



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 12, 2024 – 05:23 AM EST

PDB ID : 3GL0
Title : Crystal structure of dicamba monooxygenase bound to 3,6 dichlorosalicylic acid (DCSA)
Authors : Wilson, M.A.; Dumitru, R.; Jiang, W.Z.; Weeks, D.P.
Deposited on : 2009-03-11
Resolution : 1.75 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

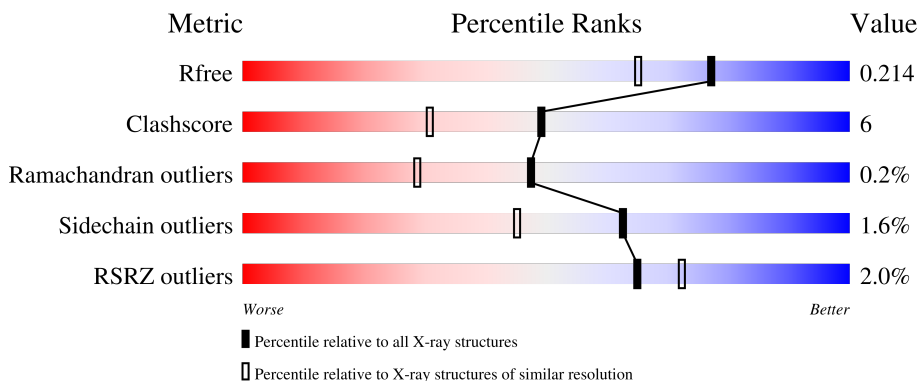
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.75 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}	130704	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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	349	 88% 9% .
1	B	349	 2% 83% 11% . .
1	C	349	 4% 83% 7% 10%

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	HXX	B	700	-	-	X	-
6	EDO	B	352	-	-	X	-

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 8678 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 DdmC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	340	Total 2642	C 1664	N 475	O 490	S 13	0	1	0
1	B	334	Total 2590	C 1634	N 463	O 480	S 13	0	0	0
1	C	315	Total 2440	C 1545	N 428	O 454	S 13	0	1	0

There are 33 discrepancies between the modelled and reference sequences:

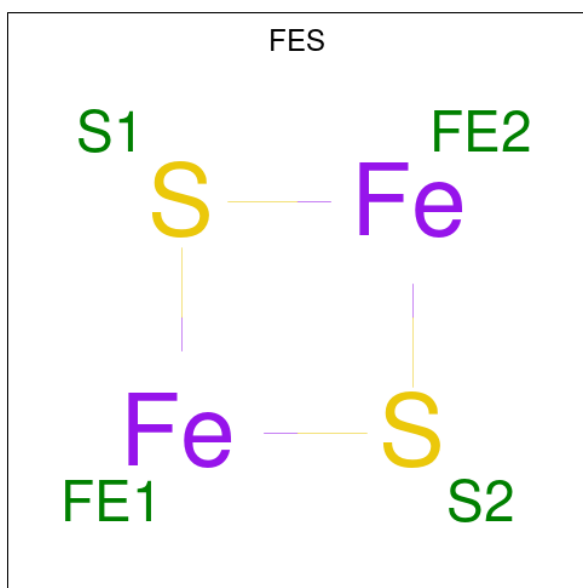
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	insertion	UNP Q5S3I3
A	2	ALA	-	insertion	UNP Q5S3I3
A	341	ARG	-	insertion	UNP Q5S3I3
A	342	LEU	-	expression tag	UNP Q5S3I3
A	343	GLU	-	expression tag	UNP Q5S3I3
A	344	HIS	-	expression tag	UNP Q5S3I3
A	345	HIS	-	expression tag	UNP Q5S3I3
A	346	HIS	-	expression tag	UNP Q5S3I3
A	347	HIS	-	expression tag	UNP Q5S3I3
A	348	HIS	-	expression tag	UNP Q5S3I3
A	349	HIS	-	expression tag	UNP Q5S3I3
B	1	MET	-	insertion	UNP Q5S3I3
B	2	ALA	-	insertion	UNP Q5S3I3
B	341	ARG	-	insertion	UNP Q5S3I3
B	342	LEU	-	expression tag	UNP Q5S3I3
B	343	GLU	-	expression tag	UNP Q5S3I3
B	344	HIS	-	expression tag	UNP Q5S3I3
B	345	HIS	-	expression tag	UNP Q5S3I3
B	346	HIS	-	expression tag	UNP Q5S3I3
B	347	HIS	-	expression tag	UNP Q5S3I3
B	348	HIS	-	expression tag	UNP Q5S3I3
B	349	HIS	-	expression tag	UNP Q5S3I3
C	1	MET	-	insertion	UNP Q5S3I3

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Chain	Residue	Modelled	Actual	Comment	Reference
C	2	ALA	-	insertion	UNP Q5S3I3
C	341	ARG	-	insertion	UNP Q5S3I3
C	342	LEU	-	expression tag	UNP Q5S3I3
C	343	GLU	-	expression tag	UNP Q5S3I3
C	344	HIS	-	expression tag	UNP Q5S3I3
C	345	HIS	-	expression tag	UNP Q5S3I3
C	346	HIS	-	expression tag	UNP Q5S3I3
C	347	HIS	-	expression tag	UNP Q5S3I3
C	348	HIS	-	expression tag	UNP Q5S3I3
C	349	HIS	-	expression tag	UNP Q5S3I3

- Molecule 2 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



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

- Molecule 3 is FE (III) ION (three-letter code: FE) (formula: Fe).

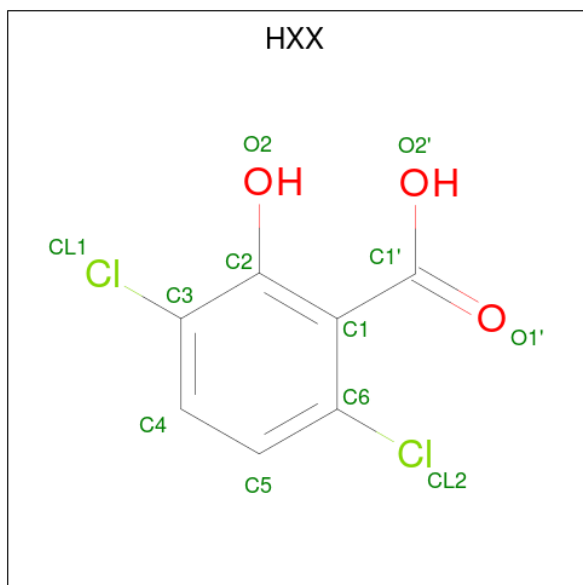
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Fe 1 1	0	0

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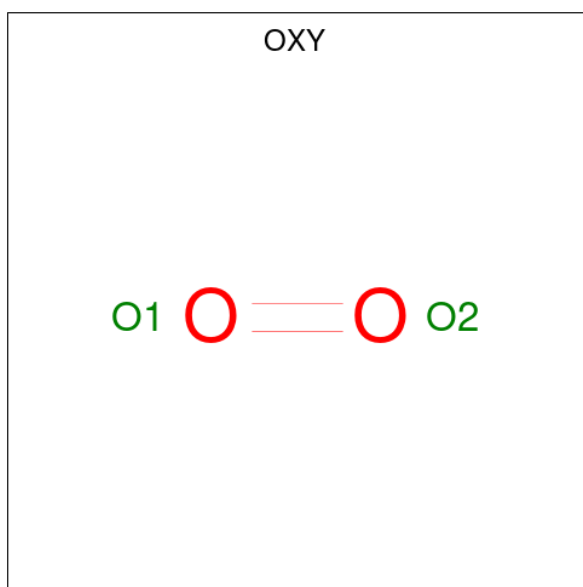
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Fe 1 1	0	0

- Molecule 4 is 3,6-dichloro-2-hydroxybenzoic acid (three-letter code: HXX) (formula: $C_7H_4Cl_2O_3$).



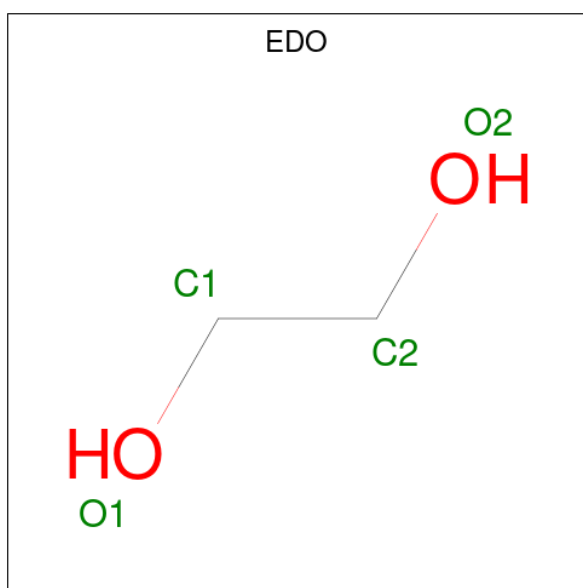
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C Cl O 12 7 2 3	0	0
4	B	1	Total C Cl O 12 7 2 3	0	0

- Molecule 5 is OXYGEN MOLECULE (three-letter code: OXY) (formula: O_2).



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

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



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

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

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	357	Total O 357 357	0	0
7	B	268	Total O 268 268	0	0
7	C	299	Total O 299 299	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	81.20Å 81.20Å 158.56Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	42.25 – 1.75 42.25 – 1.75	Depositor EDS
% Data completeness (in resolution range)	99.5 (42.25-1.75) 99.5 (42.25-1.75)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.84 (at 1.75Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.168 , 0.206 0.173 , 0.214	Depositor DCC
R_{free} test set	5898 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	26.5	Xtrriage
Anisotropy	0.100	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 43.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.002 for -h,-k,l 0.033 for h,-h-k,-l 0.016 for -k,-h,-l	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	8678	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.27% 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: HXX, FES, FE, EDO, OXY

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	0.57	1/2707 (0.0%)	0.63	1/3686 (0.0%)
1	B	0.56	0/2654	0.60	1/3612 (0.0%)
1	C	0.56	0/2502	0.61	0/3405
All	All	0.56	1/7863 (0.0%)	0.61	2/10703 (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	1
1	B	0	1
1	C	0	1
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	89	GLY	C-O	9.84	1.39	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	317	MET	CG-SD-CE	6.01	109.82	100.20
1	B	317	MET	CG-SD-CE	5.02	108.24	100.20

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	340	ALA	Peptide
1	B	175	ASP	Peptide
1	C	339	ALA	Peptide

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	2642	0	2573	20	1
1	B	2590	0	2521	47	0
1	C	2440	0	2386	21	0
2	A	4	0	0	1	0
2	B	4	0	0	0	0
2	C	4	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	12	0	3	1	0
4	B	12	0	3	5	0
5	A	2	0	0	0	0
5	B	2	0	0	0	0
6	A	12	0	18	2	0
6	B	16	0	24	10	0
6	C	12	0	18	2	0
7	A	357	0	0	6	1
7	B	268	0	0	5	2
7	C	299	0	0	7	0
All	All	8678	0	7546	90	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 6.

All (90) 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:192:MET:SD	6:B:352:EDO:H11	2.04	0.97
1:A:341:ARG:HD2	1:A:341:ARG:C	1.91	0.91
1:C:136:ARG:HB2	1:C:273:ILE:HG23	1.62	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:A:892:HOH:O	1:B:297:VAL:HG22	1.82	0.80
1:A:341:ARG:C	1:A:341:ARG:CD	2.51	0.79
1:B:321:ASP:OD1	7:B:676:HOH:O	2.04	0.74
7:A:713:HOH:O	1:B:174:PHE:CD2	2.40	0.74
1:A:177:LEU:HD11	1:A:192:MET:HB3	1.76	0.68
1:A:252:ILE:HG23	6:A:350:EDO:H12	1.78	0.66
1:B:190:ALA:HB3	6:B:352:EDO:H21	1.80	0.64
7:A:892:HOH:O	1:B:297:VAL:CG2	2.40	0.64
1:B:202:LEU:CD2	4:B:700:HXX:H4	2.28	0.64
1:B:183:VAL:HG13	1:B:188:ILE:HG12	1.84	0.60
1:C:52:ARG:HD3	7:C:496:HOH:O	2.02	0.60
1:B:330:GLU:OE2	1:B:333:LYS:NZ	2.26	0.59
1:B:202:LEU:HD21	4:B:700:HXX:C4	2.33	0.59
1:C:158:LEU:C	7:C:799:HOH:O	2.41	0.59
1:B:218:ASN:O	6:B:352:EDO:O2	2.21	0.59
1:A:177:LEU:CD1	1:A:192:MET:HB3	2.33	0.58
1:B:177:LEU:HD11	1:B:192:MET:HB3	1.85	0.58
1:B:220:ILE:HG22	6:B:352:EDO:H22	1.84	0.58
1:B:5:VAL:HG23	1:B:335:GLU:HG2	1.87	0.57
1:B:202:LEU:HD21	4:B:700:HXX:H4	1.86	0.57
1:A:295:LYS:NZ	7:A:578:HOH:O	2.36	0.57
1:C:152:VAL:HG23	1:C:253:LEU:HD12	1.86	0.57
1:B:162:GLN:CG	1:B:174:PHE:CD1	2.90	0.55
1:A:80[A]:GLN:O	1:A:82:VAL:HG13	2.07	0.54
1:B:162:GLN:HG3	1:B:174:PHE:CD1	2.43	0.54
1:C:295:LYS:HE2	7:C:419:HOH:O	2.08	0.54
6:A:350:EDO:H22	7:A:551:HOH:O	2.08	0.53
1:C:158:LEU:HD22	7:C:550:HOH:O	2.09	0.53
1:B:190:ALA:CB	6:B:352:EDO:H21	2.39	0.53
1:A:235:ALA:HB1	1:A:239:THR:OG1	2.10	0.52
1:B:176:ARG:NH2	1:B:195:PRO:O	2.43	0.52
1:B:173:ALA:HB3	1:B:194:ILE:HG22	1.90	0.52
1:C:315:PRO:HB2	1:C:317:MET:HE1	1.91	0.52
1:B:192:MET:CG	6:B:352:EDO:H11	2.40	0.51
1:C:315:PRO:HB2	1:C:317:MET:CE	2.40	0.51
1:B:202:LEU:HD23	4:B:700:HXX:H4	1.92	0.51
1:B:190:ALA:HB2	1:B:323:ALA:CB	2.40	0.51
1:C:151:LEU:CB	1:C:253:LEU:HD11	2.41	0.51
1:B:190:ALA:O	6:B:352:EDO:H21	2.10	0.51
1:C:158:LEU:HD23	1:C:218:ASN:HD21	1.77	0.50
1:A:224:LYS:HD2	7:A:465:HOH:O	2.10	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:274:ASP:HB2	7:B:810:HOH:O	2.10	0.50
1:C:338:GLU:O	1:C:340:ALA:N	2.45	0.50
1:C:151:LEU:HB2	1:C:253:LEU:HD11	1.94	0.49
1:A:333:LYS:O	1:A:337:LEU:HD13	2.13	0.49
1:C:151:LEU:HB2	1:C:253:LEU:CD1	2.42	0.49
1:B:214:VAL:HB	1:B:235:ALA:O	2.13	0.49
1:C:217:TRP:CD1	1:C:241:LYS:HE3	2.48	0.49
1:B:137:THR:HA	1:B:267:SER:O	2.13	0.48
1:A:282:LEU:HD12	4:A:600:HXX:CL2	2.50	0.48
1:B:240:PRO:HB2	1:B:243:GLN:HG3	1.96	0.48
1:B:202:LEU:CD2	4:B:700:HXX:C4	2.91	0.48
1:A:137:THR:HA	1:A:267:SER:O	2.13	0.47
1:B:220:ILE:HG22	6:B:352:EDO:C2	2.45	0.46
1:B:172:ASP:HB2	7:B:464:HOH:O	2.14	0.46
1:C:152:VAL:CG2	1:C:253:LEU:HD12	2.45	0.46
1:B:341:ARG:HG3	1:B:341:ARG:NH1	2.30	0.46
1:C:2:ALA:HB1	1:C:4:PHE:CE2	2.51	0.46
1:C:52:ARG:CD	7:C:496:HOH:O	2.62	0.46
1:B:162:GLN:HG2	1:B:174:PHE:CD1	2.51	0.46
1:B:340:ALA:HA	1:B:341:ARG:HA	1.74	0.46
1:A:240:PRO:HG2	1:A:243:GLN:CD	2.35	0.46
1:C:158:LEU:CD2	1:C:218:ASN:HD21	2.28	0.46
1:A:294:ASP:O	1:A:298:VAL:HG22	2.16	0.45
1:B:162:GLN:HG3	1:B:174:PHE:CG	2.51	0.45
1:B:162:GLN:OE1	1:B:170:GLN:HA	2.15	0.45
1:B:314:ARG:HD3	7:B:813:HOH:O	2.17	0.44
1:B:333:LYS:O	1:B:337:LEU:HB2	2.17	0.43
1:B:341:ARG:HG3	1:B:341:ARG:HH11	1.83	0.43
1:B:315:PRO:HB2	1:B:317:MET:CE	2.48	0.43
1:A:71:HIS:HB2	2:A:500:FES:S1	2.59	0.42
1:B:206:PHE:O	7:B:803:HOH:O	2.21	0.42
1:B:5:VAL:CG2	1:B:335:GLU:HG2	2.50	0.42
1:B:252:ILE:HG23	6:B:350:EDO:H12	2.02	0.41
1:B:245:ILE:O	1:B:245:ILE:HG13	2.19	0.41
1:A:75:PHE:HA	1:A:80[B]:GLN:O	2.20	0.41
1:B:192:MET:HG3	6:B:352:EDO:H11	2.03	0.41
1:C:198:THR:HG22	1:C:199:PRO:O	2.19	0.41
1:A:325:VAL:O	1:A:329:ARG:HG3	2.20	0.41
1:C:158:LEU:HA	7:C:365:HOH:O	2.20	0.41
1:C:252:ILE:HG23	6:C:352:EDO:H12	2.02	0.41
6:C:352:EDO:H22	7:C:482:HOH:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:198:THR:HG23	1:A:199:PRO:HD2	2.02	0.41
1:A:333:LYS:HE3	1:A:333:LYS:HB3	1.89	0.40
1:A:12:ALA:CB	1:A:111:ILE:HD12	2.51	0.40
1:B:166:ARG:O	1:B:170:GLN:HB2	2.21	0.40
1:B:191:LEU:N	1:B:191:LEU:CD1	2.85	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)
1:A:207:LEU:O	7:B:898:HOH:O[3_455]	1.36	0.84
7:A:854:HOH:O	7:B:898:HOH:O[3_455]	2.01	0.19

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	339/349 (97%)	327 (96%)	12 (4%)	0	100	100
1	B	330/349 (95%)	315 (96%)	14 (4%)	1 (0%)	41	22
1	C	310/349 (89%)	297 (96%)	12 (4%)	1 (0%)	41	22
All	All	979/1047 (94%)	939 (96%)	38 (4%)	2 (0%)	47	29

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	339	ALA
1	B	177	LEU

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	276/284 (97%)	273 (99%)	3 (1%)	73	60
1	B	271/284 (95%)	266 (98%)	5 (2%)	59	40
1	C	258/284 (91%)	253 (98%)	5 (2%)	57	37
All	All	805/852 (94%)	792 (98%)	13 (2%)	62	45

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

Mol	Chain	Res	Type
1	A	70	TYR
1	A	171	THR
1	A	341	ARG
1	B	70	TYR
1	B	111	ILE
1	B	162	GLN
1	B	175	ASP
1	B	337	LEU
1	C	3	THR
1	C	70	TYR
1	C	194	ILE
1	C	263	TYR
1	C	337	LEU

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	288	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 2 are monoatomic - leaving 17 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	FES	C	500	1	0,4,4	-	-	-		
6	EDO	B	353	-	3,3,3	0.59	0	2,2,2	0.09	0
6	EDO	C	350	-	3,3,3	0.41	0	2,2,2	0.42	0
2	FES	A	500	1	0,4,4	-	-	-		
6	EDO	C	351	-	3,3,3	0.35	0	2,2,2	0.28	0
6	EDO	A	351	-	3,3,3	0.52	0	2,2,2	0.14	0
4	HXX	A	600	-	12,12,12	1.19	2 (16%)	17,17,17	0.81	0
2	FES	B	500	1	0,4,4	-	-	-		
5	OXY	A	700	3	1,1,1	0.01	0	-		
6	EDO	A	350	-	3,3,3	0.45	0	2,2,2	0.15	0
6	EDO	B	351	-	3,3,3	0.45	0	2,2,2	0.27	0
6	EDO	C	352	-	3,3,3	0.45	0	2,2,2	0.85	0
6	EDO	B	350	-	3,3,3	0.61	0	2,2,2	0.51	0
6	EDO	B	352	-	3,3,3	0.36	0	2,2,2	0.43	0
6	EDO	A	352	-	3,3,3	0.41	0	2,2,2	0.43	0
4	HXX	B	700	-	12,12,12	1.32	3 (25%)	17,17,17	0.77	0
5	OXY	B	600	3	1,1,1	0.05	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	FES	C	500	1	-	-	0/1/1/1
6	EDO	B	353	-	-	0/1/1/1	-
6	EDO	C	350	-	-	1/1/1/1	-
2	FES	A	500	1	-	-	0/1/1/1
6	EDO	C	351	-	-	0/1/1/1	-
6	EDO	A	351	-	-	0/1/1/1	-
4	HXX	A	600	-	-	0/4/4/4	0/1/1/1
6	EDO	B	351	-	-	0/1/1/1	-
2	FES	B	500	1	-	-	0/1/1/1
6	EDO	A	350	-	-	0/1/1/1	-
6	EDO	C	352	-	-	0/1/1/1	-
6	EDO	B	350	-	-	0/1/1/1	-
6	EDO	B	352	-	-	1/1/1/1	-
6	EDO	A	352	-	-	1/1/1/1	-
4	HXX	B	700	-	-	0/4/4/4	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	700	HXX	C6-CL2	2.64	1.79	1.73
4	A	600	HXX	C1-C2	-2.16	1.37	1.41
4	A	600	HXX	C6-CL2	2.10	1.78	1.73
4	B	700	HXX	C3-CL1	2.02	1.78	1.73
4	B	700	HXX	C1-C2	-2.01	1.37	1.41

There are no bond angle outliers.

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	352	EDO	O1-C1-C2-O2
6	C	350	EDO	O1-C1-C2-O2
6	A	352	EDO	O1-C1-C2-O2

There are no ring outliers.

7 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	500	FES	1	0
4	A	600	HXX	1	0
6	A	350	EDO	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	C	352	EDO	2	0
6	B	350	EDO	1	0
6	B	352	EDO	9	0
4	B	700	HXX	5	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	340/349 (97%)	-0.36	1 (0%) 94 95	20, 30, 54, 87	0
1	B	334/349 (95%)	-0.00	6 (1%) 68 76	18, 34, 75, 98	0
1	C	315/349 (90%)	-0.27	13 (4%) 37 44	19, 29, 64, 89	0
All	All	989/1047 (94%)	-0.21	20 (2%) 65 72	18, 31, 67, 98	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	158	LEU	6.6
1	C	198	THR	4.9
1	C	2	ALA	4.7
1	C	197	GLY	3.3
1	B	274	ASP	3.3
1	B	339	ALA	3.3
1	B	273	ILE	3.2
1	B	2	ALA	2.9
1	C	207	LEU	2.8
1	A	2	ALA	2.7
1	C	340	ALA	2.7
1	C	215	ASP	2.6
1	C	179	ARG	2.4
1	B	194	ILE	2.4
1	C	194	ILE	2.3
1	C	337	LEU	2.2
1	C	201	VAL	2.1
1	B	271	PHE	2.1
1	C	239	THR	2.1
1	C	238	GLY	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 monosaccharides 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(Å ²)	Q<0.9
4	HXX	B	700	12/12	0.84	0.11	34,48,55,56	0
6	EDO	C	350	4/4	0.90	0.14	47,53,55,57	0
6	EDO	B	353	4/4	0.91	0.14	28,32,36,40	0
4	HXX	A	600	12/12	0.93	0.10	24,31,40,45	0
6	EDO	B	352	4/4	0.94	0.22	31,32,47,47	0
6	EDO	B	351	4/4	0.96	0.11	34,39,42,43	0
6	EDO	C	352	4/4	0.96	0.22	18,29,32,33	0
5	OXY	B	600	2/2	0.97	0.13	33,33,33,45	0
5	OXY	A	700	2/2	0.98	0.09	24,24,24,35	0
6	EDO	A	350	4/4	0.98	0.06	22,25,31,32	0
6	EDO	A	351	4/4	0.98	0.07	27,29,29,32	0
6	EDO	A	352	4/4	0.98	0.07	30,37,37,39	0
6	EDO	C	351	4/4	0.98	0.13	34,35,35,40	0
6	EDO	B	350	4/4	0.98	0.08	21,23,24,26	0
3	FE	B	501	1/1	0.99	0.09	32,32,32,32	0
3	FE	A	501	1/1	1.00	0.06	21,21,21,21	0
2	FES	A	500	4/4	1.00	0.06	27,28,28,30	0
2	FES	B	500	4/4	1.00	0.09	19,21,21,22	0
2	FES	C	500	4/4	1.00	0.09	21,22,22,23	0

6.5 Other polymers [i](#)

There are no such residues in this entry.