Full wwPDB X-ray Structure Validation Report (i)

Aug 18, 2026 – 10:58 am BST

PDB ID	:	5M8X / pdb_00005m8x
Title	:	PCE reductive dehalogenase from S. multivorans in complex with 2,4,5-trichl orophenol
Authors	:	Kunze, C.; Bommer, M.; Hagen, W.R.; Uksa, M.; Dobbek, H.; Schubert, T.; Diekert, G.
Deposited on	:	2016-10-30
Resolution	:	1.87 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 (i) 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 (i)) were used in the production of this report:

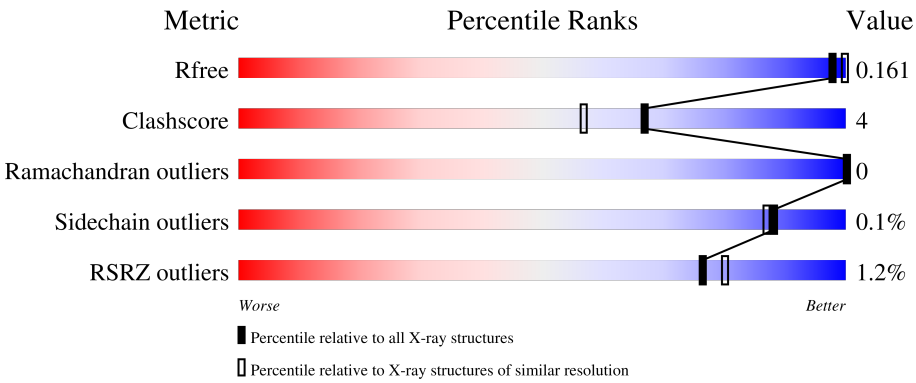
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal 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 (i)

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

The reported resolution of this entry is 1.87 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	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

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	464	2% 89% 7% •
1	B	464	% 87% • 9%

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
3	BVQ	A	503	X	-	-	-
3	BVQ	B	503	X	-	-	-

2 Entry composition (i)

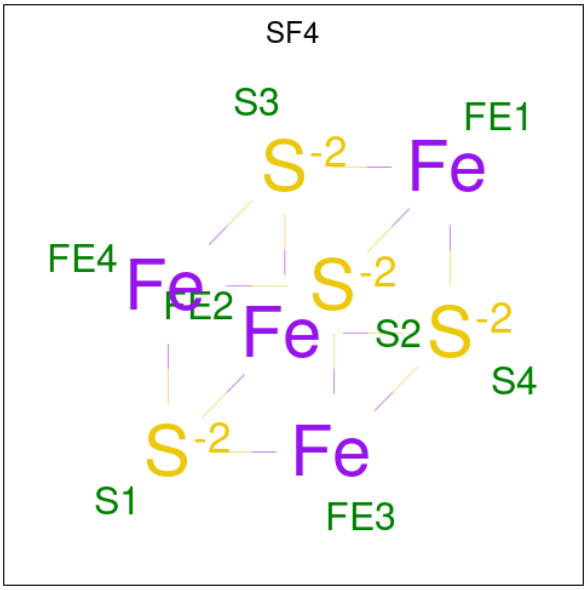
There are 7 unique types of molecules in this entry. The entry contains 7964 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Tetrachloroethene reductive dehalogenase catalytic subunit PceA.

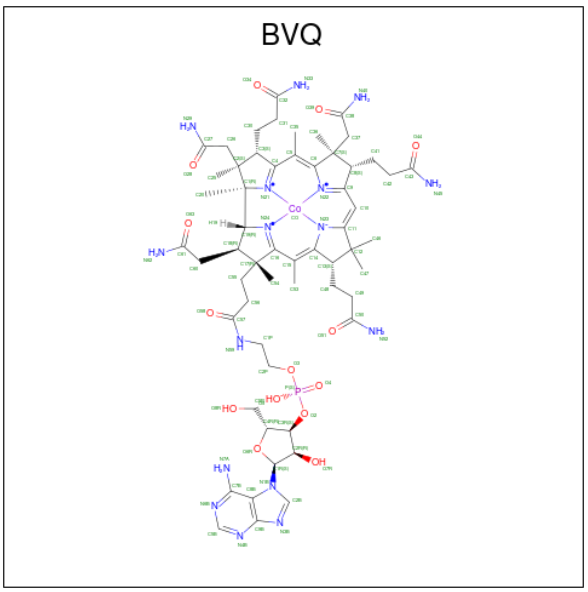
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	449	3619	2295	621	670	33	0	8	0
1	B	420	3320	2104	567	619	30	0	2	0

- Molecule 2 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe_4S_4).



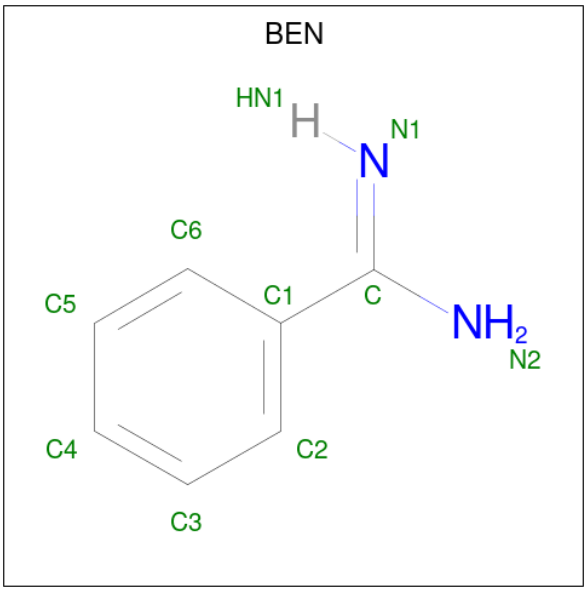
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Fe	S		
2	A	1	8	4	4	0	0
2	A	1	8	4	4	0	0
2	B	1	8	4	4	0	0
2	B	1	8	4	4	0	0

- Molecule 3 is NORPSEUDO-B12 (CCD ID: BVQ) (formula: $C_{57}H_{82}CoN_{16}O_{14}P$).



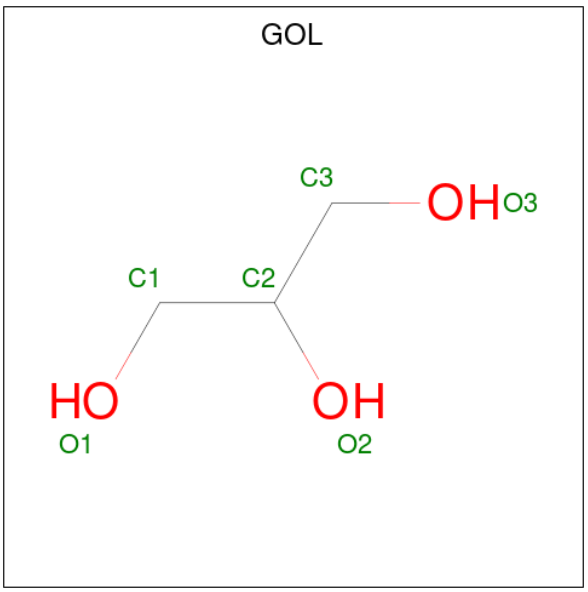
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	Co	N	O	P		
3	A	1	89	57	1	16	14	1	0	0
			Total	C	Co	N	O	P		
3	B	1	89	57	1	16	14	1	0	0

- Molecule 4 is BENZAMIDINE (CCD ID: BEN) (formula: $C_7H_8N_2$).



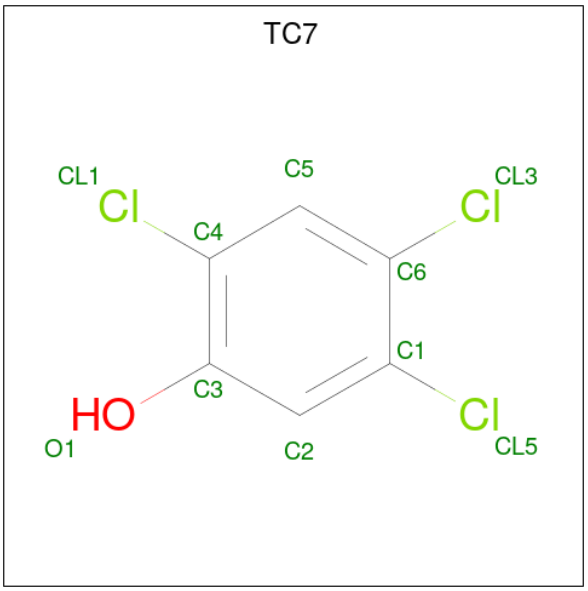
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	N		
4	A	1	9	7	2	0	0

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	A	1	Total	C	O		0	0
			6	3	3			
5	B	1	Total	C	O		0	0
			6	3	3			

- Molecule 6 is 2,4,5-trichlorophenol (CCD ID: TC7) (formula: $C_6H_3Cl_3O$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	Cl	O		
6	A	1	10	6	3	1	0	0
			Total	C	Cl	O		
6	B	1	10	6	3	1	0	0

- Molecule 7 is water.

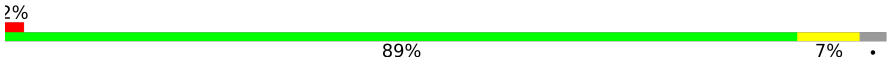
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	393	393	393	0	0
			Total	O		
7	B	339	339	339	0	0

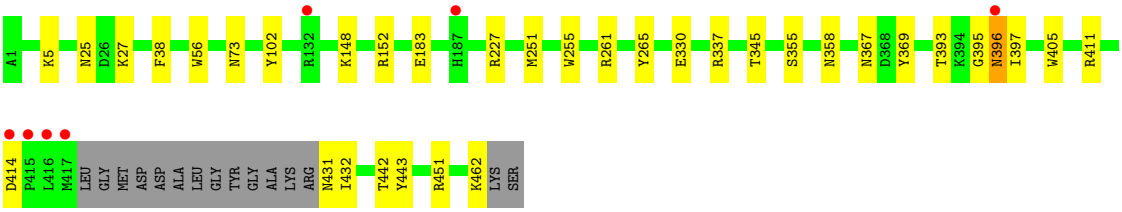
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: Tetrachloroethene reductive dehalogenase catalytic subunit PceA

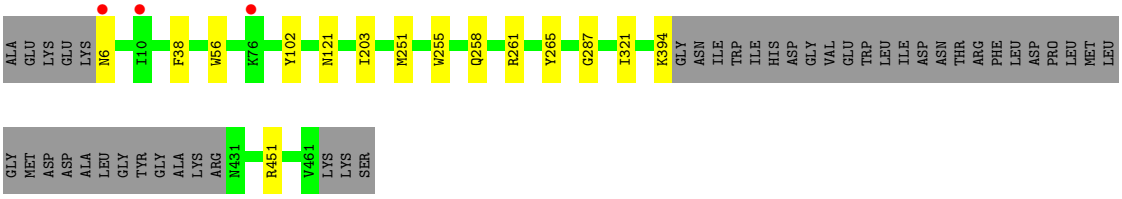
Chain A:





• Molecule 1: Tetrachloroethene reductive dehalogenase catalytic subunit PceA

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α, β, γ	73.77Å 73.77Å 185.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.31 – 1.87 47.31 – 1.87	Depositor EDS
% Data completeness (in resolution range)	96.2 (47.31-1.87) 96.5 (47.31-1.87)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.22 (at 1.87Å)	Xtriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, R_{free}	0.128 , 0.159 0.130 , 0.161	Depositor DCC
R_{free} test set	3930 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	25.4	Xtriage
Anisotropy	0.172	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 51.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.042 for h,-k,-l	Xtriage
F_o,F_c correlation	0.98	EDS
Total number of atoms	7964	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.10% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: SF4, BVQ, GOL, BEN, TC7

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	0.35	0/3710	0.55	0/5032
1	B	0.32	0/3404	0.52	0/4621
All	All	0.34	0/7114	0.53	0/9653

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	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	395	GLY	Peptide
1	A	396	ASN	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	3619	0	3511	33	0
1	B	3320	0	3212	14	0
2	A	16	0	0	0	0
2	B	16	0	0	0	0
3	A	89	0	82	7	0
3	B	89	0	82	4	0
4	A	9	0	7	0	0
5	A	48	0	64	0	0
5	B	6	0	8	0	0
6	A	10	0	2	3	0
6	B	10	0	2	3	0
7	A	393	0	0	4	1
7	B	339	0	0	3	1
All	All	7964	0	6970	52	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 4.

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:337:ARG:NH1	7:A:602:HOH:O	2.16	0.77
1:B:6:ASN:N	7:B:602:HOH:O	2.22	0.72
3:B:503:BVQ:H35	3:B:503:BVQ:H36A	1.71	0.72
1:A:337:ARG:NH1	1:A:414:ASP:OD2	2.24	0.70
3:A:503:BVQ:H35	3:A:503:BVQ:H36A	1.74	0.70
1:B:121:ASN:HD22	1:B:258:GLN:HE21	1.38	0.70
1:A:251[B]:MET:SD	1:B:251:MET:HG2	2.33	0.69
1:A:396:ASN:C	1:A:411:ARG:HH12	2.00	0.68
1:A:451:ARG:HH12	1:B:451:ARG:HH12	1.42	0.65
1:A:330[A]:GLU:OE1	7:A:601:HOH:O	2.15	0.64
1:A:451:ARG:HH12	1:B:451:ARG:NH1	1.94	0.64
3:A:503:BVQ:H53	3:A:503:BVQ:H55A	1.80	0.63
1:A:397:ILE:HA	1:A:411:ARG:NH1	2.13	0.62
1:B:394:LYS:NZ	7:B:604:HOH:O	2.32	0.61
1:A:451:ARG:NH1	1:B:451:ARG:HH12	2.00	0.58
1:A:56:TRP:HH2	6:A:513:TC7:CL3	2.23	0.57
3:B:503:BVQ:H55A	3:B:503:BVQ:H53	1.87	0.57
1:A:396:ASN:O	1:A:411:ARG:NH1	2.30	0.56
1:A:227:ARG:NH2	1:A:393:THR:O	2.39	0.55
1:A:25:ASN:OD1	1:A:27:LYS:HG2	2.08	0.54
1:A:227:ARG:NH1	7:A:605:HOH:O	2.38	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:183:GLU:H	1:A:183:GLU:CD	2.16	0.53
1:A:397:ILE:HA	1:A:411:ARG:HH12	1.74	0.53
1:A:462:LYS:N	1:A:462:LYS:HD2	2.25	0.52
1:B:102:TYR:HB3	6:B:505:TC7:C1	2.41	0.51
1:B:38:PHE:CD2	3:B:503:BVQ:H53A	2.47	0.49
1:B:56:TRP:HH2	6:B:505:TC7:CL3	2.31	0.49
1:A:38:PHE:CD2	3:A:503:BVQ:H53A	2.48	0.49
1:A:102:TYR:HB3	6:A:513:TC7:C1	2.44	0.48
1:A:355:SER:H	1:A:358:ASN:HD22	1.63	0.47
1:A:5:LYS:HA	1:A:405:TRP:CH2	2.50	0.47
1:A:411:ARG:HH11	1:A:411:ARG:HG3	1.79	0.47
1:A:396:ASN:C	1:A:411:ARG:NH1	2.71	0.47
1:A:431:ASN:ND2	7:A:608:HOH:O	2.47	0.46
3:A:503:BVQ:H49	3:A:503:BVQ:H47A	1.98	0.46
1:A:345:THR:H	1:A:367:ASN:ND2	2.14	0.46
1:A:442:THR:HG22	1:A:443:TYR:CD2	2.51	0.45
3:A:503:BVQ:H53	3:A:503:BVQ:C55	2.46	0.45
3:A:503:BVQ:H35	3:A:503:BVQ:C36	2.46	0.45
1:B:287:GLY:HA2	1:B:321:ILE:HD11	1.99	0.45
1:B:203:ILE:HD12	7:B:827:HOH:O	2.17	0.44
1:A:148:LYS:O	1:A:152:ARG:HG2	2.17	0.43
1:A:56:TRP:CH2	6:A:513:TC7:CL3	3.07	0.43
1:A:73:ASN:HB3	1:A:432:ILE:HD12	2.00	0.42
3:A:503:BVQ:H26A	3:A:503:BVQ:H19	1.86	0.42
1:A:337:ARG:NH2	1:A:414:ASP:OD2	2.52	0.42
1:B:261:ARG:HA	1:B:265:TYR:O	2.19	0.42
1:A:251[A]:MET:HG3	1:A:255:TRP:CE3	2.54	0.42
3:B:503:BVQ:H35	3:B:503:BVQ:C36	2.46	0.41
1:A:261:ARG:HA	1:A:265:TYR:O	2.19	0.41
1:B:56:TRP:CH2	6:B:505:TC7:CL3	3.11	0.41
1:A:367:ASN:HB2	1:A:369:TYR:CZ	2.55	0.41

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)
7:A:956:HOH:O	7:B:908:HOH:O[3_455]	2.14	0.06

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	453/464 (98%)	443 (98%)	10 (2%)	0	100	100
1	B	418/464 (90%)	409 (98%)	9 (2%)	0	100	100
All	All	871/928 (94%)	852 (98%)	19 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	387/389 (100%)	387 (100%)	0	100	100
1	B	355/389 (91%)	354 (100%)	1 (0%)	86	85
All	All	742/778 (95%)	741 (100%)	1 (0%)	88	87

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	255	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	184	GLN
1	A	358	ASN

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Mol	Chain	Res	Type
1	A	366	GLN
1	A	367	ASN
1	A	396	ASN
1	B	121	ASN
1	B	449	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)

18 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	$\#\|Z\| > 2$
5	GOL	A	511	-	5,5,5	0.40	0	5,5,5	0.22	0
5	GOL	A	507	-	5,5,5	0.31	0	5,5,5	0.36	0
4	BEN	A	504	-	9,9,9	1.20	1 (11%)	7,11,11	0.88	1 (14%)
5	GOL	B	504	-	5,5,5	0.34	0	5,5,5	0.48	0
5	GOL	A	509	-	5,5,5	0.36	0	5,5,5	0.31	0
2	SF4	B	502	1	0,12,12	-	-	-		
5	GOL	A	508	-	5,5,5	0.35	0	5,5,5	0.27	0
5	GOL	A	510	-	5,5,5	0.34	0	5,5,5	0.37	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	BVQ	A	503	7	91,99,99	0.97	4 (4%)	140,162,162	1.45	18 (12%)
2	SF4	A	502	1	0,12,12	-	-	-		
5	GOL	A	512	-	5,5,5	0.30	0	5,5,5	0.58	0
6	TC7	A	513	-	10,10,10	0.21	0	14,14,14	0.40	0
2	SF4	B	501	1	0,12,12	-	-	-		
6	TC7	B	505	-	10,10,10	0.20	0	14,14,14	0.39	0
2	SF4	A	501	1	0,12,12	-	-	-		
5	GOL	A	505	-	5,5,5	0.36	0	5,5,5	0.42	0
3	BVQ	B	503	7	91,99,99	0.99	5 (5%)	140,162,162	1.53	16 (11%)
5	GOL	A	506	-	5,5,5	0.28	0	5,5,5	0.48	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
5	GOL	A	511	-	-	2/4/4/4	-
5	GOL	A	507	-	-	0/4/4/4	-
4	BEN	A	504	-	-	4/4/4/4	0/1/1/1
5	GOL	B	504	-	-	4/4/4/4	-
5	GOL	A	509	-	-	4/4/4/4	-
2	SF4	B	502	1	-	-	0/6/5/5
5	GOL	A	508	-	-	0/4/4/4	-
5	GOL	A	510	-	-	2/4/4/4	-
3	BVQ	A	503	7	4/4/35/37	2/54/221/221	0/3/11/11
5	GOL	A	512	-	-	0/4/4/4	-
2	SF4	A	502	1	-	-	0/6/5/5
6	TC7	A	513	-	-	-	0/1/1/1
2	SF4	B	501	1	-	-	0/6/5/5
6	TC7	B	505	-	-	-	0/1/1/1
2	SF4	A	501	1	-	-	0/6/5/5
5	GOL	A	505	-	-	2/4/4/4	-
3	BVQ	B	503	7	3/3/35/37	2/54/221/221	0/3/11/11
5	GOL	A	506	-	-	0/4/4/4	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	503	BVQ	C14-N23	5.79	1.42	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	503	BVQ	C14-N23	5.68	1.42	1.35
3	B	503	BVQ	C13-C14	3.37	1.59	1.52
3	A	503	BVQ	C13-C14	3.31	1.58	1.52
4	A	504	BEN	C1-C	-3.28	1.41	1.47
3	B	503	BVQ	C2B-N1B	-2.91	1.32	1.37
3	A	503	BVQ	C2B-N1B	-2.65	1.32	1.37
3	A	503	BVQ	C2B-N3B	2.22	1.35	1.31
3	B	503	BVQ	C11-N23	-2.16	1.33	1.37
3	B	503	BVQ	C2B-N3B	2.15	1.35	1.31

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	503	BVQ	C8B-N1B-C1R	7.11	138.13	125.47
3	B	503	BVQ	C9B-C8B-N1B	6.94	110.31	105.65
3	A	503	BVQ	C9B-C8B-N1B	6.85	110.25	105.65
3	A	503	BVQ	C8B-N1B-C1R	5.91	135.98	125.47
3	B	503	BVQ	C8B-C9B-N3B	-4.66	105.88	110.40
3	A	503	BVQ	C8B-C9B-N3B	-4.53	106.00	110.40
3	B	503	BVQ	C9B-N3B-C2B	4.52	106.37	103.76
3	A	503	BVQ	C9B-N3B-C2B	4.42	106.31	103.76
3	B	503	BVQ	C1R-N1B-C2B	-4.04	118.02	127.14
3	B	503	BVQ	C48-C13-C14	3.82	118.01	108.49
3	B	503	BVQ	C8B-N1B-C2B	-3.56	103.46	105.41
3	A	503	BVQ	C8B-N1B-C2B	-3.50	103.50	105.41
3	A	503	BVQ	C48-C13-C14	3.33	116.79	108.49
3	B	503	BVQ	C13-C12-C11	3.16	104.54	100.97
3	A	503	BVQ	C1R-N1B-C2B	-3.16	120.01	127.14
3	B	503	BVQ	C12-C11-C10	-2.95	119.53	123.37
3	A	503	BVQ	C30-C3-C2	-2.85	113.06	119.09
3	A	503	BVQ	C12-C11-C10	-2.79	119.74	123.37
3	B	503	BVQ	C30-C3-C2	-2.72	113.34	119.09
3	A	503	BVQ	C5-C6-N22	-2.56	119.97	123.88
3	A	503	BVQ	C10-C9-N22	2.55	128.66	125.73
3	A	503	BVQ	C53-C15-C16	-2.55	116.00	120.38
3	B	503	BVQ	C35-C5-C4	-2.43	111.83	116.79
3	A	503	BVQ	C12-C11-N23	2.42	115.20	111.83
3	B	503	BVQ	C35-C5-C6	2.39	126.24	122.43
4	A	504	BEN	C1-C-N2	2.29	121.50	118.05
3	B	503	BVQ	C19-C1-N21	2.21	104.43	102.16
3	B	503	BVQ	C55-C17-C18	-2.19	106.92	111.15
3	A	503	BVQ	C15-C16-N24	-2.17	119.29	122.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	503	BVQ	C41-C8-C7	-2.15	108.21	114.14
3	A	503	BVQ	C36-C7-C8	-2.14	108.13	112.08
3	A	503	BVQ	C41-C8-C7	-2.11	108.32	114.14
3	B	503	BVQ	C8B-C9B-N4B	2.09	126.43	123.39
3	A	503	BVQ	C8B-C9B-N4B	2.07	126.41	123.39
3	A	503	BVQ	C35-C5-C4	-2.03	112.66	116.79

All (7) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	A	503	BVQ	N24
3	A	503	BVQ	N22
3	A	503	BVQ	N21
3	A	503	BVQ	N23
3	B	503	BVQ	N24
3	B	503	BVQ	N21
3	B	503	BVQ	N23

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	503	BVQ	C14-C13-C48-C49
5	A	509	GOL	O1-C1-C2-C3
5	A	509	GOL	C1-C2-C3-O3
5	A	511	GOL	C1-C2-C3-O3
5	B	504	GOL	O1-C1-C2-C3
3	A	503	BVQ	C14-C13-C48-C49
5	A	505	GOL	O1-C1-C2-C3
5	A	510	GOL	O1-C1-C2-C3
5	B	504	GOL	C1-C2-C3-O3
5	A	511	GOL	O2-C2-C3-O3
5	B	504	GOL	O1-C1-C2-O2
5	A	505	GOL	O1-C1-C2-O2
5	A	509	GOL	O1-C1-C2-O2
5	B	504	GOL	O2-C2-C3-O3
5	A	509	GOL	O2-C2-C3-O3
5	A	510	GOL	O1-C1-C2-O2
4	A	504	BEN	N2-C-C1-C2
4	A	504	BEN	N2-C-C1-C6
3	A	503	BVQ	C38-C37-C7-C6
3	B	503	BVQ	C38-C37-C7-C6
4	A	504	BEN	N1-C-C1-C2

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Mol	Chain	Res	Type	Atoms
4	A	504	BEN	N1-C-C1-C6

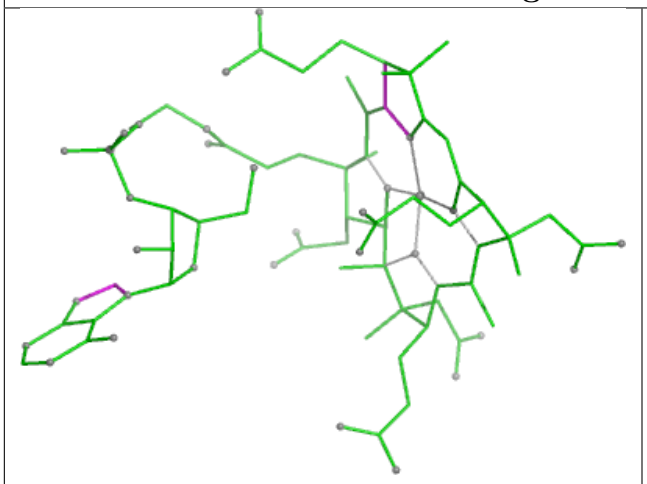
There are no ring outliers.

4 monomers are involved in 17 short contacts:

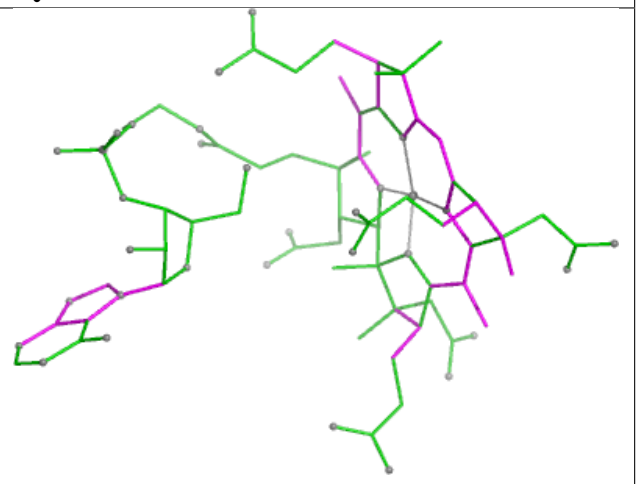
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	503	BVQ	7	0
6	A	513	TC7	3	0
6	B	505	TC7	3	0
3	B	503	BVQ	4	0

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 then 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.

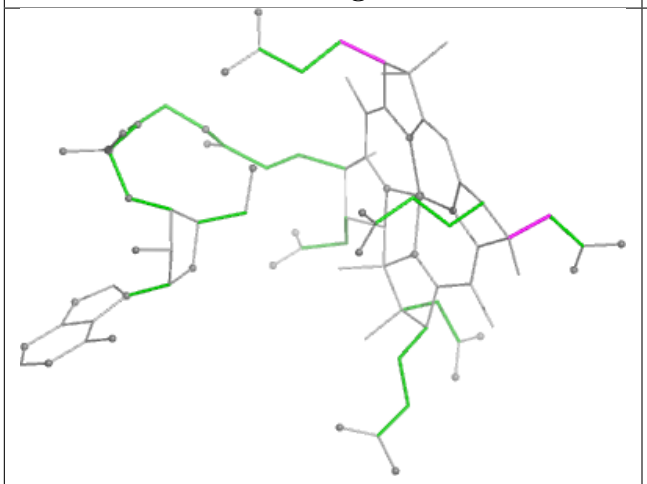
Ligand BVQ A 503



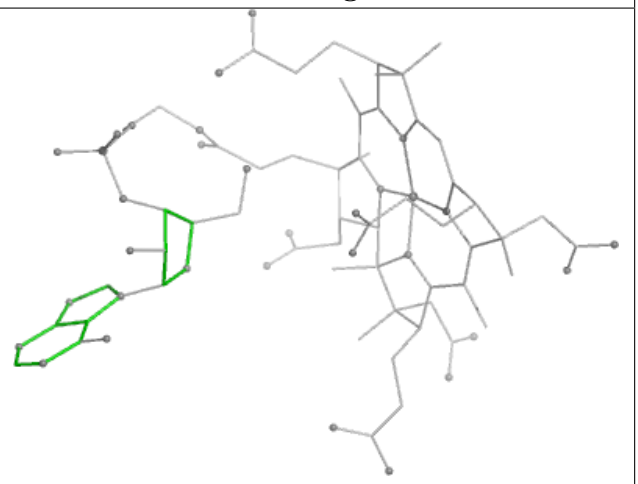
Bond lengths



Bond angles

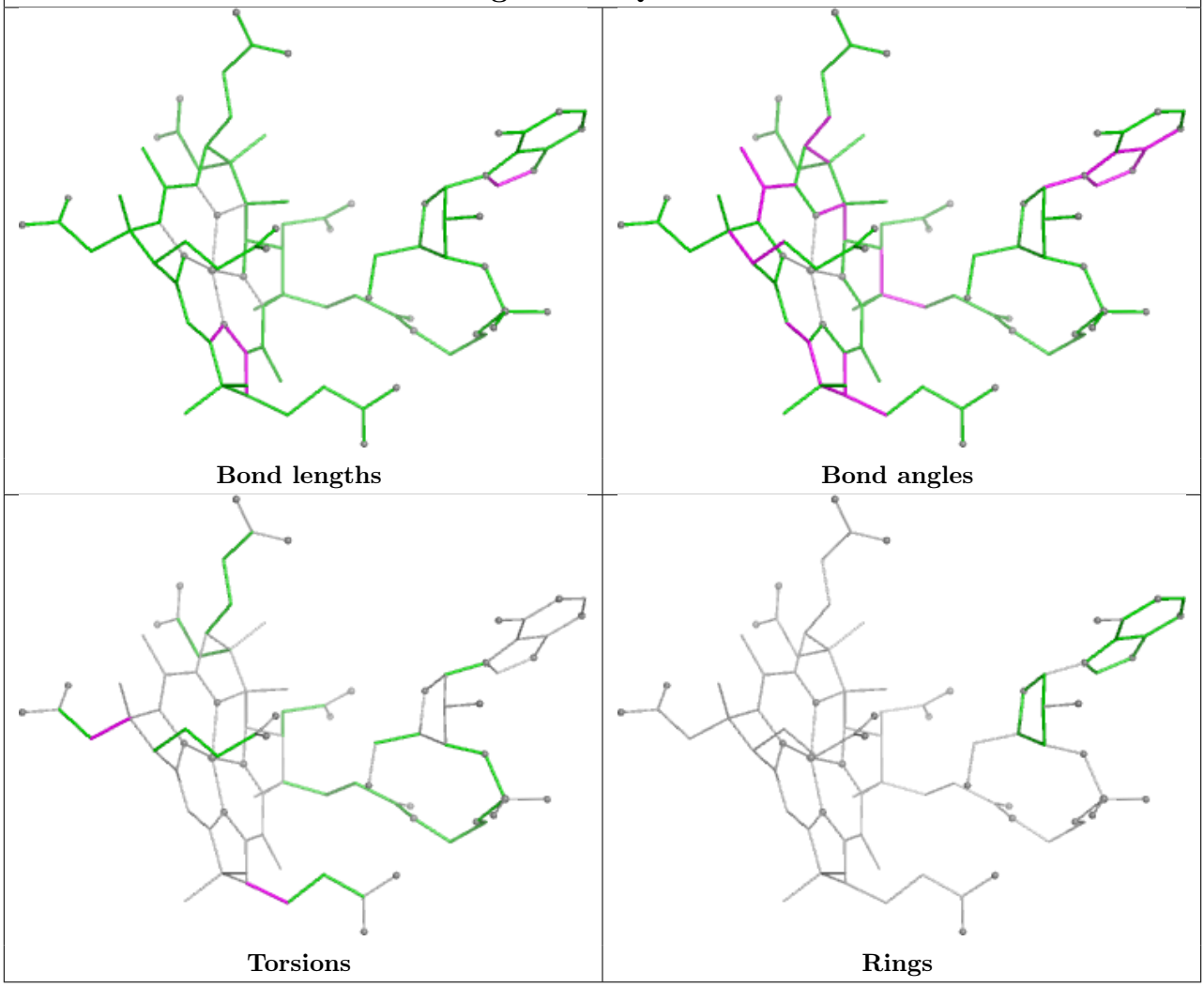


Torsions



Rings

Ligand BVQ B 503



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	449/464 (96%)	-0.66	7 (1%)	70	74	9, 23, 45, 95	8 (1%)
1	B	420/464 (90%)	-0.60	3 (0%)	84	87	14, 26, 49, 93	2 (0%)
All	All	869/928 (93%)	-0.63	10 (1%)	76	80	9, 25, 47, 95	10 (1%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	396	ASN	3.9
1	B	10	ILE	3.1
1	A	417	MET	3.1
1	A	132[A]	ARG	2.9
1	A	416	LEU	2.9
1	A	187	HIS	2.5
1	A	415	PRO	2.5
1	B	6	ASN	2.3
1	B	76	LYS	2.3
1	A	414	ASP	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)

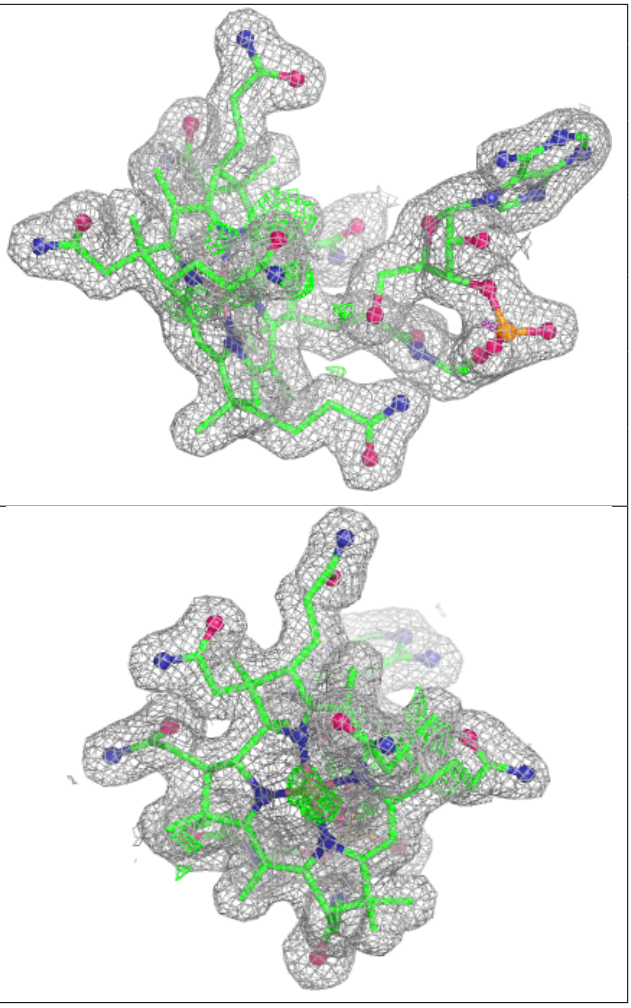
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	GOL	A	511	6/6	0.82	0.17	62,63,70,71	0
5	GOL	A	505	6/6	0.84	0.20	61,65,69,70	0
5	GOL	A	508	6/6	0.87	0.12	43,47,50,54	0
6	TC7	B	505	10/10	0.88	0.13	19,28,38,47	10
5	GOL	B	504	6/6	0.89	0.14	45,57,61,69	0
5	GOL	A	509	6/6	0.89	0.12	58,60,61,61	0
4	BEN	A	504	9/9	0.90	0.11	42,45,52,55	0
6	TC7	A	513	10/10	0.91	0.11	22,29,39,44	10
5	GOL	A	510	6/6	0.93	0.09	43,53,63,69	0
5	GOL	A	506	6/6	0.95	0.08	26,32,34,36	0
5	GOL	A	507	6/6	0.95	0.07	33,35,47,49	0
5	GOL	A	512	6/6	0.95	0.09	25,31,34,35	0
2	SF4	B	502	8/8	0.97	0.05	23,25,28,29	0
2	SF4	B	501	8/8	0.98	0.05	27,30,34,36	0
2	SF4	A	501	8/8	0.98	0.04	19,20,23,25	0
3	BVQ	A	503	89/89	0.98	0.05	12,18,22,31	0
3	BVQ	B	503	89/89	0.98	0.05	14,22,27,42	0
2	SF4	A	502	8/8	0.99	0.04	18,20,23,23	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.

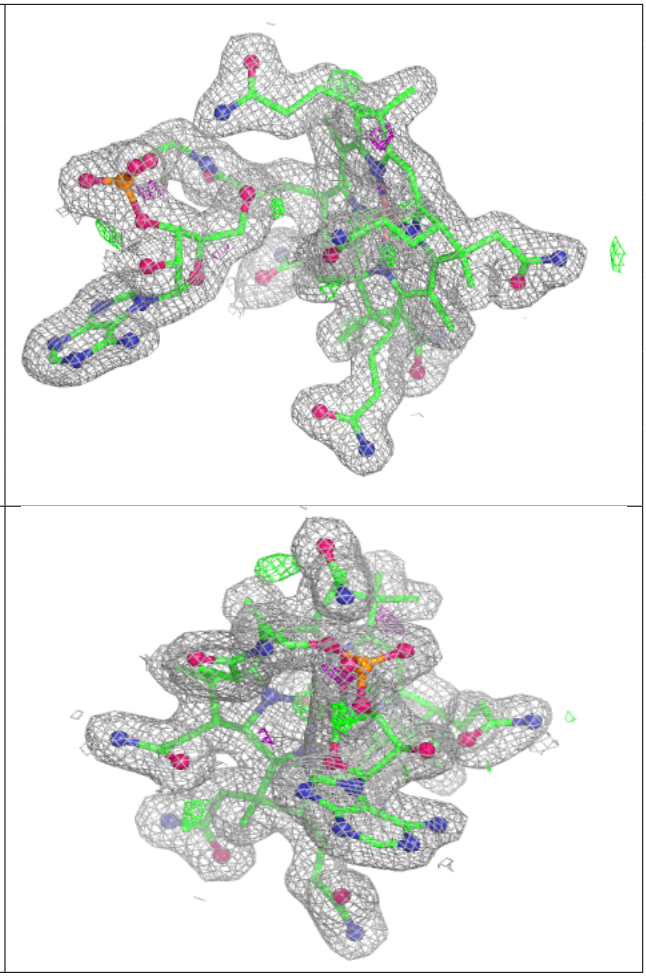
Electron density around BVQ A 503:

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



Electron density around BVQ B 503:

$2mF_o$-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.