	1:D:452:ASN:CG	2.42	0.40
1:D:557:ASN:OD1	1:D:557:ASN:N	2.48	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	507/554 (92%)	494 (97%)	12 (2%)	1 (0%)	44	51
1	B	518/554 (94%)	497 (96%)	21 (4%)	0	100	100
1	C	506/554 (91%)	488 (96%)	16 (3%)	2 (0%)	30	33
1	D	506/554 (91%)	487 (96%)	18 (4%)	1 (0%)	44	51
All	All	2037/2216 (92%)	1966 (96%)	67 (3%)	4 (0%)	44	51

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	363	GLY
1	C	318	ALA
1	A	361	THR
1	C	384	ASN

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	408/487 (84%)	400 (98%)	8 (2%)	50	63
1	B	427/487 (88%)	419 (98%)	8 (2%)	52	65
1	C	407/487 (84%)	399 (98%)	8 (2%)	50	63
1	D	405/487 (83%)	396 (98%)	9 (2%)	47	59
All	All	1647/1948 (84%)	1614 (98%)	33 (2%)	50	63

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	212	ASN
1	C	230	GLN
1	C	271	SER
1	C	298	LEU
1	C	362	TYR
1	C	364	THR
1	C	385	SER
1	C	476	ASP
1	D	234	ILE
1	D	271	SER
1	D	297	ARG
1	D	416	ILE
1	D	426	HIS
1	D	539	ASP
1	D	544	ARG
1	D	557	ASN
1	D	593	LEU
1	A	101	SER

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Mol	Chain	Res	Type
1	A	114	VAL
1	A	212	ASN
1	A	271	SER
1	A	464	LEU
1	A	534	LEU
1	A	544	ARG
1	A	592	ASP
1	B	105	CYS
1	B	271	SER
1	B	353	THR
1	B	464	LEU
1	B	477	ASN
1	B	528	SER
1	B	534	LEU
1	B	588	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	574	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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 13 are monoatomic - leaving 5 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	$\#|Z| > 2$
2	EDO	D	701	-	3,3,3	0.74	0	2,2,2	0.41	0
2	EDO	B	702	-	3,3,3	0.78	0	2,2,2	0.66	0
2	EDO	A	701	-	3,3,3	0.88	0	2,2,2	0.34	0
2	EDO	C	701	-	3,3,3	0.84	0	2,2,2	0.25	0
2	EDO	B	701	-	3,3,3	0.83	0	2,2,2	0.14	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	D	701	-	-	1/1/1/1	-
2	EDO	B	702	-	-	0/1/1/1	-
2	EDO	A	701	-	-	0/1/1/1	-
2	EDO	C	701	-	-	1/1/1/1	-
2	EDO	B	701	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	701	EDO	O1-C1-C2-O2
2	C	701	EDO	O1-C1-C2-O2
2	B	701	EDO	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	701	EDO	5	0

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 ⓘ

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(Å²)	Q<0.9
1	A	513/554 (92%)	-0.01	25 (4%)	36	33	27, 47, 77, 95	0
1	B	522/554 (94%)	-0.14	13 (2%)	58	56	27, 44, 69, 92	0
1	C	512/554 (92%)	0.12	21 (4%)	42	39	28, 51, 81, 97	0
1	D	512/554 (92%)	0.13	27 (5%)	33	30	31, 49, 79, 99	0
All	All	2059/2216 (92%)	0.02	86 (4%)	41	38	27, 48, 78, 99	0

All (86) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	105	CYS	4.6
1	C	105	CYS	4.2
1	D	604	LEU	3.8
1	D	178	ASN	3.8
1	D	101	SER	3.7
1	D	589	ASP	3.7
1	B	179	ASP	3.5
1	C	362	TYR	3.5
1	B	317	PHE	3.4
1	C	320	HIS	3.4
1	A	527	GLY	3.4
1	D	384	ASN	3.3
1	C	317	PHE	3.3
1	C	315	VAL	3.3
1	A	178	ASN	3.3
1	D	320	HIS	3.2
1	A	316	ASP	3.1
1	A	528	SER	3.1
1	C	232	ASN	3.1
1	A	320	HIS	3.1
1	C	438	LEU	3.1

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Mol	Chain	Res	Type	RSRZ
1	D	234	ILE	3.1
1	B	385	SER	3.0
1	C	589	ASP	3.0
1	B	504	THR	2.9
1	C	179	ASP	2.8
1	C	387	PRO	2.8
1	B	519	SER	2.8
1	A	387	PRO	2.8
1	A	383	PRO	2.8
1	B	316	ASP	2.8
1	A	384	ASN	2.8
1	C	104	PHE	2.8
1	D	529	SER	2.7
1	B	505	PHE	2.7
1	B	365	ILE	2.6
1	A	529	SER	2.6
1	B	513	GLU	2.6
1	C	534	LEU	2.6
1	D	103	LYS	2.6
1	D	386	LEU	2.5
1	B	105	CYS	2.5
1	D	590	ILE	2.5
1	C	384	ASN	2.5
1	A	514	LEU	2.5
1	C	604	LEU	2.4
1	A	76	GLN	2.4
1	A	504	THR	2.4
1	A	534	LEU	2.4
1	A	232	ASN	2.4
1	A	179	ASP	2.4
1	D	76	GLN	2.4
1	C	318	ALA	2.4
1	D	179	ASP	2.4
1	C	233	ASN	2.4
1	A	231	ASN	2.4
1	D	580	ARG	2.3
1	D	231	ASN	2.3
1	D	533	ALA	2.3
1	C	365	ILE	2.3
1	A	521	TYR	2.3
1	A	386	LEU	2.3
1	A	513	GLU	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	383	PRO	2.3
1	D	526	PRO	2.3
1	A	105	CYS	2.3
1	D	104	PHE	2.3
1	B	233	ASN	2.2
1	D	232	ASN	2.2
1	A	365	ILE	2.2
1	B	178	ASN	2.2
1	B	384	ASN	2.2
1	C	385	SER	2.2
1	D	317	PHE	2.2
1	C	580	ARG	2.1
1	A	580	ARG	2.1
1	D	142	TYR	2.1
1	A	532	GLU	2.1
1	D	106	GLY	2.1
1	D	464	LEU	2.1
1	D	555	PRO	2.1
1	A	515	VAL	2.1
1	A	317	PHE	2.0
1	D	316	ASP	2.0
1	D	392	ILE	2.0
1	C	183	LEU	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides 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.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	CO	B	706	1/1	0.63	0.32	163,163,163,163	0
2	EDO	B	702	4/4	0.83	0.19	50,53,59,67	0
2	EDO	D	701	4/4	0.84	0.21	57,66,70,73	0
2	EDO	C	701	4/4	0.85	0.25	58,62,67,78	0
3	CO	D	703	1/1	0.87	0.12	100,100,100,100	0
2	EDO	B	701	4/4	0.89	0.17	41,42,52,61	0
3	CO	D	702	1/1	0.89	0.12	104,104,104,104	0
3	CO	C	704	1/1	0.90	0.14	127,127,127,127	0
3	CO	A	704	1/1	0.90	0.11	89,89,89,89	0
3	CO	B	705	1/1	0.90	0.09	112,112,112,112	0
2	EDO	A	701	4/4	0.90	0.16	52,56,62,69	0
3	CO	B	704	1/1	0.91	0.10	80,80,80,80	0
3	CO	C	702	1/1	0.92	0.08	85,85,85,85	0
3	CO	D	704	1/1	0.92	0.09	90,90,90,90	0
3	CO	A	703	1/1	0.93	0.10	95,95,95,95	0
3	CO	A	702	1/1	0.94	0.07	82,82,82,82	0
3	CO	C	703	1/1	0.95	0.08	84,84,84,84	0
3	CO	B	703	1/1	0.98	0.05	73,73,73,73	0

6.5 Other polymers (i)

There are no such residues in this entry.