



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 9, 2023 – 06:51 PM EDT

PDB ID : 6XIN  
Title : The crystal structure of tryptophan synthase from *Salmonella enterica* serovar typhimurium in complex with (2S)-3-Amino-3-imino-2-phenyldiazenylpropan amide at the enzyme alpha-site.  
Authors : Hilario, E.; Chang, C.; Mueller, L.J.; Dunn, M.F.; Fan, L.  
Deposited on : 2020-06-20  
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](mailto: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>.

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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)  
Xtrriage (Phenix) : 1.13  
EDS : 2.35.1  
buster-report : 1.1.7 (2018)  
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) : 2.35.1

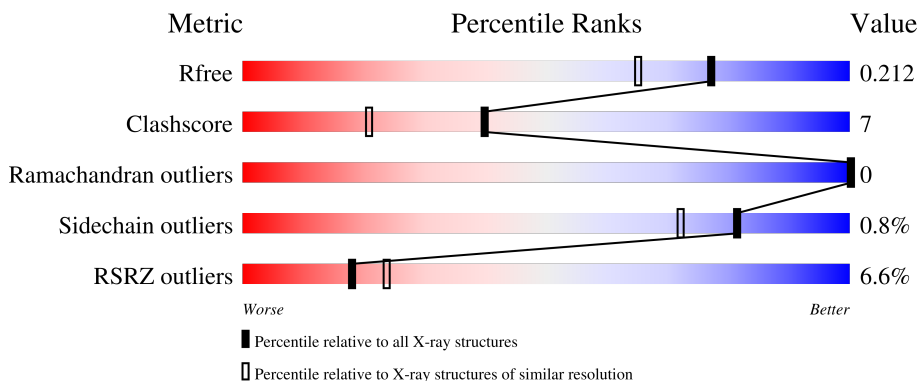
# 1 Overall quality at a glance

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  $\geq 3$ , 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	268	
2	B	397	

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
5	EDO	A	317	-	-	X	-
5	EDO	B	430	-	-	X	-

## 2 Entry composition

There are 11 unique types of molecules in this entry. The entry contains 5926 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 Tryptophan synthase alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	258	1991	1268	338	377	8	0	6	0

- Molecule 2 is a protein called Tryptophan synthase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	396	3076	1929	540	586	21	0	10	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	6	Total	Cl	0	1
			7	7		
3	B	8	Total	Cl	0	1
			9	9		

- Molecule 4 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C<sub>2</sub>H<sub>6</sub>OS).



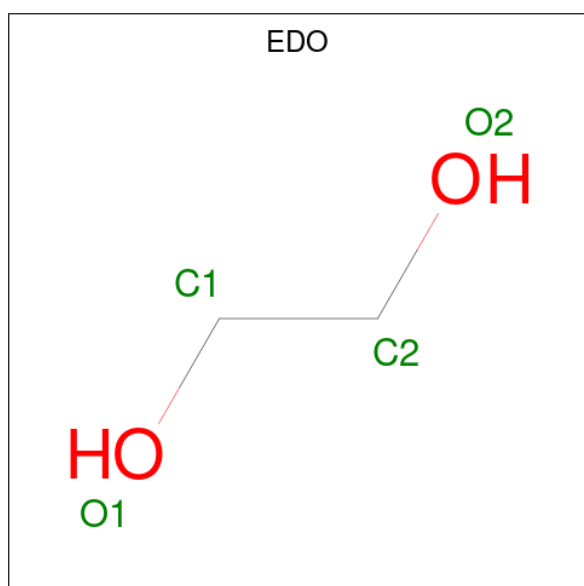
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	A	1	Total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

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

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

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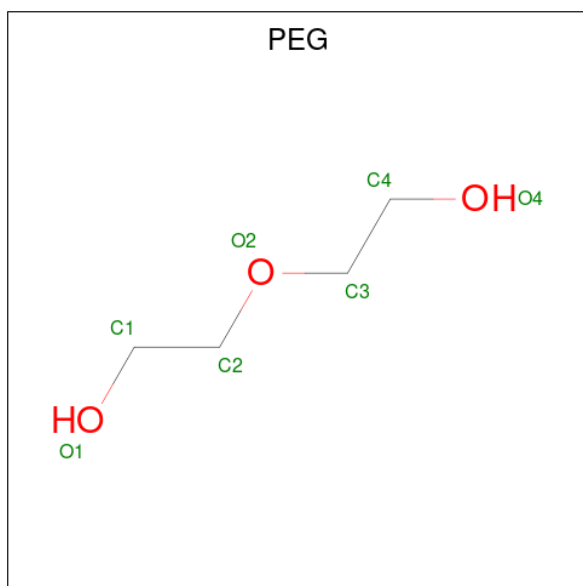
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 4	C 2	O 2	0	0
5	A	1	Total 4	C 2	O 2	0	0
5	A	1	Total 4	C 2	O 2	0	0
5	A	1	Total 4	C 2	O 2	0	0
5	A	1	Total 4	C 2	O 2	0	0
5	A	1	Total 4	C 2	O 2	0	0
5	B	1	Total 4	C 2	O 2	0	0
5	B	1	Total 4	C 2	O 2	0	0
5	B	1	Total 4	C 2	O 2	0	0
5	B	1	Total 4	C 2	O 2	0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

- Molecule 6 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>4</sub>).



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

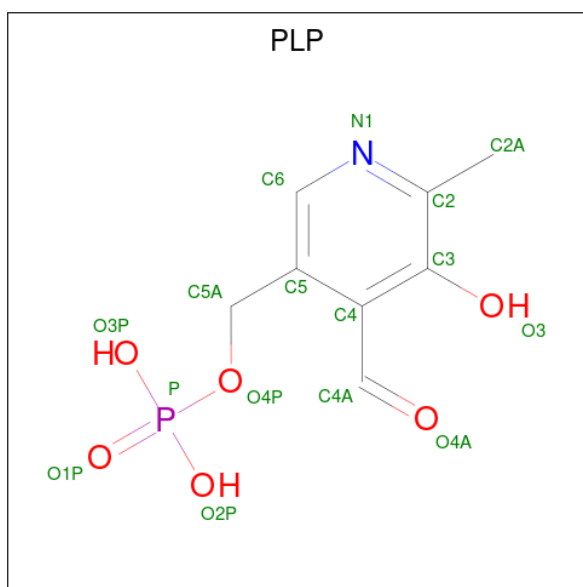
- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula:  $C_4H_{10}O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			7	4	3		

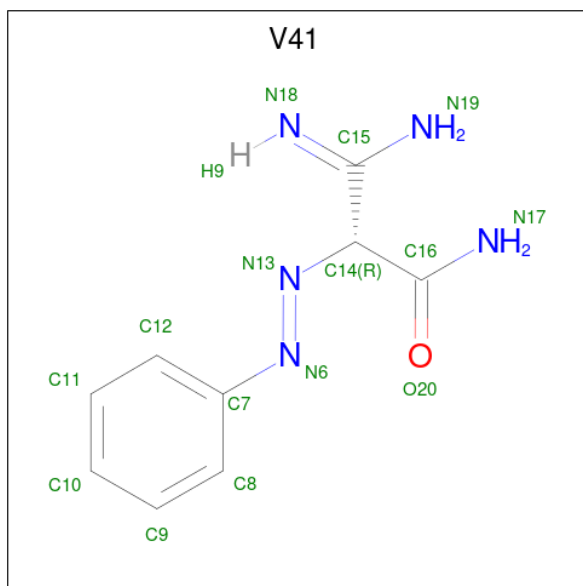
- Molecule 8 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula:  $C_8H_{10}NO_6P$ ).





Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
8	B	1	15	8	1	5	1	0	0

- Molecule 9 is (2R,3Z)-3-amino-3-imino-2-[(E)-phenyldiazenyl]propanamide (three-letter code: V41) (formula: C<sub>9</sub>H<sub>11</sub>N<sub>5</sub>O) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
9	B	1	15	9	5	1	0	0

- Molecule 10 is CESIUM ION (three-letter code: CS) (formula: Cs).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	B	2	Total 3	Cs 3	0	1

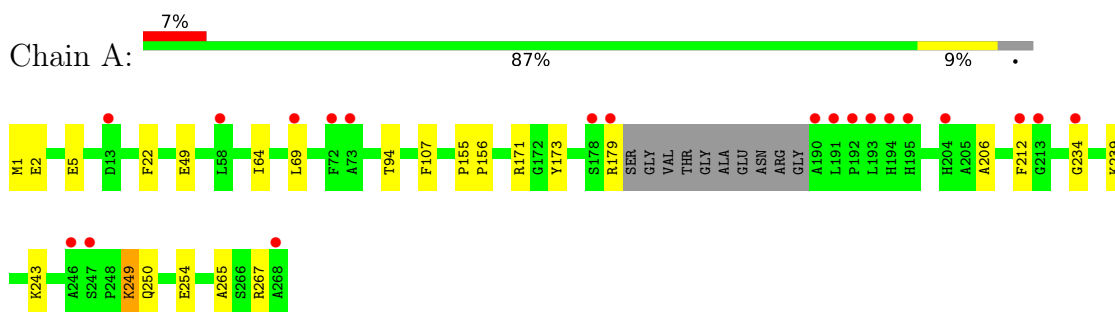
- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	235	Total 239	O 239	0	4
11	B	382	Total 394	O 394	0	12

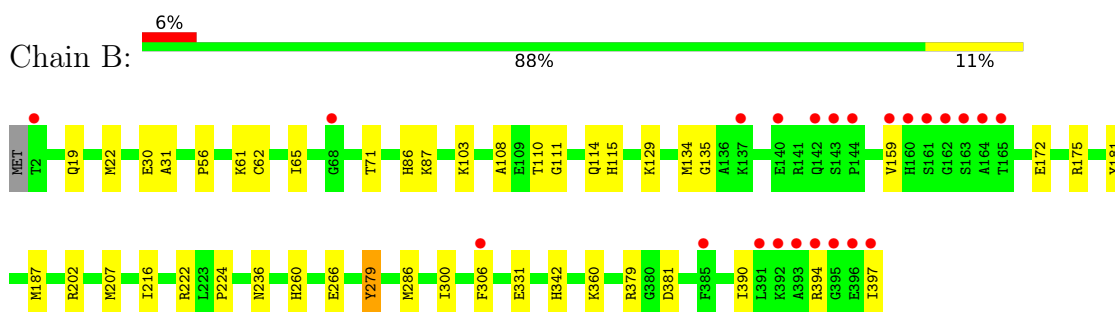
### 3 Residue-property plots [i](#)

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: Tryptophan synthase alpha chain



- Molecule 2: Tryptophan synthase beta chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	182.30Å 59.48Å 67.17Å 90.00° 94.82° 90.00°	Depositor
Resolution (Å)	22.98 – 1.75 22.98 – 1.75	Depositor EDS
% Data completeness (in resolution range)	99.1 (22.98-1.75) 99.2 (22.98-1.75)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.55 (at 1.75Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.165 , 0.204 0.175 , 0.212	Depositor DCC
$R_{free}$ test set	3637 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	19.9	Xtrriage
Anisotropy	0.192	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 71.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	5926	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.69% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: CL, EDO, PLP, CS, PEG, DMS, V41, PGE

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	0.78	0/2031	0.88	0/2759
2	B	0.84	3/3135 (0.1%)	0.92	1/4230 (0.0%)
All	All	0.82	3/5166 (0.1%)	0.90	1/6989 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	56	PRO	C-O	5.89	1.35	1.23
2	B	331	GLU	CD-OE2	5.61	1.31	1.25
2	B	71	THR	C-O	5.30	1.33	1.23

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	306	PHE	CB-CA-C	5.89	122.17	110.40

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	1991	0	1974	27	0
2	B	3076	0	3034	40	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	7	0	0	2	0
3	B	9	0	0	0	0
4	A	40	0	60	4	0
4	B	56	0	82	3	0
5	A	28	0	42	12	0
5	B	36	0	54	13	0
6	A	10	0	14	3	0
7	A	7	0	10	1	0
8	B	15	0	6	1	0
9	B	15	0	0	1	0
10	B	3	0	0	0	0
11	A	239	0	0	8	0
11	B	394	0	0	12	0
All	All	5926	0	5276	77	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 7.

All (77) 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:107:PHE:CE2	5:A:317:EDO:H22	1.81	1.14
9:B:433:V41:N13	11:B:503:HOH:O	2.10	0.83
2:B:222:ARG:NH2	11:B:504:HOH:O	2.11	0.83
1:A:107:PHE:CE2	5:A:317:EDO:C2	2.61	0.82
5:B:424:EDO:H22	11:B:764:HOH:O	1.80	0.81
1:A:173:TYR:OH	11:A:401:HOH:O	1.99	0.81
5:B:430:EDO:O2	11:B:501:HOH:O	2.03	0.77
1:A:107:PHE:HE2	5:A:317:EDO:H22	1.49	0.76
3:A:302:CL:CL	5:A:321:EDO:O1	2.45	0.72
2:B:62[B]:CYS:HB3	2:B:65:ILE:HG22	1.71	0.71
5:B:432:EDO:O1	11:B:502:HOH:O	2.07	0.71
4:A:309:DMS:H11	11:A:407:HOH:O	1.91	0.71
1:A:49[A]:GLU:OE1	3:A:306[A]:CL:CL	2.47	0.69
1:A:156:PRO:O	11:A:402:HOH:O	2.08	0.69
7:A:325:PEG:H12	11:A:577:HOH:O	1.92	0.69
2:B:31:ALA:HB2	5:B:424:EDO:H12	1.74	0.69
1:A:2:GLU:OE2	11:A:403:HOH:O	2.10	0.68
4:B:422:DMS:H12	11:B:731:HOH:O	1.97	0.64
1:A:171:ARG:HA	5:A:321:EDO:H21	1.80	0.64
2:B:19:GLN:HE21	5:B:430:EDO:C2	2.11	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:260:HIS:HD2	2:B:266[A]:GLU:OE1	1.82	0.62
1:A:1:MET:O	1:A:5[B]:GLU:OE1	2.18	0.61
1:A:64:ILE:HD11	1:A:234:GLY:O	2.03	0.59
2:B:19:GLN:HG3	5:B:430:EDO:H22	1.86	0.58
1:A:265:ALA:HA	6:A:324:PGE:H5	1.87	0.56
2:B:87:LYS:HD2	2:B:114:GLN:HG3	1.88	0.56
1:A:107:PHE:CD2	5:A:317:EDO:H22	2.41	0.54
2:B:31:ALA:HB2	5:B:424:EDO:C1	2.38	0.54
2:B:172:GLU:OE2	2:B:175:ARG:NH2	2.41	0.53
1:A:155:PRO:HB2	1:A:156:PRO:HD2	1.91	0.53
1:A:94:THR:HG22	5:A:319:EDO:H12	1.89	0.52
1:A:267:ARG:O	6:A:324:PGE:H4	2.10	0.52
1:A:107:PHE:CD2	5:A:317:EDO:C2	2.92	0.52
2:B:19:GLN:HE21	5:B:430:EDO:H22	1.74	0.51
2:B:360[B]:LYS:HG3	11:B:638:HOH:O	2.09	0.51
2:B:111:GLY:H	5:B:431:EDO:HO1	1.55	0.51
1:A:265:ALA:O	6:A:324:PGE:H32	2.10	0.50
2:B:110:THR:HG23	2:B:134:MET:CE	2.41	0.50
2:B:111:GLY:N	5:B:431:EDO:O1	2.29	0.49
1:A:22:PHE:HA	1:A:49[B]:GLU:O	2.13	0.49
2:B:19:GLN:HG3	5:B:430:EDO:C2	2.43	0.49
1:A:107:PHE:CE1	4:A:310:DMS:H13	2.48	0.49
2:B:103:LYS:NZ	2:B:181:TYR:O	2.43	0.49
2:B:379[A]:ARG:HD2	2:B:381:ASP:OD2	2.14	0.47
2:B:22:MET:HB2	5:B:430:EDO:H21	1.97	0.47
1:A:179:ARG:HA	1:A:212:PHE:CG	2.51	0.46
2:B:216:ILE:HG21	2:B:224:PRO:HD3	1.96	0.46
2:B:115:HIS:HD2	11:B:665[B]:HOH:O	1.99	0.46
1:A:107:PHE:CE1	4:A:310:DMS:C1	3.00	0.45
11:A:560:HOH:O	2:B:175:ARG:HD3	2.15	0.45
2:B:61:LYS:H	4:B:420:DMS:C2	2.29	0.45
2:B:286:MET:HE2	2:B:286:MET:HB3	1.92	0.45
2:B:19:GLN:HE21	5:B:430:EDO:H21	1.81	0.44
2:B:110:THR:HG23	2:B:134:MET:HE1	1.99	0.44
2:B:135:GLY:HA2	2:B:159:VAL:CG2	2.47	0.44
5:A:323:EDO:H22	11:A:432:HOH:O	2.17	0.44
1:A:249:LYS:HG3	1:A:250:GLN:N	2.32	0.43
2:B:260:HIS:CD2	2:B:266[A]:GLU:OE1	2.66	0.43
2:B:300:ILE:HD11	2:B:390:ILE:CD1	2.48	0.43
1:A:243:LYS:NZ	1:A:254:GLU:OE1	2.50	0.43
2:B:87:LYS:NZ	8:B:401:PLP:O3	2.52	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:30[B]:GLU:OE2	11:B:505:HOH:O	2.21	0.43
1:A:107:PHE:CD2	5:A:317:EDO:H21	2.54	0.42
2:B:279:TYR:HD1	2:B:286:MET:CE	2.32	0.42
2:B:86:HIS:CE1	2:B:236:ASN:HB3	2.55	0.42
2:B:342[B]:HIS:HD2	11:B:678:HOH:O	2.01	0.42
2:B:202:ARG:HH12	4:B:418:DMS:H13	1.84	0.41
2:B:394:ARG:O	2:B:397:ILE:HD13	2.20	0.41
2:B:108:ALA:HB2	2:B:187[B]:MET:HB3	2.01	0.41
1:A:107:PHE:O	5:A:317:EDO:H21	2.21	0.41
2:B:115:HIS:CE1	2:B:187[A]:MET:O	2.74	0.41
1:A:69:LEU:HD23	1:A:69:LEU:HA	1.84	0.41
1:A:206:ALA:HA	5:A:321:EDO:H12	2.02	0.41
2:B:115:HIS:CD2	11:B:665[B]:HOH:O	2.73	0.41
2:B:129:LYS:CD	11:B:540:HOH:O	2.68	0.41
2:B:134:MET:O	2:B:159:VAL:HG22	2.21	0.41
4:A:309:DMS:H22	11:A:407:HOH:O	2.22	0.40

There are no symmetry-related clashes.

## 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	260/268 (97%)	258 (99%)	2 (1%)	0	100	100
2	B	404/397 (102%)	396 (98%)	8 (2%)	0	100	100
All	All	664/665 (100%)	654 (98%)	10 (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	206/208 (99%)	204 (99%)	2 (1%)	76	63
2	B	319/311 (103%)	317 (99%)	2 (1%)	86	79
All	All	525/519 (101%)	521 (99%)	4 (1%)	81	72

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	239	LYS
1	A	249	LYS
2	B	207	MET
2	B	279	TYR

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

Mol	Chain	Res	Type
2	B	115	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 monosaccharides in this entry.

## 5.6 Ligand geometry

Of 63 ligands modelled in this entry, 19 are monoatomic - leaving 44 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
5	EDO	B	428	-	3,3,3	0.12	0	2,2,2	0.07	0
4	DMS	A	310	-	3,3,3	0.24	0	3,3,3	0.13	0
4	DMS	B	416	-	3,3,3	0.22	0	3,3,3	0.17	0
4	DMS	A	311	-	3,3,3	0.23	0	3,3,3	0.13	0
4	DMS	A	309	-	3,3,3	0.21	0	3,3,3	0.21	0
4	DMS	B	419	-	3,3,3	0.26	0	3,3,3	0.10	0
8	PLP	B	401	2	15,15,16	0.81	0	20,22,23	1.32	3 (15%)
5	EDO	A	320	-	3,3,3	0.12	0	2,2,2	0.30	0
4	DMS	B	422	-	3,3,3	0.22	0	3,3,3	0.27	0
5	EDO	B	427	-	3,3,3	0.20	0	2,2,2	0.37	0
4	DMS	A	308	-	3,3,3	0.21	0	3,3,3	0.12	0
4	DMS	A	314	-	3,3,3	0.36	0	3,3,3	0.37	0
4	DMS	B	421	-	3,3,3	0.29	0	3,3,3	0.14	0
5	EDO	A	319	-	3,3,3	0.18	0	2,2,2	0.40	0
5	EDO	A	317	-	3,3,3	0.13	0	2,2,2	0.47	0
4	DMS	B	411	-	3,3,3	0.20	0	3,3,3	0.35	0
4	DMS	A	313	-	3,3,3	0.21	0	3,3,3	0.19	0
4	DMS	B	415	-	3,3,3	0.23	0	3,3,3	0.12	0
5	EDO	B	426	-	3,3,3	0.11	0	2,2,2	0.27	0
4	DMS	B	417	-	3,3,3	0.20	0	3,3,3	0.18	0
5	EDO	B	432	-	3,3,3	0.12	0	2,2,2	0.23	0
5	EDO	B	430	-	3,3,3	0.17	0	2,2,2	0.54	0
4	DMS	A	316	-	3,3,3	0.21	0	3,3,3	0.14	0
5	EDO	B	431	-	3,3,3	0.19	0	2,2,2	0.06	0
5	EDO	A	321	-	3,3,3	0.06	0	2,2,2	0.36	0
4	DMS	B	413	-	3,3,3	0.23	0	3,3,3	0.21	0
4	DMS	B	418	-	3,3,3	0.55	0	3,3,3	0.45	0
4	DMS	B	412	-	3,3,3	0.51	0	3,3,3	0.64	0
4	DMS	A	312	-	3,3,3	0.23	0	3,3,3	0.11	0
5	EDO	B	425	-	3,3,3	0.33	0	2,2,2	0.24	0
5	EDO	A	318	-	3,3,3	0.21	0	2,2,2	0.20	0
4	DMS	B	423	-	3,3,3	0.19	0	3,3,3	0.18	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	A	322	-	3,3,3	0.05	0	2,2,2	0.24	0
7	PEG	A	325	-	6,6,6	0.12	0	5,5,5	0.11	0
5	EDO	B	429	-	3,3,3	0.18	0	2,2,2	0.45	0
9	V41	B	433	-	14,15,15	1.66	2 (14%)	13,19,19	2.59	3 (23%)
5	EDO	B	424	-	3,3,3	0.14	0	2,2,2	0.33	0
4	DMS	B	414	-	3,3,3	0.29	0	3,3,3	0.11	0
4	DMS	B	420	-	3,3,3	0.18	0	3,3,3	0.28	0
5	EDO	A	323	-	3,3,3	0.16	0	2,2,2	0.50	0
4	DMS	A	315	-	3,3,3	0.25	0	3,3,3	0.27	0
6	PGE	A	324	-	9,9,9	0.65	0	8,8,8	0.38	0
4	DMS	B	410	-	3,3,3	0.20	0	3,3,3	0.11	0
4	DMS	A	307	-	3,3,3	0.23	0	3,3,3	0.12	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	EDO	B	428	-	-	0/1/1/1	-
8	PLP	B	401	2	-	0/6/6/8	0/1/1/1
5	EDO	A	320	-	-	0/1/1/1	-
5	EDO	B	427	-	-	1/1/1/1	-
5	EDO	A	319	-	-	1/1/1/1	-
5	EDO	A	317	-	-	1/1/1/1	-
5	EDO	B	426	-	-	1/1/1/1	-
5	EDO	B	432	-	-	0/1/1/1	-
5	EDO	B	430	-	-	1/1/1/1	-
5	EDO	B	431	-	-	0/1/1/1	-
5	EDO	A	321	-	-	0/1/1/1	-
5	EDO	B	425	-	-	1/1/1/1	-
5	EDO	A	318	-	-	1/1/1/1	-
7	PEG	A	325	-	-	1/4/4/4	-
5	EDO	A	322	-	-	1/1/1/1	-
9	V41	B	433	-	-	4/7/13/13	0/1/1/1
5	EDO	B	424	-	-	1/1/1/1	-
5	EDO	A	323	-	-	1/1/1/1	-
6	PGE	A	324	-	-	3/7/7/7	-
5	EDO	B	429	-	-	0/1/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	B	433	V41	C15-N19	4.25	1.40	1.33
9	B	433	V41	C16-N17	3.90	1.42	1.32

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	B	433	V41	C14-C15-N19	7.01	126.60	117.33
9	B	433	V41	C14-C16-N17	5.38	121.52	117.23
8	B	401	PLP	O4P-C5A-C5	2.90	114.88	109.35
8	B	401	PLP	C4A-C4-C5	2.73	123.75	120.94
9	B	433	V41	O20-C16-N17	-2.37	118.88	123.00
8	B	401	PLP	O4P-P-O1P	-2.31	99.98	106.47

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	425	EDO	O1-C1-C2-O2
9	B	433	V41	N13-C14-C16-N17
9	B	433	V41	C15-C14-C16-N17
6	A	324	PGE	C6-C5-O3-C4
6	A	324	PGE	O2-C3-C4-O3
5	A	318	EDO	O1-C1-C2-O2
5	A	323	EDO	O1-C1-C2-O2
5	A	317	EDO	O1-C1-C2-O2
5	A	322	EDO	O1-C1-C2-O2
5	B	426	EDO	O1-C1-C2-O2
5	B	424	EDO	O1-C1-C2-O2
6	A	324	PGE	O1-C1-C2-O2
9	B	433	V41	N13-C14-C16-O20
7	A	325	PEG	O2-C3-C4-O4
5	B	427	EDO	O1-C1-C2-O2
5	A	319	EDO	O1-C1-C2-O2
5	B	430	EDO	O1-C1-C2-O2
9	B	433	V41	C15-C14-C16-O20

There are no ring outliers.

17 monomers are involved in 38 short contacts:

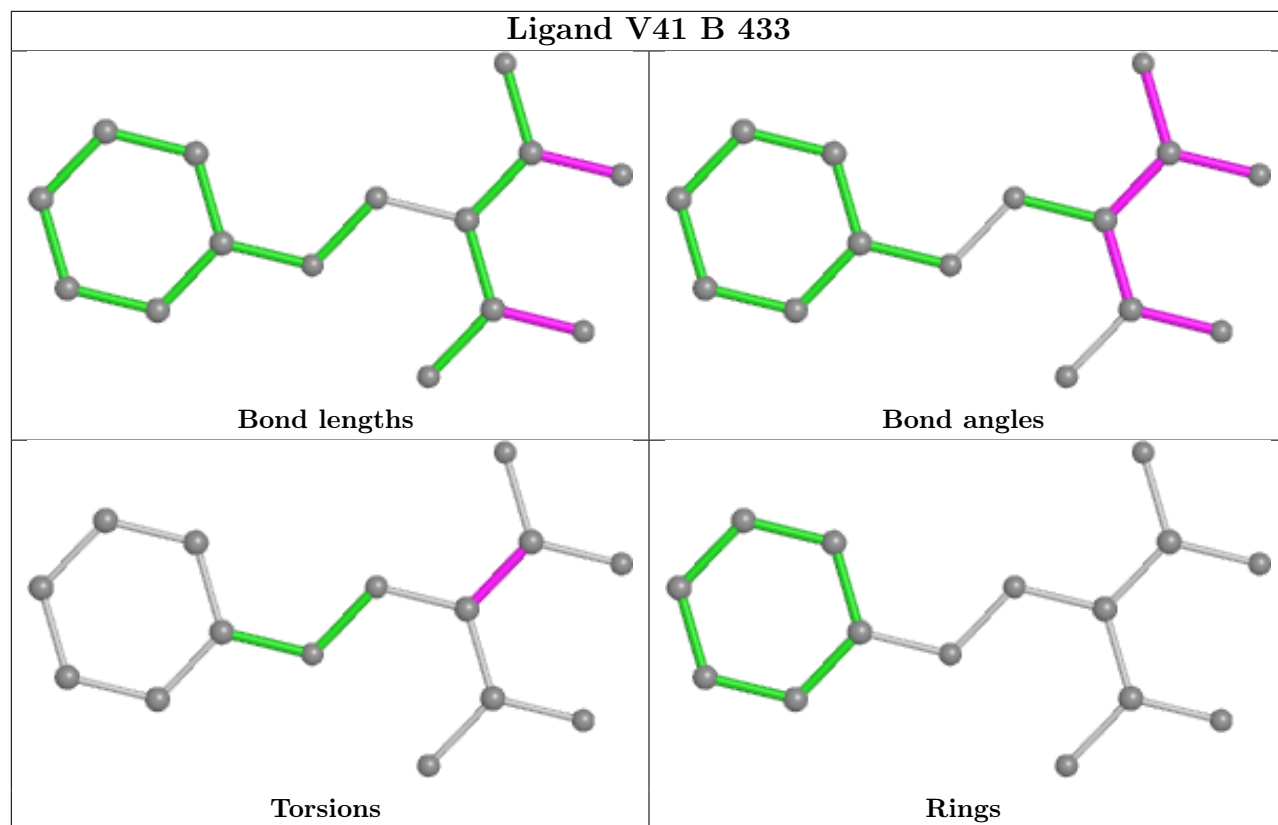
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	310	DMS	2	0
4	A	309	DMS	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	401	PLP	1	0
4	B	422	DMS	1	0
5	A	319	EDO	1	0
5	A	317	EDO	7	0
5	B	432	EDO	1	0
5	B	430	EDO	7	0
5	B	431	EDO	2	0
5	A	321	EDO	3	0
4	B	418	DMS	1	0
7	A	325	PEG	1	0
9	B	433	V41	1	0
5	B	424	EDO	3	0
4	B	420	DMS	1	0
5	A	323	EDO	1	0
6	A	324	PGE	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	258/268 (96%)	0.48	20 (7%) 13 17	13, 23, 42, 82	5 (1%)
2	B	396/397 (99%)	0.16	23 (5%) 23 28	11, 18, 46, 86	9 (2%)
All	All	654/665 (98%)	0.28	43 (6%) 18 24	11, 20, 44, 86	14 (2%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	397	ILE	11.2
1	A	191	LEU	10.6
1	A	190	ALA	6.5
1	A	212	PHE	6.2
2	B	395	GLY	5.0
2	B	392	LYS	4.9
1	A	179	ARG	4.8
1	A	73	ALA	4.6
1	A	194	HIS	4.5
2	B	396	GLU	4.5
2	B	143	SER	4.2
1	A	268	ALA	4.1
1	A	213	GLY	4.0
2	B	161	SER	4.0
2	B	159	VAL	3.8
1	A	13[A]	ASP	3.8
1	A	178	SER	3.7
2	B	385	PHE	3.7
2	B	140	GLU	3.6
1	A	193	LEU	3.2
2	B	165	THR	3.2
2	B	2	THR	3.2
1	A	234	GLY	3.1
2	B	164	ALA	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	246	ALA	3.0
1	A	58	LEU	3.0
2	B	393	ALA	3.0
1	A	247	SER	2.7
2	B	160	HIS	2.7
1	A	195	HIS	2.7
2	B	163	SER	2.6
2	B	68	GLY	2.5
2	B	394	ARG	2.5
1	A	72[A]	PHE	2.5
2	B	306	PHE	2.5
2	B	162	GLY	2.4
2	B	137	LYS	2.3
2	B	391	LEU	2.2
2	B	144	PRO	2.2
1	A	204	HIS	2.1
1	A	69	LEU	2.1
2	B	142	GLN	2.0
1	A	192	PRO	2.0

## 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
5	EDO	A	320	4/4	0.38	0.23	50,50,51,51	4
3	CL	B	405	1/1	0.46	0.10	81,81,81,81	0
4	DMS	B	421	4/4	0.57	0.29	50,55,56,57	1
4	DMS	B	418	4/4	0.64	0.22	24,25,28,28	1

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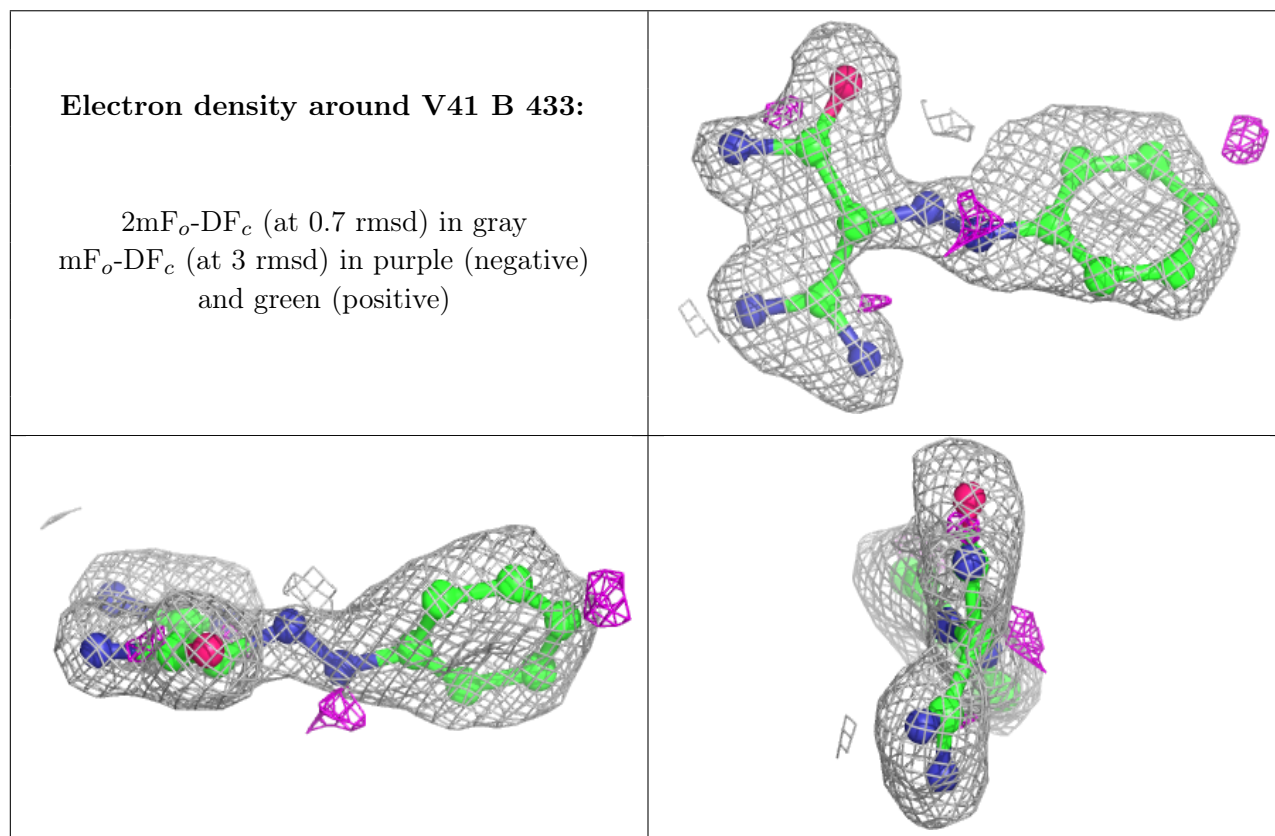
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	CL	B	403	1/1	0.67	0.32	84,84,84,84	0
4	DMS	B	420	4/4	0.68	0.32	34,34,38,39	4
5	EDO	A	323	4/4	0.71	0.15	36,36,38,38	4
5	EDO	B	427	4/4	0.71	0.14	44,45,45,46	1
4	DMS	B	423	4/4	0.73	0.24	29,36,37,39	4
5	EDO	A	317	4/4	0.81	0.20	20,26,31,32	1
3	CL	B	404	1/1	0.82	0.08	65,65,65,65	0
4	DMS	A	312	4/4	0.82	0.23	51,51,52,53	4
4	DMS	B	410	4/4	0.83	0.16	47,49,52,54	1
5	EDO	B	424	4/4	0.84	0.19	31,31,31,33	1
5	EDO	A	321	4/4	0.84	0.16	37,38,39,47	0
7	PEG	A	325	7/7	0.84	0.15	36,37,39,40	7
4	DMS	B	414	4/4	0.85	0.24	50,50,52,59	0
5	EDO	B	426	4/4	0.85	0.15	37,38,43,46	0
5	EDO	B	431	4/4	0.86	0.12	37,37,39,41	0
5	EDO	A	318	4/4	0.86	0.11	29,29,32,40	0
3	CL	B	407	1/1	0.87	0.09	72,72,72,72	0
4	DMS	A	313	4/4	0.87	0.22	48,49,49,52	4
6	PGE	A	324	10/10	0.87	0.20	13,27,30,36	2
4	DMS	A	308	4/4	0.87	0.18	75,75,78,80	0
5	EDO	A	322	4/4	0.88	0.19	25,29,31,33	4
5	EDO	B	430	4/4	0.88	0.22	28,30,31,36	1
4	DMS	B	422	4/4	0.88	0.16	26,29,40,40	1
4	DMS	A	307	4/4	0.88	0.14	53,55,60,63	0
4	DMS	B	419	4/4	0.88	0.15	55,56,58,65	0
9	V41	B	433	15/15	0.88	0.15	31,33,35,36	2
5	EDO	B	429	4/4	0.89	0.16	39,42,44,45	0
3	CL	B	408	1/1	0.89	0.10	63,63,63,63	1
5	EDO	B	425	4/4	0.89	0.12	29,30,31,37	0
3	CL	B	409[B]	1/1	0.90	0.14	29,29,29,29	1
4	DMS	A	314	4/4	0.90	0.16	30,30,31,33	4
3	CL	A	305	1/1	0.90	0.12	51,51,51,51	1
3	CL	A	303	1/1	0.90	0.11	67,67,67,67	0
3	CL	B	409[A]	1/1	0.90	0.14	32,32,32,32	1
5	EDO	B	428	4/4	0.90	0.09	43,45,45,48	0
5	EDO	A	319	4/4	0.91	0.29	28,31,33,42	0
4	DMS	A	309	4/4	0.91	0.15	35,45,46,51	0
3	CL	A	304	1/1	0.92	0.07	64,64,64,64	0
4	DMS	B	416	4/4	0.93	0.19	38,39,39,41	4
4	DMS	A	310	4/4	0.93	0.17	28,29,29,32	4
4	DMS	A	316	4/4	0.93	0.15	55,56,56,59	4
3	CL	B	406	1/1	0.93	0.08	65,65,65,65	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	CL	A	301	1/1	0.93	0.08	42,42,42,42	0
4	DMS	A	315	4/4	0.94	0.15	34,36,37,37	4
5	EDO	B	432	4/4	0.95	0.14	22,27,28,33	4
4	DMS	B	413	4/4	0.95	0.08	35,38,39,41	1
3	CL	B	402	1/1	0.95	0.08	39,39,39,39	0
4	DMS	A	311	4/4	0.95	0.13	41,41,42,43	4
4	DMS	B	411	4/4	0.96	0.12	25,28,29,29	4
4	DMS	B	415	4/4	0.96	0.24	44,48,49,50	4
4	DMS	B	412	4/4	0.97	0.08	13,14,16,16	2
3	CL	A	306[B]	1/1	0.97	0.08	39,39,39,39	1
4	DMS	B	417	4/4	0.97	0.12	61,62,62,64	0
3	CL	A	306[A]	1/1	0.97	0.08	32,32,32,32	1
8	PLP	B	401	15/16	0.98	0.07	12,14,15,16	0
10	CS	B	434[A]	1/1	0.98	0.06	30,30,30,30	1
10	CS	B	434[B]	1/1	0.98	0.06	22,22,22,22	1
10	CS	B	435	1/1	0.99	0.07	24,24,24,24	0
3	CL	A	302	1/1	1.00	0.07	20,20,20,20	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.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.