



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 3, 2024 – 03:48 PM EST

PDB ID : 1M0Q  
Title : Structure of Dialkylglycine Decarboxylase Complexed with S-1-aminoethanep  
hosphonate  
Authors : Liu, W.; Rogers, C.J.; Fisher, A.J.; Toney, M.D.  
Deposited on : 2002-06-13  
Resolution : 2.00 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) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

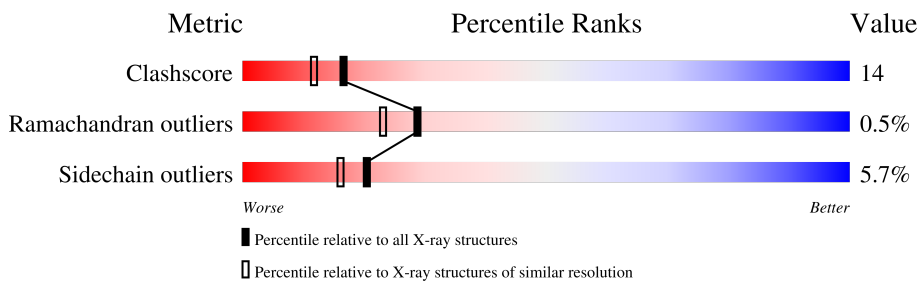
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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))
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	433	 66% 29% .

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 3511 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 2,2-Dialkylglycine Decarboxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	431	3252	2051	576	607	18	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	15	HIS	GLN	SEE REMARK 999	UNP P16932
A	81	GLU	GLY	SEE REMARK 999	UNP P16932

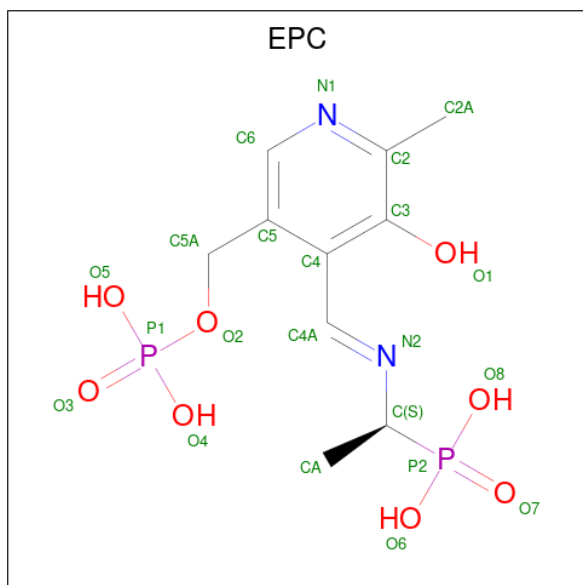
- Molecule 2 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total K 1 1	0	0

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

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

- Molecule 4 is (1S)-1-(((1E)-{3-HYDROXY-2-METHYL-5-[(PHOSPHONOOXY)METHYL]PYRIDIN-4-YL}METHYLENE)AMINO)ETHYLPHOSPHONIC ACID (three-letter code: EPC) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>2</sub>O<sub>8</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	A	1	22	10	2	8	2	0	0

- Molecule 5 is water.

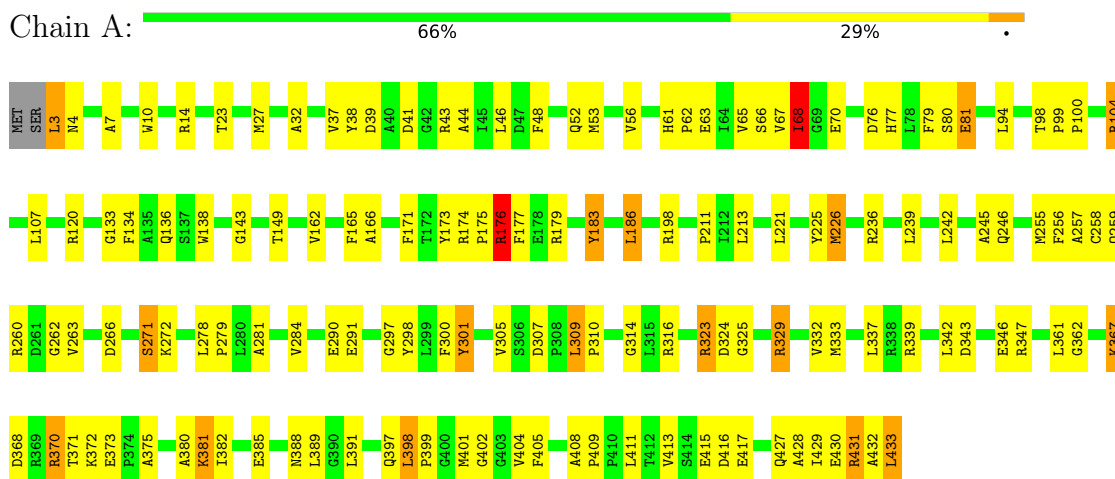
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	235	Total	O	0	0
			235	235		

### 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. 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. 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.

Note EDS was not executed.

- Molecule 1: 2,2-Dialkylglycine Decarboxylase



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 64 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	150.81Å 150.81Å 85.05Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.00	Depositor
% Data completeness (in resolution range)	99.2 (20.00-2.00)	Depositor
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	TNT, CNS	Depositor
R, $R_{free}$	0.191 , 0.240	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	3511	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

## 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: K, EPC, NA

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	1.65	32/3309 (1.0%)	1.20	18/4478 (0.4%)

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	415	GLU	CG-CD	10.75	1.68	1.51
1	A	430	GLU	CG-CD	10.35	1.67	1.51
1	A	176	ARG	CG-CD	7.79	1.71	1.51
1	A	415	GLU	CB-CG	7.56	1.66	1.52
1	A	257	ALA	CA-CB	7.55	1.68	1.52
1	A	81	GLU	CB-CG	7.28	1.66	1.52
1	A	176	ARG	CZ-NH2	7.16	1.42	1.33
1	A	176	ARG	CB-CG	6.80	1.71	1.52
1	A	63	GLU	CG-CD	-6.72	1.41	1.51
1	A	177	PHE	CE2-CZ	6.54	1.49	1.37
1	A	290	GLU	CB-CG	6.40	1.64	1.52
1	A	380	ALA	CA-CB	-6.36	1.39	1.52
1	A	300	PHE	CD2-CE2	6.23	1.51	1.39
1	A	70	GLU	CB-CG	-6.15	1.40	1.52
1	A	134	PHE	CE2-CZ	5.92	1.48	1.37
1	A	7	ALA	CA-CB	-5.86	1.40	1.52
1	A	291	GLU	CG-CD	5.85	1.60	1.51
1	A	301	TYR	CD2-CE2	5.79	1.48	1.39
1	A	236	ARG	CZ-NH1	5.71	1.40	1.33
1	A	416	ASP	CB-CG	5.58	1.63	1.51
1	A	70	GLU	CD-OE2	5.50	1.31	1.25
1	A	183	TYR	CB-CG	5.50	1.59	1.51
1	A	430	GLU	CB-CG	5.40	1.62	1.52
1	A	225	TYR	CE1-CZ	5.22	1.45	1.38
1	A	430	GLU	CD-OE2	5.21	1.31	1.25
1	A	417	GLU	CG-CD	5.20	1.59	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	314	GLY	CA-C	5.19	1.60	1.51
1	A	165	PHE	CB-CG	-5.18	1.42	1.51
1	A	262	GLY	CA-C	5.14	1.60	1.51
1	A	284	VAL	CB-CG1	5.14	1.63	1.52
1	A	415	GLU	CD-OE2	5.05	1.31	1.25
1	A	301	TYR	CD1-CE1	5.01	1.46	1.39

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	104	ARG	NE-CZ-NH1	7.70	124.15	120.30
1	A	226	MET	CG-SD-CE	-7.52	88.16	100.20
1	A	174	ARG	NE-CZ-NH1	-6.63	116.98	120.30
1	A	39	ASP	CB-CG-OD1	-6.41	112.53	118.30
1	A	186	LEU	CB-CG-CD1	6.12	121.40	111.00
1	A	260	ARG	NE-CZ-NH1	6.02	123.31	120.30
1	A	342	LEU	CB-CG-CD1	-5.68	101.34	111.00
1	A	431	ARG	NE-CZ-NH1	-5.67	117.46	120.30
1	A	266	ASP	CB-CG-OD2	5.60	123.34	118.30
1	A	68	ILE	CG1-CB-CG2	-5.58	99.12	111.40
1	A	389	LEU	CB-CG-CD2	-5.48	101.68	111.00
1	A	236	ARG	NE-CZ-NH2	-5.48	117.56	120.30
1	A	3	LEU	CB-CG-CD1	5.47	120.30	111.00
1	A	402	GLY	N-CA-C	-5.35	99.72	113.10
1	A	120	ARG	NE-CZ-NH2	-5.19	117.71	120.30
1	A	324	ASP	CB-CG-OD2	5.16	122.94	118.30
1	A	307	ASP	CB-CG-OD1	5.05	122.84	118.30
1	A	94	LEU	CB-CG-CD1	-5.01	102.49	111.00

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	3252	0	3279	93	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	1	0	0	0	0
3	A	1	0	0	0	0
4	A	22	0	12	0	0
5	A	235	0	0	3	0
All	All	3511	0	3291	93	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 14.

All (93) 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:3:LEU:HD12	1:A:4:ASN:H	1.17	1.08
1:A:278:LEU:HG	1:A:279:PRO:HD2	1.38	1.02
1:A:370:ARG:HH11	1:A:370:ARG:HG3	1.30	0.94
1:A:332:VAL:HG12	1:A:333:MET:HE2	1.47	0.93
1:A:79:PHE:CE2	1:A:81:GLU:HB2	2.08	0.88
1:A:278:LEU:HG	1:A:279:PRO:CD	2.08	0.83
1:A:368:ASP:HB3	1:A:371:THR:OG1	1.82	0.80
1:A:10:TRP:O	1:A:14:ARG:HG3	1.87	0.75
1:A:61:HIS:ND1	1:A:62:PRO:HD2	2.01	0.75
1:A:67:VAL:HB	1:A:316:ARG:NH1	2.02	0.74
1:A:3:LEU:HD13	1:A:41:ASP:OD2	1.90	0.71
1:A:246:GLN:HG2	1:A:272:LYS:HE2	1.74	0.70
1:A:371:THR:OG1	1:A:373:GLU:HB2	1.91	0.70
1:A:79:PHE:CD2	1:A:81:GLU:HB2	2.27	0.70
1:A:3:LEU:CD1	1:A:4:ASN:H	2.00	0.69
1:A:3:LEU:HD12	1:A:4:ASN:N	2.01	0.69
1:A:329:ARG:HB3	1:A:329:ARG:CZ	2.24	0.67
1:A:278:LEU:CG	1:A:279:PRO:HD2	2.21	0.66
1:A:370:ARG:NH1	5:A:533:HOH:O	2.30	0.65
1:A:370:ARG:HG3	1:A:370:ARG:NH1	2.06	0.63
1:A:138:TRP:HA	1:A:149:THR:HG23	1.82	0.61
1:A:246:GLN:HG2	1:A:272:LYS:CE	2.31	0.60
1:A:309:LEU:C	1:A:309:LEU:HD12	2.23	0.59
1:A:368:ASP:O	1:A:372:LYS:N	2.27	0.59
1:A:246:GLN:CG	1:A:272:LYS:HE2	2.33	0.58
1:A:332:VAL:HG12	1:A:333:MET:CE	2.27	0.57
1:A:255:MET:HB3	1:A:259:GLN:HE22	1.69	0.57
1:A:38:TYR:CE1	1:A:44:ALA:HB2	2.40	0.56
1:A:171:PHE:CE1	1:A:173:TYR:HB3	2.41	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:211:PRO:O	1:A:221:LEU:HG	2.07	0.54
1:A:323:ARG:HH11	1:A:323:ARG:HG2	1.72	0.54
1:A:56:VAL:HB	1:A:411:LEU:HG	1.89	0.53
1:A:343:ASP:O	1:A:346:GLU:HB2	2.08	0.53
1:A:242:LEU:CD1	1:A:258:CYS:HB3	2.39	0.52
1:A:362:GLY:HA2	1:A:405:PHE:O	2.10	0.52
1:A:337:LEU:HD23	1:A:361:LEU:HD12	1.92	0.52
1:A:98:THR:HB	1:A:99:PRO:HD2	1.90	0.51
1:A:67:VAL:HG13	1:A:68:ILE:N	2.25	0.51
1:A:61:HIS:CE1	1:A:62:PRO:HD2	2.45	0.51
1:A:397:GLN:C	1:A:398:LEU:HD12	2.32	0.50
1:A:38:TYR:HA	1:A:43:ARG:O	2.10	0.50
1:A:239:LEU:HD12	1:A:239:LEU:N	2.25	0.50
1:A:398:LEU:HD12	1:A:398:LEU:N	2.28	0.49
1:A:256:PHE:H	1:A:259:GLN:NE2	2.09	0.49
1:A:133:GLY:O	1:A:166:ALA:HA	2.12	0.49
1:A:381:LYS:HE2	1:A:432:ALA:HA	1.95	0.48
1:A:325:GLY:HA2	5:A:580:HOH:O	2.13	0.48
1:A:255:MET:HG3	1:A:256:PHE:CE2	2.48	0.48
1:A:213:LEU:HD12	1:A:213:LEU:N	2.28	0.48
1:A:76:ASP:CG	1:A:77:HIS:H	2.16	0.47
1:A:258:CYS:HB2	1:A:263:VAL:O	2.14	0.47
1:A:309:LEU:HB3	1:A:310:PRO:HD3	1.96	0.47
1:A:278:LEU:HG	1:A:279:PRO:N	2.30	0.47
1:A:375:ALA:N	5:A:670:HOH:O	2.44	0.47
1:A:67:VAL:HB	1:A:316:ARG:HH12	1.77	0.47
1:A:175:PRO:O	1:A:176:ARG:HD3	2.15	0.46
1:A:398:LEU:HB3	1:A:399:PRO:HD2	1.98	0.46
1:A:32:ALA:HA	1:A:37:VAL:HA	1.97	0.46
1:A:38:TYR:HE1	1:A:44:ALA:HB2	1.81	0.46
1:A:382:ILE:HD13	1:A:429:ILE:HG12	1.98	0.46
1:A:80:SER:HB2	1:A:301:TYR:CZ	2.50	0.46
1:A:245:ALA:O	1:A:272:LYS:HB2	2.15	0.46
1:A:226:MET:O	1:A:226:MET:HG3	2.15	0.46
1:A:61:HIS:O	1:A:65:VAL:HG23	2.16	0.46
1:A:323:ARG:HG2	1:A:323:ARG:NH1	2.31	0.46
1:A:46:LEU:HD23	1:A:391:LEU:HD13	1.98	0.45
1:A:333:MET:CE	1:A:333:MET:HA	2.46	0.45
1:A:68:ILE:HD13	1:A:68:ILE:HG23	1.62	0.45
1:A:107:LEU:O	1:A:305:VAL:HA	2.16	0.45
1:A:385:GLU:HB2	1:A:428:ALA:HB1	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:408:ALA:N	1:A:409:PRO:HD3	2.31	0.44
1:A:323:ARG:HH11	1:A:323:ARG:CG	2.30	0.44
1:A:61:HIS:CG	1:A:62:PRO:HD2	2.52	0.44
1:A:23:THR:HG23	1:A:23:THR:O	2.17	0.44
1:A:175:PRO:HB3	1:A:183:TYR:CD2	2.53	0.44
1:A:367:LYS:HG3	1:A:375:ALA:HA	1.99	0.44
1:A:76:ASP:OD1	1:A:77:HIS:N	2.39	0.44
1:A:429:ILE:O	1:A:433:LEU:HD12	2.18	0.43
1:A:43:ARG:NH2	1:A:388:ASN:O	2.44	0.43
1:A:175:PRO:HB3	1:A:183:TYR:CG	2.53	0.43
1:A:52:GLN:O	1:A:53:MET:HB2	2.19	0.43
1:A:398:LEU:N	1:A:398:LEU:CD1	2.82	0.42
1:A:99:PRO:HA	1:A:100:PRO:HD3	1.69	0.42
1:A:413:VAL:O	1:A:413:VAL:HG13	2.20	0.41
1:A:162:VAL:H	1:A:162:VAL:HG23	1.54	0.41
1:A:297:GLY:O	1:A:298:TYR:C	2.57	0.41
1:A:61:HIS:HA	1:A:62:PRO:HD3	1.78	0.41
1:A:401:MET:HE3	1:A:404:VAL:HG23	2.02	0.41
1:A:271:SER:HA	1:A:281:ALA:HA	2.02	0.41
1:A:179:ARG:HD3	1:A:179:ARG:HA	1.92	0.41
1:A:333:MET:HE2	1:A:333:MET:N	2.36	0.40
1:A:427:GLN:O	1:A:431:ARG:HG3	2.22	0.40
1:A:3:LEU:HD12	1:A:4:ASN:HB2	2.03	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	429/433 (99%)	411 (96%)	16 (4%)	2 (0%)	29 23

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	143	GLY
1	A	271	SER

### 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	334/336 (99%)	315 (94%)	19 (6%)	20 16

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	27	MET
1	A	48	PHE
1	A	66	SER
1	A	68	ILE
1	A	104	ARG
1	A	136	GLN
1	A	176	ARG
1	A	186	LEU
1	A	198	ARG
1	A	309	LEU
1	A	323	ARG
1	A	329	ARG
1	A	339	ARG
1	A	347	ARG
1	A	367	LYS
1	A	370	ARG
1	A	381	LYS
1	A	398	LEU
1	A	433	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	199	GLN

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Mol	Chain	Res	Type
1	A	259	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 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 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
4	EPC	A	435	-	21,22,22	4.05	9 (42%)	26,33,33	1.56	4 (15%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EPC	A	435	-	-	1/15/17/17	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	435	EPC	P2-C	-10.99	1.68	1.84
4	A	435	EPC	C4-C3	8.59	1.53	1.40
4	A	435	EPC	C6-C5	6.99	1.52	1.37
4	A	435	EPC	C2-N1	5.15	1.43	1.33
4	A	435	EPC	P2-O7	5.02	1.58	1.49
4	A	435	EPC	P2-O6	3.91	1.61	1.54
4	A	435	EPC	C4-C4A	2.96	1.52	1.46
4	A	435	EPC	CA-C	2.92	1.60	1.52
4	A	435	EPC	C2A-C2	2.48	1.54	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	435	EPC	C-N2-C4A	5.24	127.19	117.87
4	A	435	EPC	O4-P1-O2	2.95	114.59	106.73
4	A	435	EPC	C6-N1-C2	2.31	123.44	119.17
4	A	435	EPC	CA-C-N2	2.14	112.60	108.54

There are no chirality outliers.

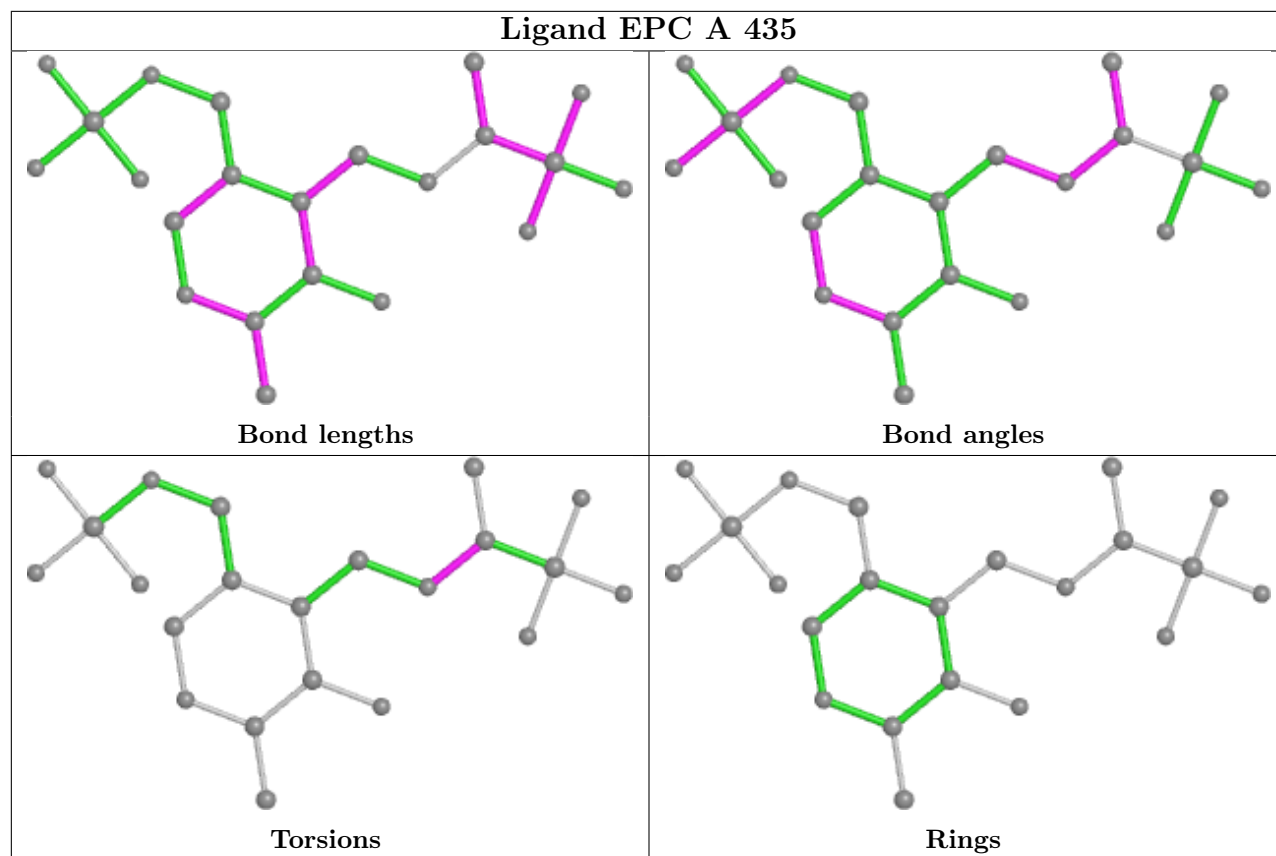
All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	435	EPC	CA-C-N2-C4A

There are no ring outliers.

No monomer is involved in short contacts.

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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.