



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 15, 2024 – 08:15 PM EDT

PDB ID : 4QSJ  
Title : Crystal structure of human carbonic anhydrase isozyme XIII with 2-chloro-4-  
{[(4-methyl-6-oxo-1,6-dihydropyrimidin-2-yl)thio]acetyl}benzenesulfonamide  
Authors : Smirnov, A.; Manakova, E.; Grazulis, S.  
Deposited on : 2014-07-04  
Resolution : 1.70 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)  
Xtriage (Phenix) : 1.13  
EDS : 2.37.1  
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) : 2.37.1

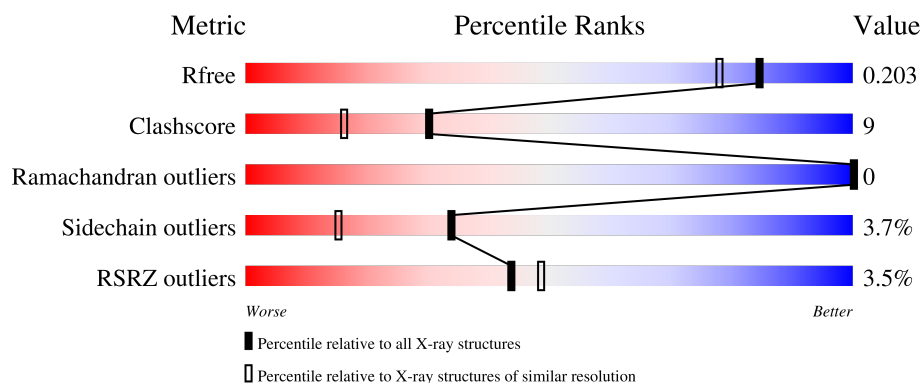
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


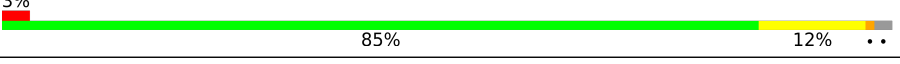
The reported resolution of this entry is 1.70 Å.

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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	263	
1	B	263	

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	EWV	A	302	-	-	X	-
3	EWV	B	302[A]	-	-	X	-
4	PEG	B	303	-	-	X	-
4	PEG	B	306	-	-	X	-
6	CIT	B	308	-	X	-	-
7	EDO	B	309	-	-	X	-

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 4942 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 Carbonic anhydrase 13.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	258	Total	C	N	O	S	0	8	0
			2115	1346	368	400	1			
1	A	260	Total	C	N	O	S	0	10	0
			2160	1375	375	409	1			

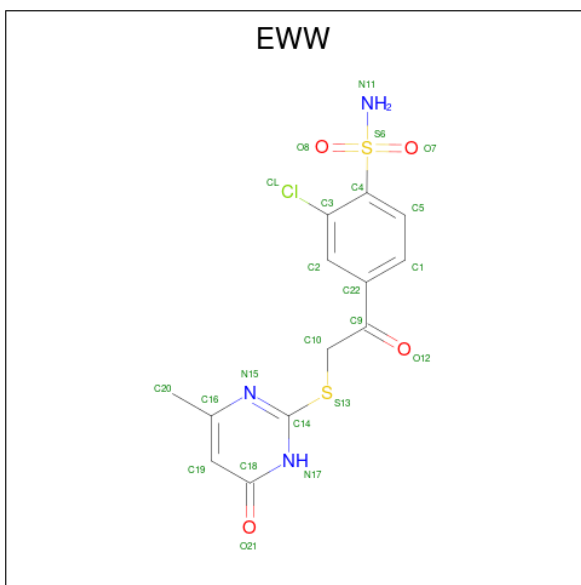
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-1	MET	-	expression tag	UNP Q8N1Q1
A	-1	MET	-	expression tag	UNP Q8N1Q1

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

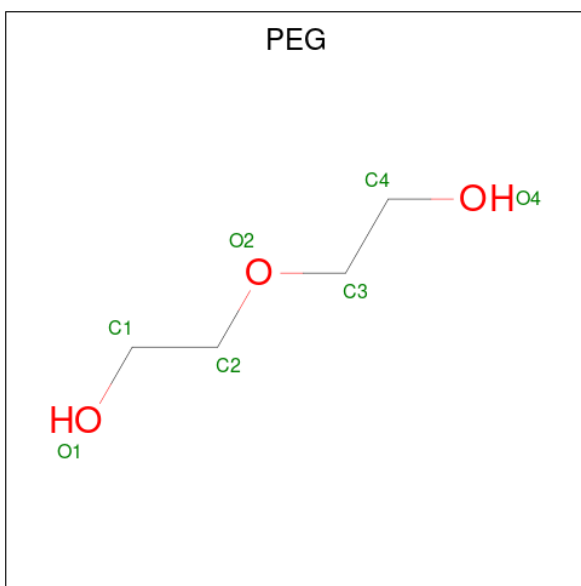
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Zn	0	0
			1	1		
2	A	1	Total	Zn	0	0
			1	1		

- Molecule 3 is 2-chloro-4-[[[4-methyl-6-oxo-1,6-dihydropyrimidin-2-yl)sulfanyl]acetyl]benzenesulfonamide (three-letter code: EWW) (formula: C<sub>13</sub>H<sub>12</sub>ClN<sub>3</sub>O<sub>4</sub>S<sub>2</sub>).



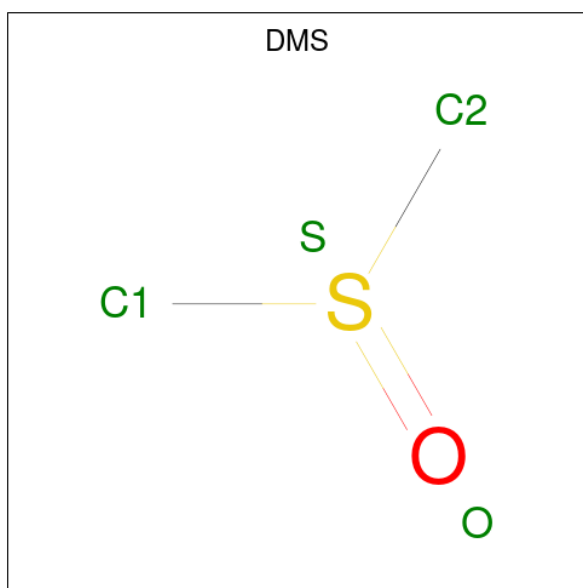
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	B	1	Total	C	Cl	N	O	S	0	1
			46	26	2	6	8	4		
3	A	1	Total	C	Cl	N	O	S	0	0
			23	13	1	3	4	2		

- Molecule 4 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



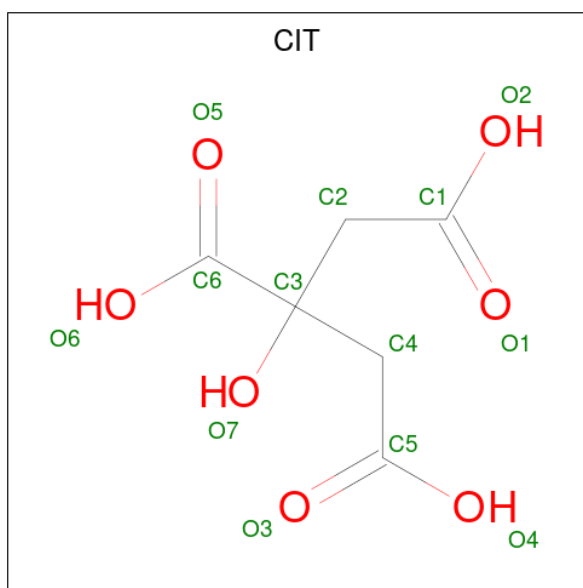
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			7	4	3		
4	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 5 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula:  $C_2H_6OS$ ).



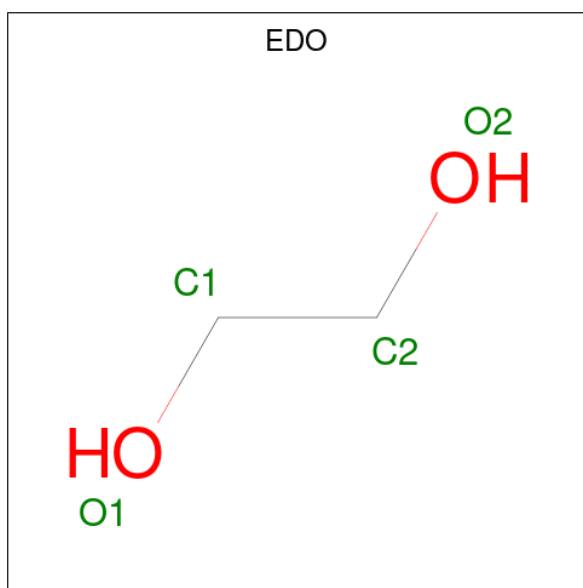
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	S	
			4	2	1	1	
							0
							0

- Molecule 6 is CITRIC ACID (three-letter code: CIT) (formula:  $C_6H_8O_7$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O		
			13	6	7	0	0
6	B	1	Total	C	O		
			13	6	7	0	0

- Molecule 7 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula:  $C_2H_6O_2$ ).



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

- Molecule 8 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Ni	0	0
			1	1		

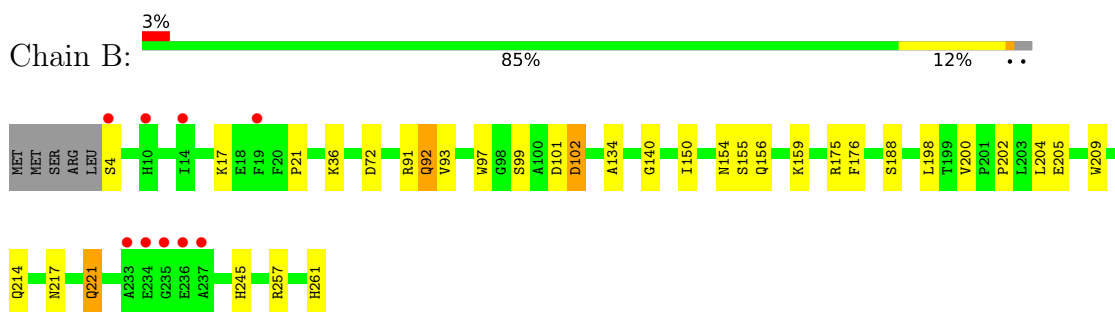
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	B	290	Total	O	0	0
			290	290		
9	A	253	Total	O	0	0
			253	253		

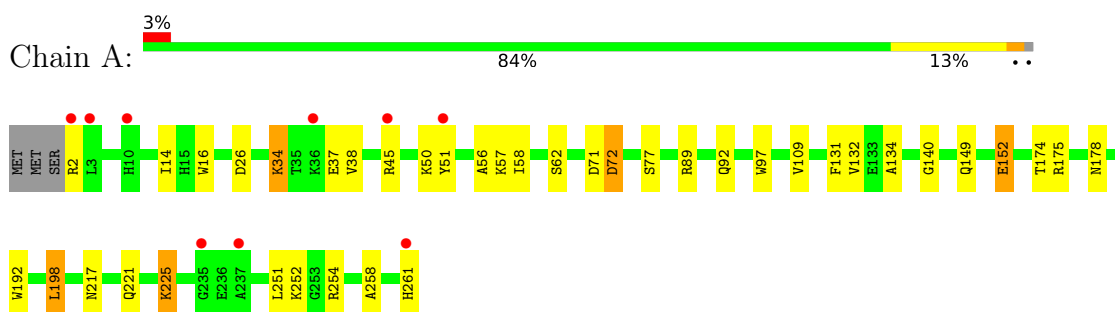
### 3 Residue-property plots [i](#)

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: Carbonic anhydrase 13



- Molecule 1: Carbonic anhydrase 13



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	56.66Å 57.78Å 160.08Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.87 – 1.70 27.87 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.8 (27.87-1.70) 98.8 (27.87-1.70)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.60 (at 1.70Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.164 , 0.204 0.162 , 0.203	Depositor DCC
$R_{free}$ test set	5865 reflections (10.11%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	15.3	Xtriage
Anisotropy	0.270	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 47.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.022 for k,h,-l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	4942	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.99% 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: EDO, NI, CIT, EWW, DMS, ZN, PEG

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	1.28	7/2223 (0.3%)	1.11	3/3025 (0.1%)
1	B	1.24	3/2178 (0.1%)	1.04	1/2963 (0.0%)
All	All	1.26	10/4401 (0.2%)	1.08	4/5988 (0.1%)

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	205	GLU	CD-OE1	5.67	1.31	1.25
1	B	257	ARG	CZ-NH1	5.64	1.40	1.33
1	A	152[A]	GLU	CD-OE2	-5.60	1.19	1.25
1	A	152[B]	GLU	CD-OE2	-5.60	1.19	1.25
1	A	192	TRP	CD2-CE2	5.37	1.47	1.41
1	A	97	TRP	CD2-CE2	5.32	1.47	1.41
1	A	72	ASP	CA-C	5.26	1.66	1.52
1	A	16	TRP	CD2-CE2	5.19	1.47	1.41
1	A	62	SER	CB-OG	5.11	1.48	1.42
1	B	209	TRP	CD2-CE2	5.02	1.47	1.41

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	198	LEU	CB-CG-CD2	5.38	120.15	111.00
1	A	254	ARG	NE-CZ-NH1	-5.34	117.63	120.30
1	B	72	ASP	CB-CG-OD2	5.32	123.09	118.30
1	A	58	ILE	CG1-CB-CG2	-5.21	99.94	111.40

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts ⓘ

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	2160	0	2086	29	0
1	B	2115	0	2039	47	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	23	0	12	7	0
3	B	46	0	22	17	0
4	B	14	0	20	11	0
5	B	4	0	6	0	0
6	B	26	0	10	2	0
7	B	8	0	12	5	0
8	A	1	0	0	0	0
9	A	253	0	0	4	0
9	B	290	0	0	4	0
All	All	4942	0	4207	80	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 9.

All (80) 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)
4:B:306:PEG:H41	9:B:536:HOH:O	1.31	1.24
1:A:221:GLN:O	1:A:225:LYS:HD3	1.53	1.08
1:B:175:ARG:HE	4:B:303:PEG:H31	0.93	1.08
1:B:175:ARG:HE	4:B:303:PEG:C3	1.77	0.97
1:B:175:ARG:NE	4:B:303:PEG:H31	1.78	0.96
1:A:252:LYS:HE2	9:A:622:HOH:O	1.69	0.90
1:A:225:LYS:N	1:A:225:LYS:HD2	1.85	0.88
1:A:221:GLN:O	1:A:225:LYS:CD	2.23	0.85
1:A:178:ASN:HB3	9:A:639:HOH:O	1.85	0.77
1:B:155:SER:OG	7:B:309:EDO:H21	1.86	0.76
1:B:217[B]:ASN:HD22	1:B:217[B]:ASN:H	1.33	0.74
1:A:109[B]:VAL:O	1:A:109[B]:VAL:HG23	1.88	0.73
1:B:92[A]:GLN:HE21	3:B:302[A]:EWW:C20	2.05	0.68
1:B:198:LEU:HD22	3:B:302[A]:EWW:C3	2.24	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:217[A]:ASN:ND2	9:B:682:HOH:O	2.26	0.67
1:A:225:LYS:HD2	1:A:225:LYS:H	1.58	0.66
1:B:92[A]:GLN:CG	3:B:302[A]:EWW:H11	2.27	0.65
1:B:217[B]:ASN:H	1:B:217[B]:ASN:ND2	1.95	0.65
1:B:92[A]:GLN:NE2	3:B:302[A]:EWW:H11	2.15	0.62
1:A:149:GLN:HE21	1:A:217[A]:ASN:HD21	1.48	0.62
1:B:92[A]:GLN:HE21	3:B:302[A]:EWW:H11	1.65	0.61
1:B:198:LEU:HD22	3:B:302[A]:EWW:C2	2.31	0.60
1:B:92[B]:GLN:HG2	1:B:93:VAL:N	2.18	0.59
1:A:174[B]:THR:HG22	1:A:175[B]:ARG:O	2.02	0.59
1:B:150:ILE:HG21	4:B:306:PEG:H12	1.83	0.59
1:A:149:GLN:HE21	1:A:217[A]:ASN:ND2	2.01	0.58
1:B:92[A]:GLN:HG3	3:B:302[A]:EWW:H11	1.86	0.57
1:B:156[B]:GLN:HG3	7:B:309:EDO:C2	2.34	0.57
1:A:57:LYS:HE2	1:A:71:ASP:HB2	1.86	0.56
1:A:132:VAL:HG22	3:A:302:EWW:C19	2.36	0.56
1:B:221:GLN:HE21	1:B:221:GLN:H	1.52	0.56
1:B:221:GLN:H	1:B:221:GLN:NE2	2.05	0.55
1:B:175:ARG:NE	4:B:303:PEG:C3	2.54	0.55
6:B:308:CIT:H22	9:B:471:HOH:O	2.06	0.55
1:B:92[A]:GLN:NE2	3:B:302[A]:EWW:C20	2.69	0.55
1:B:198:LEU:HD22	3:B:302[A]:EWW:CL	2.44	0.55
1:B:175:ARG:HH21	4:B:303:PEG:H32	1.72	0.53
1:A:198:LEU:CD1	3:A:302:EWW:S13	2.97	0.53
1:B:101:ASP:CB	4:B:306:PEG:H21	2.39	0.52
1:B:101:ASP:HB3	4:B:306:PEG:H21	1.91	0.52
1:A:34:LYS:HG2	9:A:623:HOH:O	2.09	0.52
1:A:26:ASP:HA	1:A:252:LYS:HD2	1.90	0.52
1:B:159:LYS:HG2	1:B:176:PHE:CE1	2.45	0.51
3:B:302[A]:EWW:N15	3:B:302[A]:EWW:C9	2.72	0.51
1:A:134:ALA:O	1:A:140:GLY:HA3	2.11	0.51
1:A:198:LEU:HD13	3:A:302:EWW:S13	2.51	0.50
1:B:200:VAL:HG22	3:B:302[B]:EWW:C5	2.42	0.50
1:B:97:TRP:O	1:B:245:HIS:HD2	1.94	0.49
1:B:134:ALA:O	1:B:140:GLY:HA3	2.13	0.49
1:A:34:LYS:HE2	1:A:37:GLU:HG3	1.93	0.49
1:B:154:ASN:OD1	7:B:309:EDO:H12	2.13	0.49
1:B:102:ASP:CG	9:B:632:HOH:O	2.52	0.48
1:B:91:ARG:HE	3:B:302[A]:EWW:H8	1.79	0.48
1:B:200:VAL:HG21	3:B:302[B]:EWW:H5	1.96	0.47
1:A:131:PHE:HZ	3:A:302:EWW:H6	1.78	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:175:ARG:NH2	4:B:303:PEG:H32	2.30	0.46
1:B:92[B]:GLN:CG	1:B:93:VAL:N	2.79	0.46
1:B:188:SER:H	1:B:214:GLN:NE2	2.14	0.46
1:B:156[B]:GLN:HG3	7:B:309:EDO:C1	2.46	0.45
1:B:198:LEU:HA	3:B:302[B]:EWW:O7	2.15	0.45
3:A:302:EWW:H6	3:A:302:EWW:H4	1.79	0.45
1:A:51[B]:TYR:HD2	9:A:505:HOH:O	2.00	0.44
1:A:38:VAL:CG1	1:A:258:ALA:HB2	2.47	0.44
1:A:132:VAL:HG22	3:A:302:EWW:H8	2.00	0.44
1:B:159:LYS:HG2	1:B:176:PHE:HE1	1.80	0.44
1:A:34:LYS:HZ2	1:A:34:LYS:HG3	1.51	0.44
1:B:156[B]:GLN:HG3	7:B:309:EDO:H12	2.00	0.44
1:B:217[B]:ASN:HD22	1:B:217[B]:ASN:N	2.09	0.44
1:B:200:VAL:CG2	3:B:302[B]:EWW:C1	2.97	0.43
1:A:72:ASP:CA	1:A:89:ARG:HD3	2.49	0.43
1:A:109[B]:VAL:O	1:A:109[B]:VAL:CG2	2.61	0.43
1:A:198:LEU:HD22	3:A:302:EWW:CL	2.56	0.42
1:B:92[A]:GLN:CB	3:B:302[A]:EWW:H11	2.50	0.42
1:A:38:VAL:HG11	1:A:258:ALA:HB2	2.01	0.42
1:B:175:ARG:HH21	4:B:303:PEG:C3	2.33	0.42
1:B:200:VAL:CG2	3:B:302[B]:EWW:H5	2.50	0.42
1:B:99:SER:OG	6:B:305:CIT:O5	2.37	0.41
1:B:202:PRO:HG2	1:B:204:LEU:HG	2.03	0.40
1:A:50:LYS:O	1:A:77:SER:HA	2.21	0.40
1:A:56:ALA:O	1:A:57:LYS:HD3	2.20	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	268/263 (102%)	258 (96%)	10 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	264/263 (100%)	260 (98%)	4 (2%)	0	100	100
All	All	532/526 (101%)	518 (97%)	14 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	239/232 (103%)	228 (95%)	11 (5%)	27	10
1	B	235/232 (101%)	226 (96%)	9 (4%)	33	14
All	All	474/464 (102%)	454 (96%)	20 (4%)	34	12

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	4	SER
1	B	17	LYS
1	B	21	PRO
1	B	36	LYS
1	B	92[A]	GLN
1	B	92[B]	GLN
1	B	102	ASP
1	B	221	GLN
1	B	261	HIS
1	A	2	ARG
1	A	14	ILE
1	A	34	LYS
1	A	45	ARG
1	A	92[A]	GLN
1	A	92[B]	GLN
1	A	152[A]	GLU
1	A	152[B]	GLU
1	A	225	LYS

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Mol	Chain	Res	Type
1	A	251	LEU
1	A	261	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	103	HIS
1	B	178	ASN
1	B	214	GLN
1	B	221	GLN
1	B	245	HIS
1	B	261	HIS
1	A	173	GLN
1	A	214	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 13 ligands modelled in this entry, 3 are monoatomic - leaving 10 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
3	EWV	A	302	2	24,24,24	3.50	7 (29%)	34,35,35	2.30	11 (32%)
3	EWV	B	302[A]	2	24,24,24	3.84	8 (33%)	34,35,35	3.20	15 (44%)
6	CIT	B	305	-	12,12,12	2.04	4 (33%)	17,17,17	1.76	4 (23%)
4	PEG	B	306	-	6,6,6	0.41	0	5,5,5	0.72	0
7	EDO	B	309	-	3,3,3	0.44	0	2,2,2	0.20	0
3	EWV	B	302[B]	2	24,24,24	3.81	7 (29%)	34,35,35	2.37	14 (41%)
7	EDO	B	307	-	3,3,3	0.66	0	2,2,2	0.80	0
6	CIT	B	308	-	12,12,12	2.03	6 (50%)	17,17,17	3.86	9 (52%)
4	PEG	B	303	-	6,6,6	0.86	0	5,5,5	1.87	2 (40%)
5	DMS	B	304	-	3,3,3	0.54	0	3,3,3	1.12	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
3	EWV	A	302	2	-	8/15/15/15	0/2/2/2
3	EWV	B	302[A]	2	-	1/15/15/15	0/2/2/2
6	CIT	B	305	-	-	7/16/16/16	-
4	PEG	B	306	-	-	2/4/4/4	-
7	EDO	B	309	-	-	0/1/1/1	-
3	EWV	B	302[B]	2	-	4/15/15/15	0/2/2/2
7	EDO	B	307	-	-	0/1/1/1	-
6	CIT	B	308	-	-	6/16/16/16	-
4	PEG	B	303	-	-	3/4/4/4	-

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	302[B]	EWV	O7-S6	12.34	1.66	1.43
3	B	302[A]	EWV	S6-N11	12.10	1.84	1.60
3	A	302	EWV	S6-N11	12.03	1.84	1.60
3	B	302[A]	EWV	O7-S6	11.92	1.65	1.43
3	B	302[B]	EWV	S6-N11	11.48	1.83	1.60
3	A	302	EWV	O7-S6	9.65	1.61	1.43
3	B	302[B]	EWV	O8-S6	4.98	1.53	1.43
3	B	302[A]	EWV	C14-S13	3.98	1.81	1.75
3	A	302	EWV	C14-N15	3.97	1.38	1.31

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	302[A]	EWV	O8-S6	3.77	1.50	1.43
6	B	305	CIT	C4-C3	3.74	1.58	1.53
3	A	302	EWV	C10-C9	-3.45	1.48	1.51
6	B	305	CIT	C3-C6	-3.45	1.49	1.53
6	B	308	CIT	C2-C3	3.13	1.57	1.53
6	B	308	CIT	O1-C1	3.02	1.32	1.22
3	A	302	EWV	C4-S6	2.78	1.81	1.77
3	B	302[B]	EWV	C14-N15	2.78	1.36	1.31
6	B	308	CIT	O7-C3	-2.62	1.38	1.43
3	B	302[A]	EWV	C14-N15	2.61	1.36	1.31
3	B	302[B]	EWV	C4-S6	2.60	1.80	1.77
3	B	302[B]	EWV	C14-S13	2.51	1.79	1.75
3	A	302	EWV	C14-S13	2.43	1.79	1.75
6	B	305	CIT	O3-C5	2.40	1.30	1.22
3	A	302	EWV	C19-C16	2.34	1.41	1.36
3	B	302[A]	EWV	C19-C16	2.33	1.41	1.36
6	B	308	CIT	C2-C1	2.20	1.57	1.50
6	B	308	CIT	O3-C5	2.19	1.29	1.22
3	B	302[A]	EWV	O21-C18	-2.11	1.20	1.24
6	B	305	CIT	C2-C3	2.10	1.56	1.53
3	B	302[B]	EWV	C10-S13	2.10	1.84	1.80
6	B	308	CIT	O5-C6	2.06	1.28	1.22
3	B	302[A]	EWV	C3-CL	2.01	1.78	1.73

All (55) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	302[A]	EWV	C18-C19-C16	-9.00	115.11	120.17
6	B	308	CIT	C3-C2-C1	8.42	134.20	113.81
6	B	308	CIT	O7-C3-C6	-7.57	98.23	108.86
6	B	308	CIT	O7-C3-C2	-6.40	94.42	109.40
6	B	308	CIT	C4-C3-C2	6.10	125.08	109.16
3	B	302[A]	EWV	C5-C4-C3	6.08	123.33	119.02
3	B	302[A]	EWV	C19-C18-N17	5.94	122.31	115.14
3	A	302	EWV	C20-C16-N15	5.75	120.95	115.06
3	B	302[A]	EWV	C10-C9-C22	5.62	123.17	117.94
3	B	302[A]	EWV	O8-S6-N11	-5.50	99.20	107.36
3	A	302	EWV	C19-C18-N17	5.05	121.24	115.14
3	B	302[B]	EWV	C20-C16-N15	4.86	120.04	115.06
3	A	302	EWV	C19-C16-N15	-4.68	117.56	123.21
3	B	302[B]	EWV	O8-S6-N11	-4.67	100.44	107.36
3	B	302[A]	EWV	C2-C3-C4	-4.62	116.71	121.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	302[A]	EW	S13-C14-N17	4.33	120.08	113.09
3	B	302[B]	EW	S13-C14-N17	4.24	119.94	113.09
3	A	302	EW	C5-C4-C3	3.94	121.81	119.02
3	B	302[B]	EW	C19-C18-N17	3.93	119.88	115.14
6	B	305	CIT	C4-C3-C2	3.82	119.13	109.16
3	B	302[B]	EW	O21-C18-C19	-3.81	120.13	125.47
3	B	302[B]	EW	C10-S13-C14	-3.72	93.06	101.20
3	B	302[A]	EW	C10-S13-C14	-3.70	93.10	101.20
3	B	302[A]	EW	O7-S6-O8	3.53	124.56	118.76
3	B	302[A]	EW	O21-C18-N17	-3.52	114.13	119.31
3	B	302[B]	EW	C10-C9-C22	3.46	121.16	117.94
3	A	302	EW	O21-C18-C19	-3.39	120.72	125.47
3	B	302[B]	EW	C5-C4-C3	3.32	121.37	119.02
6	B	308	CIT	O7-C3-C4	-3.25	101.78	109.40
3	A	302	EW	O8-S6-N11	-3.23	102.57	107.36
3	B	302[A]	EW	O7-S6-N11	3.10	111.95	107.36
3	B	302[B]	EW	C18-C19-C16	-3.01	118.48	120.17
6	B	308	CIT	O5-C6-C3	2.97	126.46	122.25
3	B	302[B]	EW	O7-S6-N11	2.97	111.76	107.36
6	B	308	CIT	C3-C4-C5	2.95	120.95	113.81
3	B	302[A]	EW	O12-C9-C22	-2.90	116.64	120.74
3	A	302	EW	S13-C14-N17	2.79	117.59	113.09
4	B	303	PEG	O1-C1-C2	2.77	127.87	111.81
3	A	302	EW	O7-S6-N11	2.75	111.44	107.36
6	B	305	CIT	O2-C1-C2	2.74	123.16	114.35
3	A	302	EW	O12-C9-C22	2.72	124.59	120.74
6	B	308	CIT	C4-C3-C6	2.66	115.83	110.11
3	B	302[A]	EW	C5-C4-S6	-2.66	113.87	117.52
3	B	302[B]	EW	C19-C16-N15	-2.62	120.05	123.21
6	B	305	CIT	C3-C4-C5	2.55	119.98	113.81
6	B	305	CIT	O2-C1-O1	-2.43	117.25	123.30
3	B	302[B]	EW	O12-C9-C22	-2.41	117.33	120.74
4	B	303	PEG	O2-C2-C1	2.33	120.30	110.07
3	A	302	EW	C10-S13-C14	-2.31	96.14	101.20
3	B	302[A]	EW	N17-C14-N15	-2.22	119.84	123.78
3	A	302	EW	C14-N17-C18	-2.21	118.63	122.30
6	B	308	CIT	O4-C5-O3	-2.17	117.88	123.30
3	B	302[B]	EW	S13-C14-N15	-2.11	120.01	122.04
3	B	302[B]	EW	N17-C14-N15	-2.10	120.06	123.78
3	B	302[A]	EW	S13-C14-N15	-2.03	120.08	122.04

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	302[B]	EWV	N17-C14-S13-C10
3	B	302[B]	EWV	N15-C14-S13-C10
3	A	302	EWV	C9-C10-S13-C14
3	A	302	EWV	N17-C14-S13-C10
3	A	302	EWV	N15-C14-S13-C10
6	B	305	CIT	O7-C3-C4-C5
6	B	308	CIT	O7-C3-C6-O5
6	B	308	CIT	O7-C3-C6-O6
6	B	308	CIT	C4-C3-C6-O5
6	B	308	CIT	C4-C3-C6-O6
4	B	306	PEG	O2-C3-C4-O4
4	B	303	PEG	O2-C3-C4-O4
6	B	305	CIT	C6-C3-C4-C5
6	B	308	CIT	C1-C2-C3-C6
6	B	305	CIT	C2-C3-C4-C5
6	B	308	CIT	C1-C2-C3-O7
3	A	302	EWV	S13-C10-C9-C22
6	B	305	CIT	C2-C3-C6-O6
4	B	303	PEG	C1-C2-O2-C3
3	B	302[B]	EWV	C9-C10-S13-C14
6	B	305	CIT	C2-C3-C6-O5
3	A	302	EWV	S13-C10-C9-O12
3	B	302[A]	EWV	C5-C4-S6-N11
6	B	305	CIT	C3-C4-C5-O3
3	B	302[B]	EWV	S13-C10-C9-C22
6	B	305	CIT	C3-C4-C5-O4
4	B	303	PEG	C4-C3-O2-C2
3	A	302	EWV	C1-C22-C9-C10
3	A	302	EWV	C3-C4-S6-N11
4	B	306	PEG	O1-C1-C2-O2
3	A	302	EWV	C1-C22-C9-O12

There are no ring outliers.

8 monomers are involved in 42 short contacts:

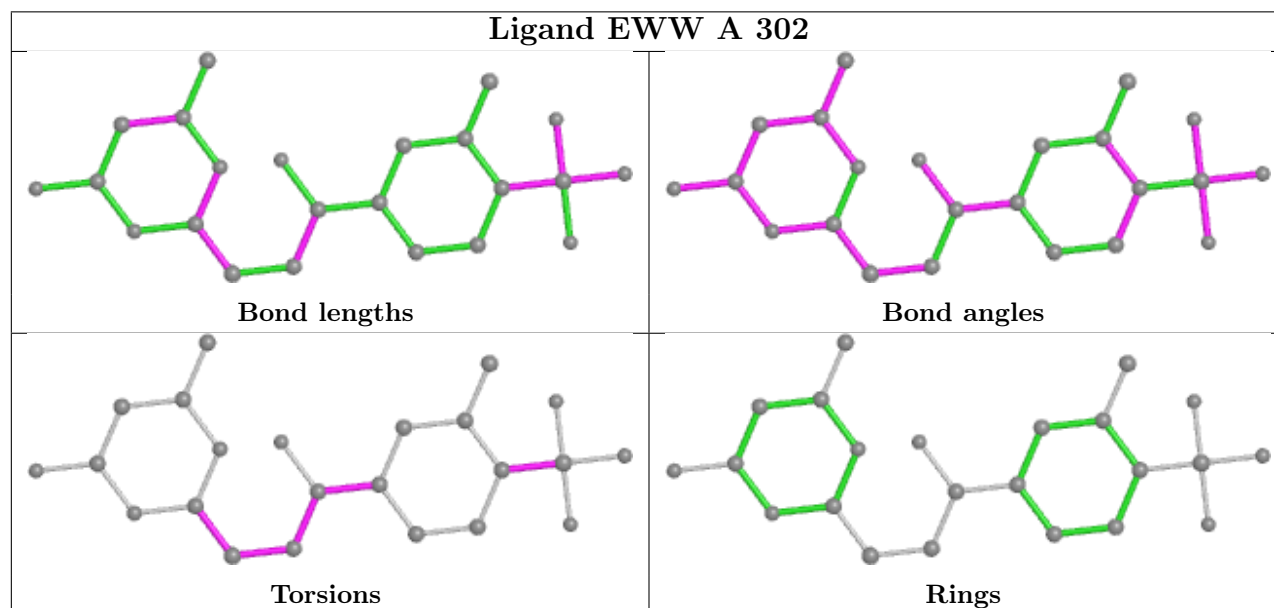
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	302	EWV	7	0
3	B	302[A]	EWV	12	0
6	B	305	CIT	1	0
4	B	306	PEG	4	0
7	B	309	EDO	5	0

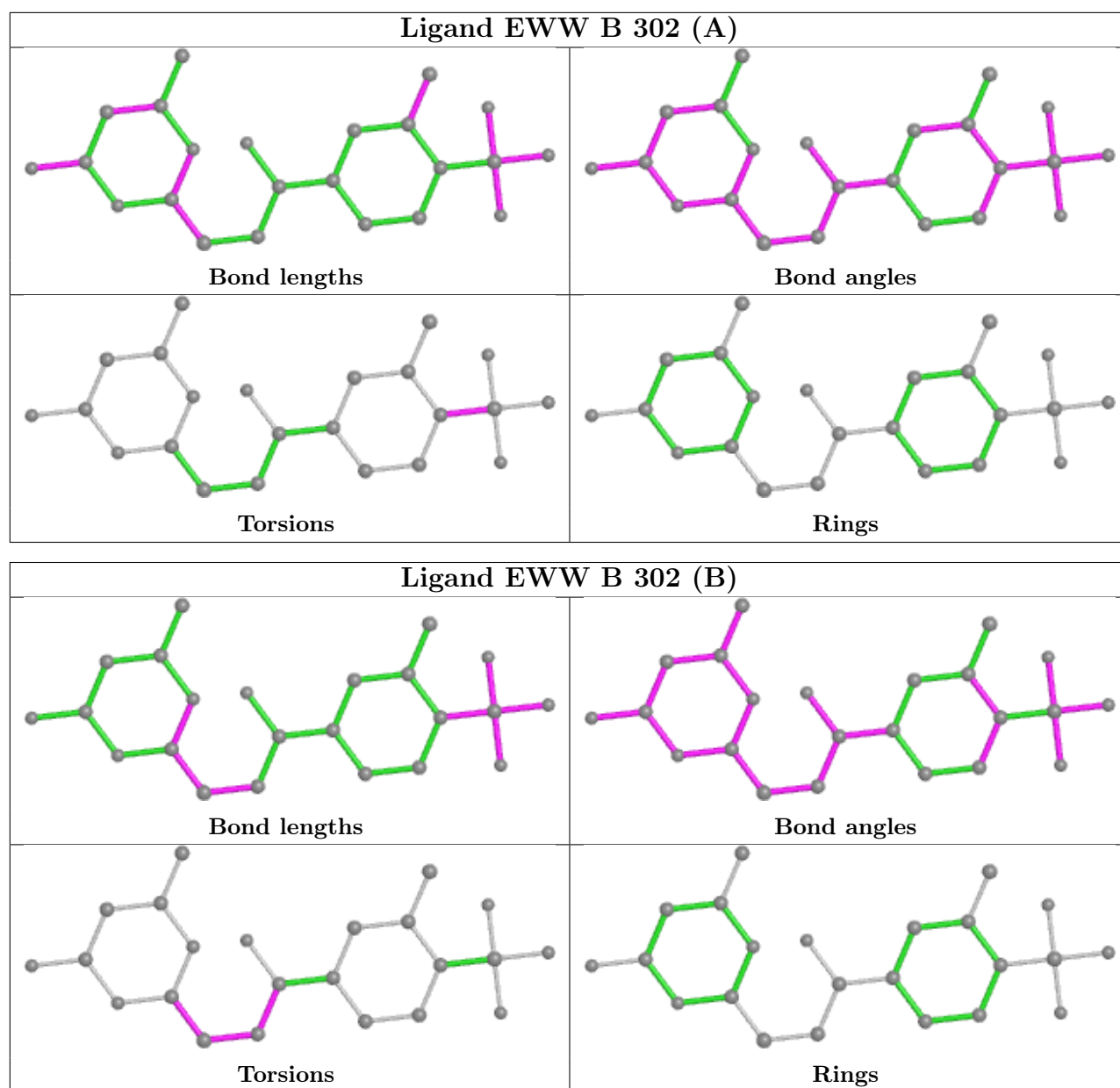
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	302[B]	EWV	5	0
6	B	308	CIT	1	0
4	B	303	PEG	7	0

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	260/263 (98%)	0.06	9 (3%) 44 49	7, 14, 31, 54	2 (0%)
1	B	258/263 (98%)	-0.04	9 (3%) 44 49	7, 13, 29, 47	2 (0%)
All	All	518/526 (98%)	0.01	18 (3%) 44 49	7, 14, 30, 54	4 (0%)

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	3	LEU	8.4
1	B	237	ALA	5.8
1	B	19	PHE	3.8
1	B	235	GLY	3.3
1	A	261	HIS	2.9
1	A	51[A]	TYR	2.9
1	B	234	GLU	2.8
1	A	235	GLY	2.8
1	B	10[A]	HIS	2.8
1	A	2	ARG	2.6
1	B	236	GLU	2.5
1	B	233	ALA	2.5
1	B	14	ILE	2.3
1	A	10	HIS	2.3
1	B	4	SER	2.2
1	A	237	ALA	2.2
1	A	36	LYS	2.2
1	A	45	ARG	2.1

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

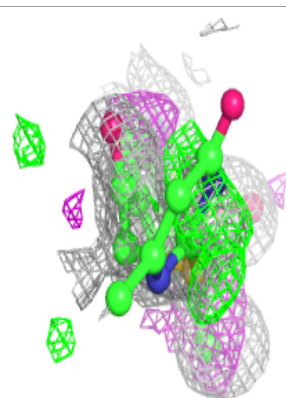
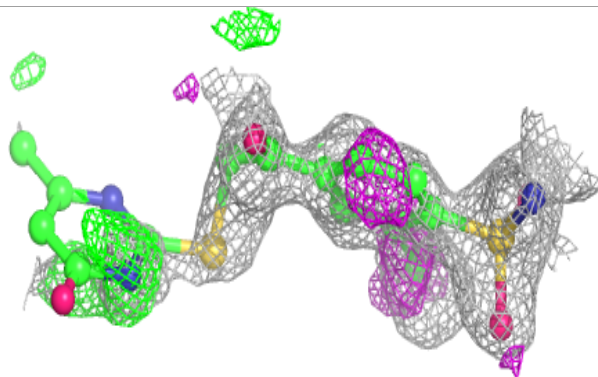
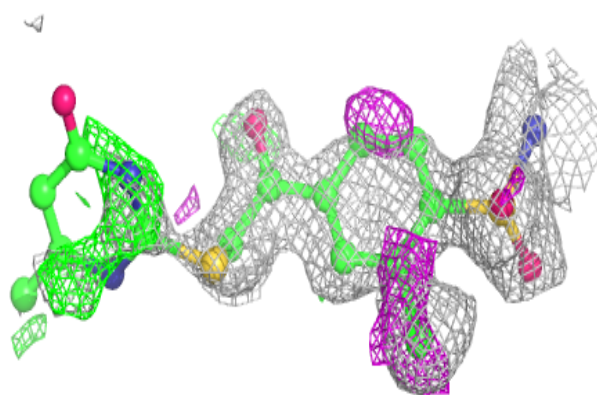
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	CIT	B	308	13/13	0.69	0.39	29,39,55,63	0
6	CIT	B	305	13/13	0.77	0.23	23,36,53,59	0
8	NI	A	303	1/1	0.79	0.11	67,67,67,67	0
5	DMS	B	304	4/4	0.80	0.23	40,51,59,62	0
3	EWV	B	302[B]	23/23	0.87	0.27	22,31,36,40	23
4	PEG	B	303	7/7	0.87	0.20	22,27,31,35	0
3	EWV	B	302[A]	23/23	0.87	0.27	17,26,32,36	23
7	EDO	B	309	4/4	0.90	0.24	31,32,35,39	0
4	PEG	B	306	7/7	0.90	0.33	28,34,47,47	0
7	EDO	B	307	4/4	0.91	0.10	28,29,29,29	0
3	EWV	A	302	23/23	0.96	0.19	13,36,84,90	0
2	ZN	A	301	1/1	1.00	0.04	8,8,8,8	0
2	ZN	B	301	1/1	1.00	0.06	10,10,10,10	0

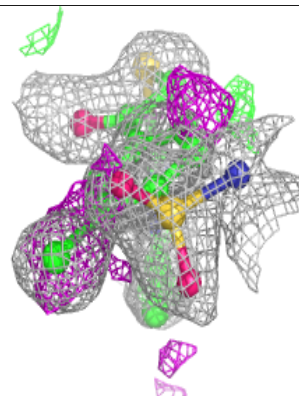
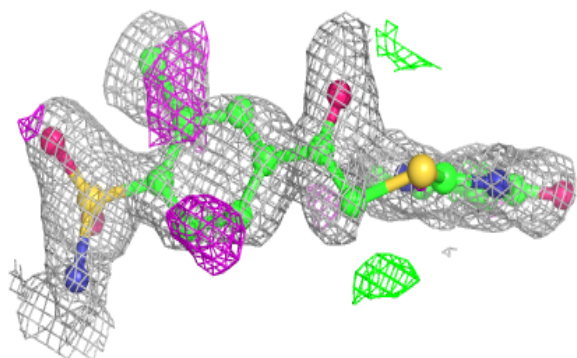
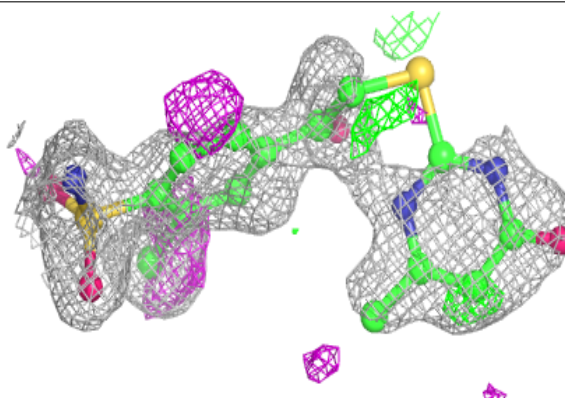
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around EWW B 302 (B):**

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

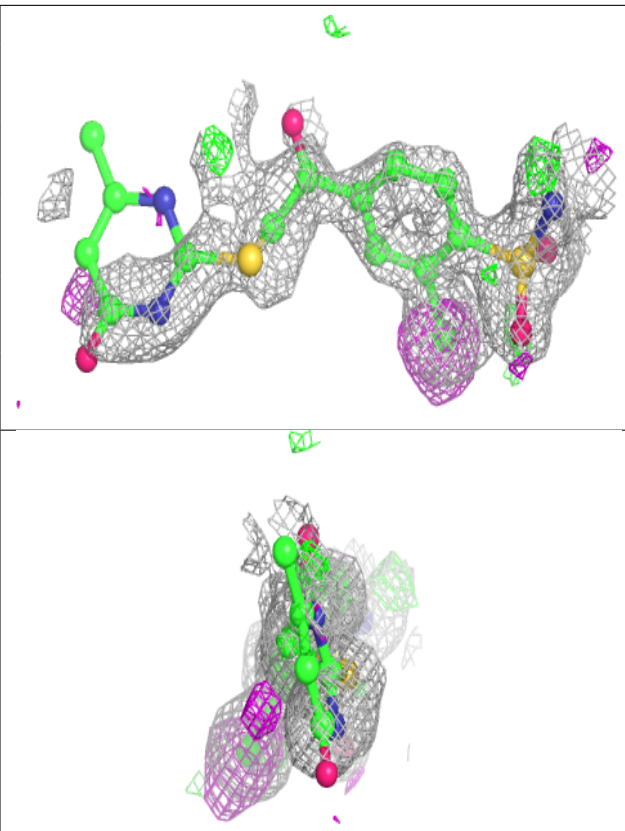
**Electron density around EWW B 302 (A):**

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



**Electron density around EWW A 302:**

$2mF_o-DF_c$  (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.