



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 16, 2020 – 05:26 pm BST

PDB ID : 5IN9  
Title : Crystal structure of Grp94 bound to methyl 3-chloro-2-(2-(1-((5-chlorofuran-2-yl)methyl)-1H-imidazol-2-yl)ethyl)-4,6-dihydroxybenzoate, an inhibitor based on the BnIm and Radamide scaffolds.  
Authors : Lieberman, R.L.; Huard, D.J.E.; Kizziah, J.L.  
Deposited on : 2016-03-07  
Resolution : 2.60 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.

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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 : 2.11  
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) : 2.11

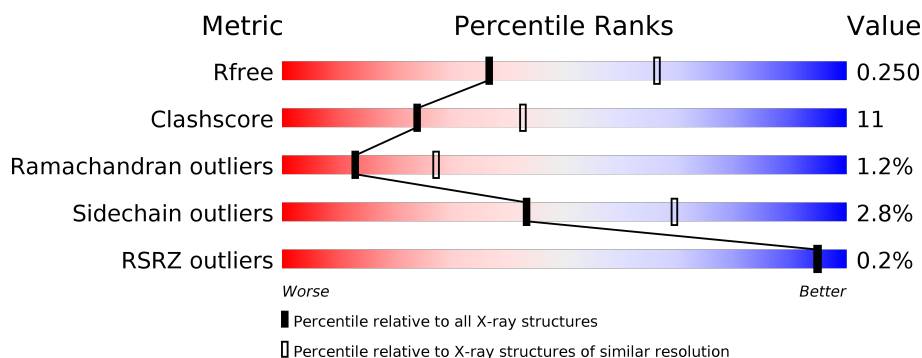
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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 on 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	233	
1	B	233	

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 3672 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 Endoplasmin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	217	Total	C	N	O	S	0	0	0
			1729	1099	285	339	6			
1	B	218	Total	C	N	O	S	0	0	0
			1738	1103	287	342	6			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	68	SER	-	expression tag	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	THR	deletion	UNP P41148
A	?	-	VAL	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	PRO	deletion	UNP P41148
A	?	-	MET	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	ALA	deletion	UNP P41148
A	?	-	ALA	deletion	UNP P41148
A	?	-	LYS	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	LYS	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	ASP	deletion	UNP P41148
A	?	-	SER	deletion	UNP P41148
A	?	-	ASP	deletion	UNP P41148
A	?	-	ASP	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	ALA	deletion	UNP P41148

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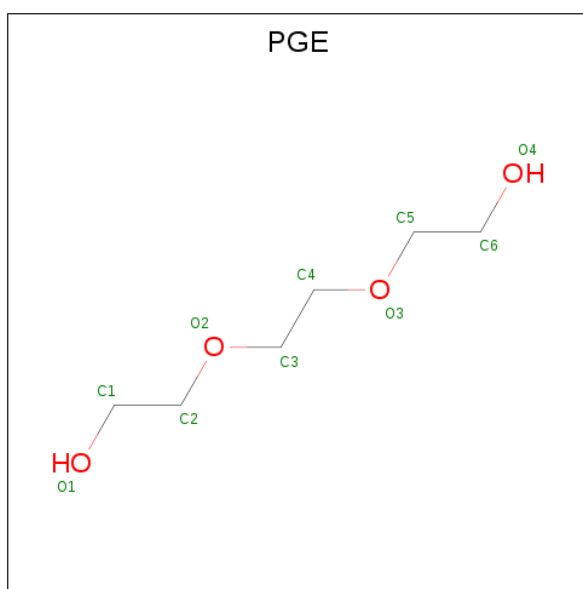
Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	ALA	deletion	UNP P41148
A	?	-	VAL	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	GLU	deletion	UNP P41148
A	?	-	LYS	deletion	UNP P41148
A	?	-	LYS	deletion	UNP P41148
A	?	-	PRO	deletion	UNP P41148
A	?	-	LYS	deletion	UNP P41148
A	?	-	THR	deletion	UNP P41148
A	324	GLY	LYS	linker	UNP P41148
A	325	GLY	LYS	linker	UNP P41148
A	326	GLY	VAL	linker	UNP P41148
A	327	GLY	GLU	linker	UNP P41148
B	68	SER	-	expression tag	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	THR	deletion	UNP P41148
B	?	-	VAL	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	PRO	deletion	UNP P41148
B	?	-	MET	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	ALA	deletion	UNP P41148
B	?	-	ALA	deletion	UNP P41148
B	?	-	LYS	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	LYS	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	ASP	deletion	UNP P41148
B	?	-	SER	deletion	UNP P41148
B	?	-	ASP	deletion	UNP P41148
B	?	-	ASP	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	ALA	deletion	UNP P41148

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Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	ALA	deletion	UNP P41148
B	?	-	VAL	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	GLU	deletion	UNP P41148
B	?	-	LYS	deletion	UNP P41148
B	?	-	LYS	deletion	UNP P41148
B	?	-	PRO	deletion	UNP P41148
B	?	-	LYS	deletion	UNP P41148
B	?	-	THR	deletion	UNP P41148
B	324	GLY	LYS	linker	UNP P41148
B	325	GLY	LYS	linker	UNP P41148
B	326	GLY	VAL	linker	UNP P41148
B	327	GLY	GLU	linker	UNP P41148

- Molecule 2 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula:  $C_6H_{14}O_4$ ).



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

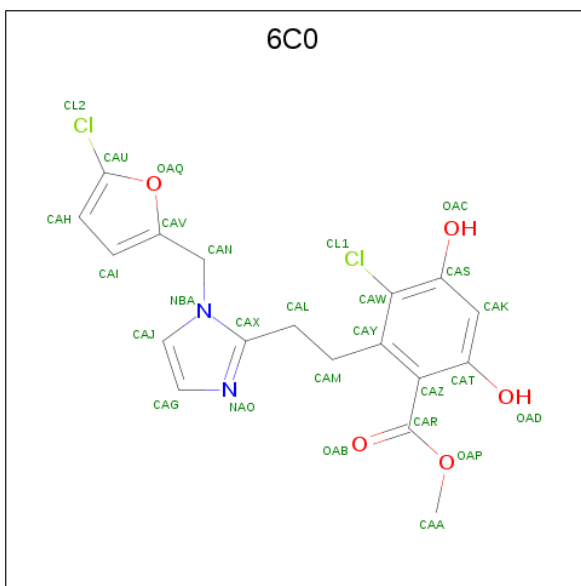
- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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

- Molecule 4 is methyl 3-chloro-2-(2-{1-[(5-chlorofuran-2-yl)methyl]-1H-imidazol-2-yl}ethyl)-

4,6-dihydroxybenzoate (three-letter code: 6C0) (formula:  $\text{C}_{18}\text{H}_{16}\text{Cl}_2\text{N}_2\text{O}_5$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 27	C 18	Cl 2	N 2	O 5	0	0
4	B	1	Total 27	C 18	Cl 2	N 2	O 5	0	0


- Molecule 5 is water.

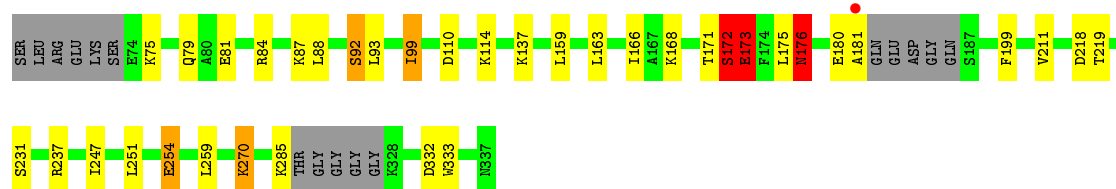
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	36	Total O 36 36	0	0
5	B	27	Total O 27 27	0	0

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

These plots are drawn for all protein, RNA and DNA 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.

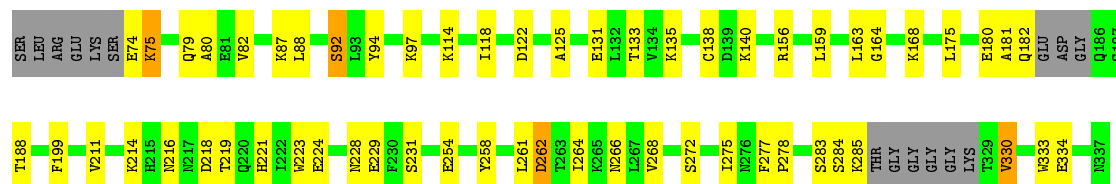
#### • Molecule 1: Endoplasmin

Chain A: 



#### • Molecule 1: Endoplasmin

Chain B: 





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	43.02Å 65.65Å 95.86Å 90.00° 92.91° 90.00°	Depositor
Resolution (Å)	47.87 – 2.60 47.87 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.87-2.60) 95.2 (47.87-2.60)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.40 (at 2.61Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.175 , 0.248 0.178 , 0.250	Depositor DCC
$R_{free}$ test set	1656 reflections (9.98%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	35.1	Xtriage
Anisotropy	0.330	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 47.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.166 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	3672	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.12% 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: 6C0, GOL, 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	0.48	0/1754	0.67	2/2362 (0.1%)
1	B	0.41	0/1763	0.57	0/2375
All	All	0.45	0/3517	0.62	2/4737 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	176	ASN	N-CA-CB	6.79	122.82	110.60
1	A	173	GLU	CA-CB-CG	5.91	126.40	113.40

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	172	SER	Peptide
1	A	173	GLU	Peptide

## 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	1729	0	1737	37	0
1	B	1738	0	1740	42	0
2	A	10	0	14	2	0
3	A	48	0	64	4	0
3	B	30	0	40	5	0
4	A	27	0	0	2	0
4	B	27	0	0	2	0
5	A	36	0	0	1	1
5	B	27	0	0	2	0
All	All	3672	0	3595	80	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 11.

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)
1:B:262:ASP:O	1:B:266:ASN:ND2	2.17	0.77
1:B:75:LYS:HG3	1:B:231:SER:HB3	1.66	0.77
1:A:137:LYS:NZ	3:A:405:GOL:O3	2.19	0.75
1:B:92:SER:HG	1:B:188:THR:HG1	1.29	0.75
1:A:173:GLU:HB3	1:A:176:ASN:HD22	1.52	0.73
1:A:79:GLN:NE2	1:A:81:GLU:OE1	2.21	0.72
1:B:114:LYS:NZ	5:B:502:HOH:O	2.22	0.71
1:A:93:LEU:HD13	1:A:99:ILE:HG21	1.72	0.70
1:B:216:ASN:HB2	3:B:405:GOL:H12	1.74	0.70
1:B:94:TYR:O	1:B:97:LYS:NZ	2.22	0.69
1:A:75:LYS:NZ	3:A:402:GOL:O3	2.25	0.69
1:A:173:GLU:CB	1:A:176:ASN:ND2	2.58	0.66
1:A:173:GLU:HB2	1:A:176:ASN:ND2	2.11	0.65
4:B:406:6C0:OAC	5:B:501:HOH:O	2.15	0.64
1:B:92:SER:OG	1:B:188:THR:OG1	2.05	0.64
1:A:180:GLU:HB3	1:A:181:ALA:HA	1.80	0.63
1:A:172:SER:O	1:A:173:GLU:HG3	1.99	0.62
1:B:199:PHE:HB2	4:B:406:6C0:CL1	2.37	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:173:GLU:CB	1:A:176:ASN:HD22	2.12	0.62
1:B:125:ALA:HA	3:B:405:GOL:H32	1.82	0.60
1:B:229:GLU:HG3	3:B:401:GOL:H12	1.83	0.59
1:A:166:ILE:O	5:A:501:HOH:O	2.17	0.59
1:B:133:THR:HG22	1:B:278:PRO:HG2	1.84	0.57
1:A:88:LEU:HD12	1:A:175:LEU:HD22	1.86	0.57
1:A:218:ASP:OD1	1:A:219:THR:N	2.34	0.57
1:B:218:ASP:OD1	1:B:219:THR:N	2.35	0.57
1:B:131:GLU:OE1	1:B:135:LYS:NZ	2.38	0.57
1:B:138:CYS:SG	1:B:264:ILE:HG13	2.45	0.57
1:A:173:GLU:HB3	1:A:176:ASN:ND2	2.20	0.56
1:B:88:LEU:O	1:B:92:SER:HB3	2.06	0.56
1:A:171:THR:O	1:A:173:GLU:N	2.38	0.56
1:A:237:ARG:HH22	3:A:406:GOL:H2	1.71	0.55
1:A:110:ASP:O	1:A:114:LYS:HG3	2.06	0.54
1:B:180:GLU:O	1:B:182:GLN:N	2.37	0.54
1:A:199:PHE:HB2	4:A:410:6C0:CL1	2.46	0.53
2:A:401:PGE:H2	1:B:87:LYS:HE3	1.89	0.53
1:A:176:ASN:HB3	1:A:180:GLU:OE1	2.10	0.52
1:B:285:LYS:CB	1:B:330:VAL:HG23	2.40	0.52
1:A:211:VAL:HG22	1:A:247:ILE:HD13	1.92	0.52
1:B:159:LEU:O	1:B:163:LEU:HB2	2.09	0.52
1:A:173:GLU:HB3	1:A:176:ASN:N	2.24	0.52
1:A:176:ASN:HD22	1:A:176:ASN:N	2.09	0.51
1:B:88:LEU:HD12	1:B:175:LEU:HD22	1.93	0.51
1:A:332:ASP:OD1	1:A:333:TRP:N	2.43	0.51
1:B:122:ASP:OD2	3:B:405:GOL:H31	2.11	0.50
3:A:408:GOL:H12	1:B:80:ALA:HB2	1.93	0.50
1:A:251:LEU:HD12	1:A:259:LEU:HG	1.93	0.50
1:B:275:ILE:HG22	1:B:277:PHE:H	1.77	0.50
1:A:159:LEU:O	1:A:163:LEU:HB2	2.12	0.48
1:A:173:GLU:HB2	1:A:176:ASN:HD21	1.77	0.48
1:B:135:LYS:HB3	1:B:333:TRP:CZ3	2.49	0.48
1:B:79:GLN:HB3	1:B:82:VAL:HG23	1.96	0.48
1:A:176:ASN:HD22	1:A:176:ASN:H	1.60	0.48
1:B:285:LYS:HB2	1:B:330:VAL:HG23	1.95	0.47
1:B:283:SER:OG	1:B:334:GLU:OE1	2.27	0.47
1:A:87:LYS:NZ	2:A:401:PGE:H12	2.30	0.46
1:B:214:LYS:NZ	1:B:218:ASP:O	2.37	0.46
1:B:283:SER:OG	1:B:284:SER:N	2.48	0.46
1:A:84:ARG:HG2	1:B:228:ASN:ND2	2.31	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:254:GLU:H	1:A:254:GLU:HG3	1.43	0.45
1:A:81:GLU:N	1:A:81:GLU:OE1	2.50	0.45
4:A:410:6C0:OAQ	4:A:410:6C0:CAJ	2.64	0.45
1:A:285:LYS:HD3	1:A:285:LYS:HA	1.73	0.45
1:A:180:GLU:HB3	1:A:181:ALA:CA	2.45	0.45
1:B:211:VAL:HB	1:B:223:TRP:HB3	1.99	0.45
1:B:156:ARG:HB2	1:B:221:HIS:CD2	2.52	0.45
1:B:285:LYS:HB2	1:B:330:VAL:O	2.16	0.45
1:B:261:LEU:HD13	1:B:284:SER:HB2	2.00	0.44
1:A:270:LYS:HD2	1:A:270:LYS:HA	1.35	0.44
1:B:258:TYR:O	1:B:264:ILE:HD11	2.18	0.44
1:B:268:VAL:O	1:B:272:SER:HB2	2.17	0.44
1:B:118:ILE:HG22	1:B:125:ALA:HB2	1.99	0.43
1:B:163:LEU:HD23	1:B:163:LEU:HA	1.79	0.43
1:A:173:GLU:HB3	1:A:176:ASN:H	1.82	0.42
1:A:88:LEU:O	1:A:92:SER:OG	2.28	0.42
1:B:135:LYS:HD3	1:B:333:TRP:CE2	2.54	0.42
1:A:75:LYS:HD3	1:A:231:SER:HB3	2.02	0.41
1:B:224:GLU:OE2	3:B:401:GOL:O1	2.38	0.41
1:B:74:GLU:N	1:B:74:GLU:OE1	2.55	0.40
1:B:168:LYS:HA	1:B:168:LYS:HD2	1.79	0.40

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)
5:A:509:HOH:O	5:A:534:HOH:O[1_655]	2.16	0.04

## 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	211/233 (91%)	198 (94%)	11 (5%)	2 (1%)	17	35
1	B	212/233 (91%)	198 (93%)	11 (5%)	3 (1%)	11	22
All	All	423/466 (91%)	396 (94%)	22 (5%)	5 (1%)	13	27

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	172	SER
1	A	173	GLU
1	B	181	ALA
1	B	164	GLY
1	B	262	ASP

### 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	194/205 (95%)	188 (97%)	6 (3%)	40	66
1	B	195/205 (95%)	190 (97%)	5 (3%)	46	72
All	All	389/410 (95%)	378 (97%)	11 (3%)	43	69

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	92	SER
1	A	99	ILE
1	A	168	LYS
1	A	176	ASN
1	A	254	GLU
1	A	270	LYS
1	B	75	LYS
1	B	92	SER
1	B	140	LYS
1	B	254	GLU
1	B	330	VAL

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

Mol	Chain	Res	Type
1	A	176	ASN
1	B	176	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

16 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	$\# Z  > 2$
3	GOL	B	402	-	5,5,5	0.39	0	5,5,5	0.55	0
2	PGE	A	401	-	9,9,9	0.53	0	8,8,8	0.39	0
3	GOL	A	403	-	5,5,5	0.29	0	5,5,5	0.22	0
3	GOL	A	404	-	5,5,5	0.37	0	5,5,5	0.30	0
3	GOL	A	407	-	5,5,5	0.32	0	5,5,5	0.54	0
3	GOL	B	403	-	5,5,5	0.28	0	5,5,5	0.24	0
4	6C0	B	406	-	23,29,29	3.18	8 (34%)	27,41,41	2.95	7 (25%)
3	GOL	A	409	-	5,5,5	0.31	0	5,5,5	0.26	0
3	GOL	A	402	-	5,5,5	0.39	0	5,5,5	0.43	0
3	GOL	B	404	-	5,5,5	0.32	0	5,5,5	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	GOL	A	406	-	5,5,5	0.36	0	5,5,5	0.80	0
3	GOL	B	401	-	5,5,5	0.30	0	5,5,5	0.45	0
3	GOL	A	408	-	5,5,5	0.29	0	5,5,5	0.27	0
3	GOL	A	405	-	5,5,5	0.36	0	5,5,5	0.42	0
3	GOL	B	405	-	5,5,5	0.40	0	5,5,5	0.39	0
4	6C0	A	410	-	23,29,29	3.13	8 (34%)	27,41,41	1.49	5 (18%)

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	GOL	B	402	-	-	2/4/4/4	-
2	PGE	A	401	-	-	3/7/7/7	-
3	GOL	A	403	-	-	0/4/4/4	-
3	GOL	A	404	-	-	2/4/4/4	-
3	GOL	A	407	-	-	4/4/4/4	-
3	GOL	B	403	-	-	2/4/4/4	-
4	6C0	B	406	-	-	7/14/15/15	0/3/3/3
3	GOL	A	409	-	-	2/4/4/4	-
3	GOL	A	402	-	-	4/4/4/4	-
3	GOL	B	404	-	-	2/4/4/4	-
3	GOL	A	406	-	-	0/4/4/4	-
3	GOL	B	401	-	-	2/4/4/4	-
3	GOL	A	408	-	-	2/4/4/4	-
3	GOL	A	405	-	-	4/4/4/4	-
3	GOL	B	405	-	-	0/4/4/4	-
4	6C0	A	410	-	-	7/14/15/15	0/3/3/3

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	410	6C0	CAI-CAV	7.73	1.50	1.39
4	B	406	6C0	CAI-CAV	7.44	1.49	1.39
4	B	406	6C0	OAB-CAR	7.36	1.42	1.22
4	A	410	6C0	OAB-CAR	7.26	1.42	1.22
4	A	410	6C0	OAP-CAR	-6.14	1.19	1.33
4	B	406	6C0	OAP-CAR	-6.10	1.19	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	406	6C0	CAN-NBA	-5.26	1.39	1.48
4	A	410	6C0	CAZ-CAR	4.62	1.61	1.50
4	B	406	6C0	CAZ-CAR	4.56	1.61	1.50
4	A	410	6C0	CAN-NBA	-3.81	1.41	1.48
4	B	406	6C0	OAC-CAS	3.20	1.42	1.36
4	A	410	6C0	OAC-CAS	3.03	1.42	1.36
4	B	406	6C0	CAK-CAT	-2.46	1.35	1.38
4	A	410	6C0	CAM-CAY	2.34	1.55	1.52
4	B	406	6C0	CAM-CAY	2.29	1.55	1.52
4	A	410	6C0	CAK-CAT	-2.20	1.35	1.38

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	406	6C0	CAV-CAN-NBA	-12.15	93.51	113.14
4	B	406	6C0	CAH-CAI-CAV	-4.84	104.13	106.76
4	B	406	6C0	CAL-CAM-CAY	3.88	119.65	112.49
4	A	410	6C0	OAP-CAR-CAZ	3.55	120.79	112.27
4	B	406	6C0	CAA-OAP-CAR	3.54	122.67	115.83
4	A	410	6C0	CAA-OAP-CAR	3.51	122.60	115.83
4	B	406	6C0	OAP-CAR-CAZ	3.39	120.39	112.27
4	A	410	6C0	CAL-CAM-CAY	2.54	117.17	112.49
4	A	410	6C0	CAH-CAI-CAV	-2.47	105.42	106.76
4	B	406	6C0	CAN-NBA-CAJ	-2.27	121.39	124.73
4	B	406	6C0	CAL-CAX-NAO	-2.21	121.05	124.22
4	A	410	6C0	CAN-NBA-CAJ	2.05	127.75	124.73

There are no chirality outliers.

All (43) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	407	GOL	O1-C1-C2-C3
4	B	406	6C0	CAM-CAL-CAX-NBA
3	B	404	GOL	O1-C1-C2-C3
3	A	408	GOL	O1-C1-C2-C3
3	A	405	GOL	O1-C1-C2-C3
4	A	410	6C0	NBA-CAN-CAV-CAI
3	B	403	GOL	O2-C2-C3-O3
2	A	401	PGE	O2-C3-C4-O3
2	A	401	PGE	O1-C1-C2-O2
4	B	406	6C0	CAL-CAM-CAY-CAW
3	A	404	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
3	A	407	GOL	C1-C2-C3-O3
3	B	403	GOL	C1-C2-C3-O3
3	A	402	GOL	O1-C1-C2-C3
3	A	402	GOL	C1-C2-C3-O3
3	B	401	GOL	O1-C1-C2-C3
3	A	405	GOL	C1-C2-C3-O3
3	A	407	GOL	O1-C1-C2-O2
3	A	402	GOL	O1-C1-C2-O2
3	A	402	GOL	O2-C2-C3-O3
3	B	404	GOL	O1-C1-C2-O2
3	A	408	GOL	O1-C1-C2-O2
4	B	406	6C0	CAL-CAM-CAY-CAZ
3	A	407	GOL	O2-C2-C3-O3
4	A	410	6C0	CAL-CAM-CAY-CAZ
3	B	401	GOL	O1-C1-C2-O2
3	A	405	GOL	O2-C2-C3-O3
4	A	410	6C0	CAV-CAN-NBA-CAJ
4	A	410	6C0	CAM-CAL-CAX-NBA
3	B	402	GOL	O1-C1-C2-O2
3	A	405	GOL	O1-C1-C2-O2
2	A	401	PGE	C4-C3-O2-C2
3	A	404	GOL	O2-C2-C3-O3
4	B	406	6C0	OAB-CAR-CAZ-CAT
4	A	410	6C0	OAB-CAR-CAZ-CAT
4	A	410	6C0	CAL-CAM-CAY-CAW
4	B	406	6C0	OAP-CAR-CAZ-CAT
4	A	410	6C0	OAP-CAR-CAZ-CAT
3	B	402	GOL	O1-C1-C2-C3
4	B	406	6C0	CAV-CAN-NBA-CAJ
3	A	409	GOL	O1-C1-C2-O2
3	A	409	GOL	O1-C1-C2-C3
4	B	406	6C0	CAV-CAN-NBA-CAX

There are no ring outliers.

9 monomers are involved in 15 short contacts:

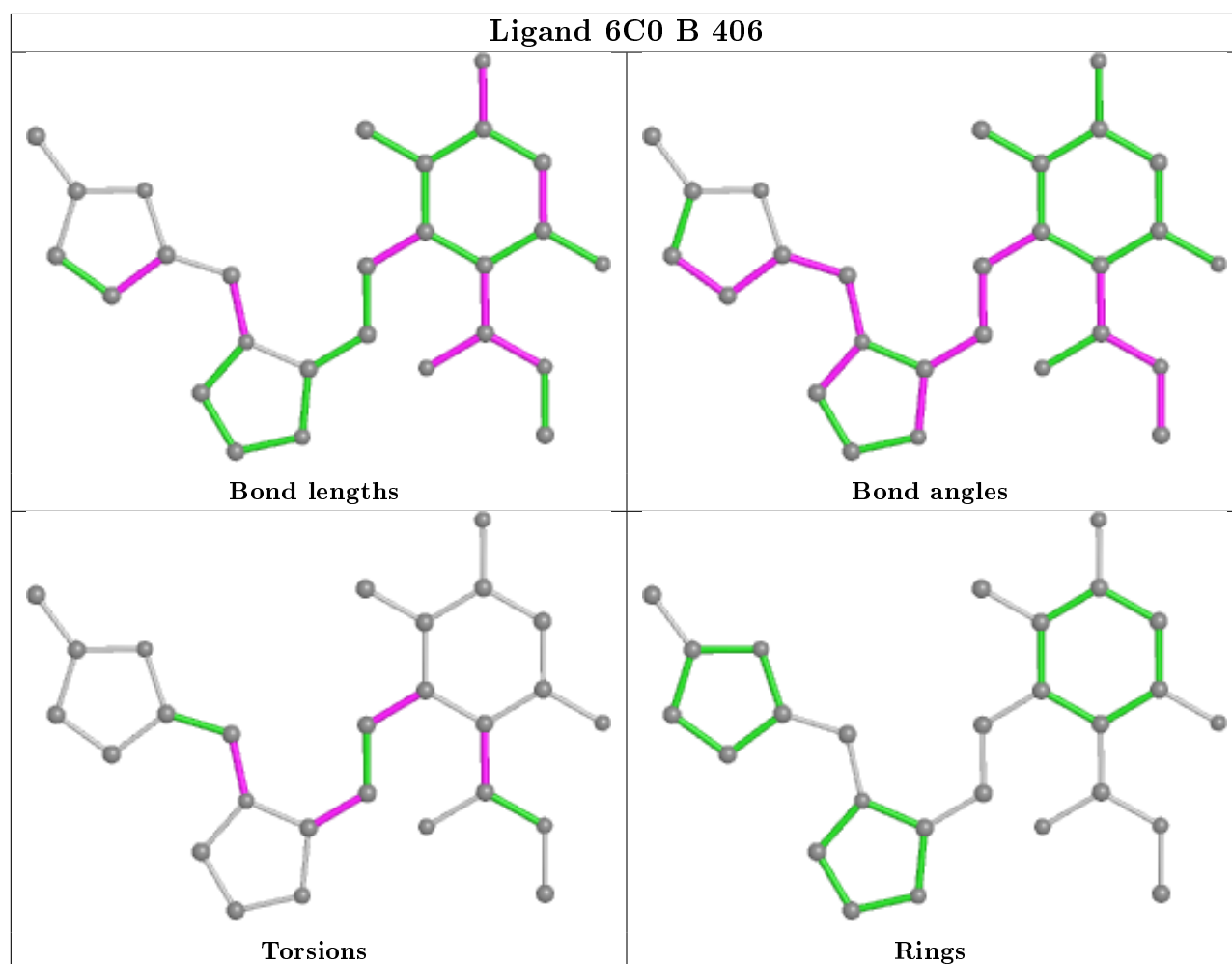
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	401	PGE	2	0
4	B	406	6C0	2	0
3	A	402	GOL	1	0
3	A	406	GOL	1	0
3	B	401	GOL	2	0

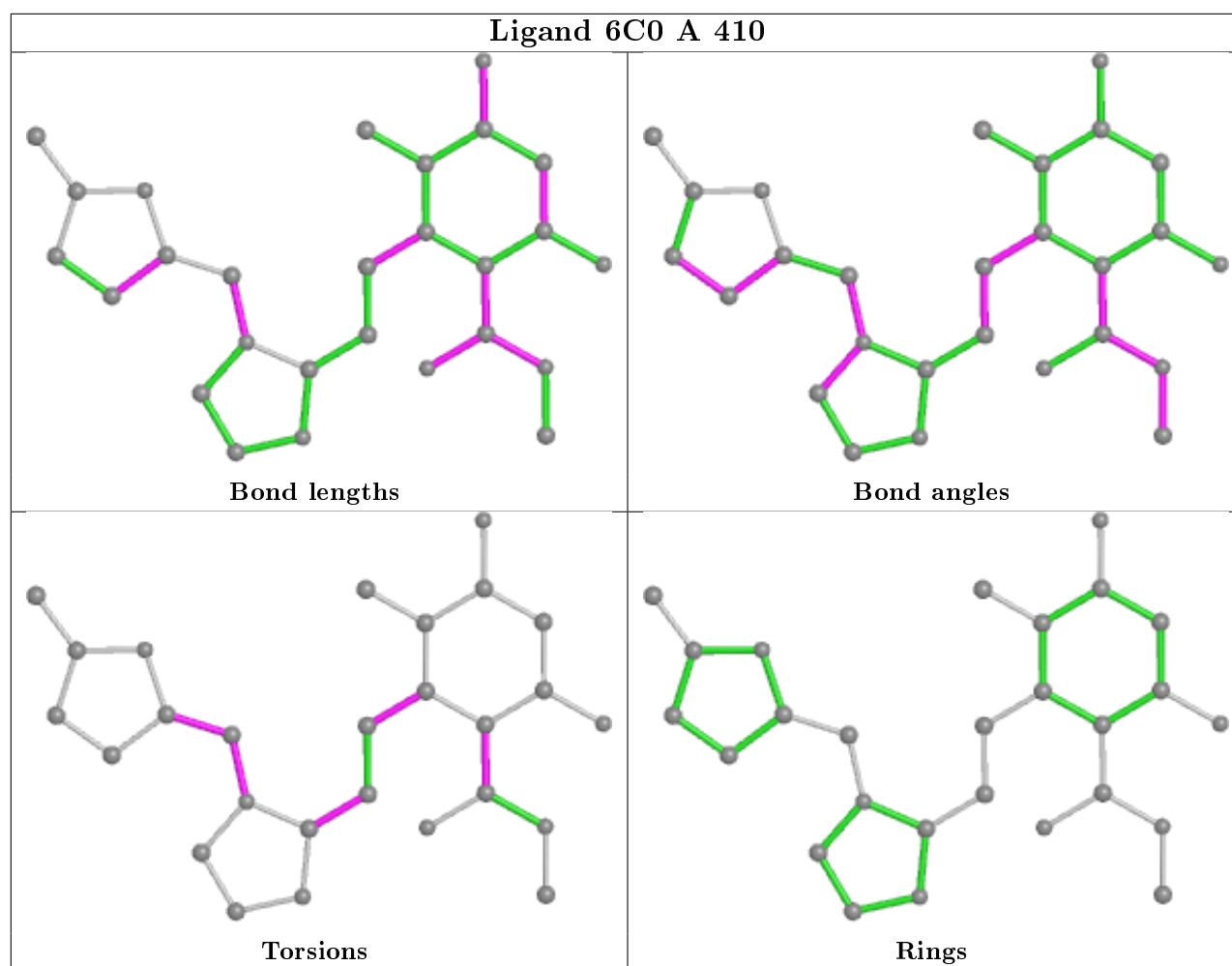
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	408	GOL	1	0
3	A	405	GOL	1	0
3	B	405	GOL	3	0
4	A	410	6C0	2	0

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 [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, 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	217/233 (93%)	-0.54	1 (0%) 91 89	26, 39, 73, 100	0
1	B	218/233 (93%)	-0.52	0 100 100	27, 44, 83, 126	0
All	All	435/466 (93%)	-0.53	1 (0%) 95 95	26, 42, 83, 126	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	181	ALA	3.1

### 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 carbohydrates 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
3	GOL	B	403	6/6	0.88	0.20	51,61,73,82	0
3	GOL	A	404	6/6	0.89	0.21	39,47,57,57	0
3	GOL	A	409	6/6	0.89	0.16	53,61,68,69	0
3	GOL	B	401	6/6	0.89	0.18	61,65,66,75	0

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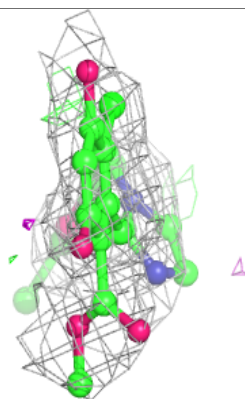
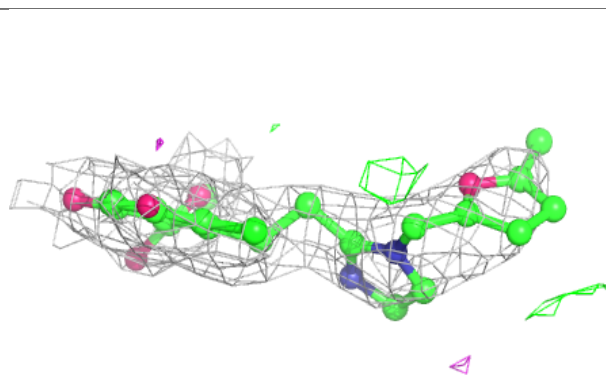
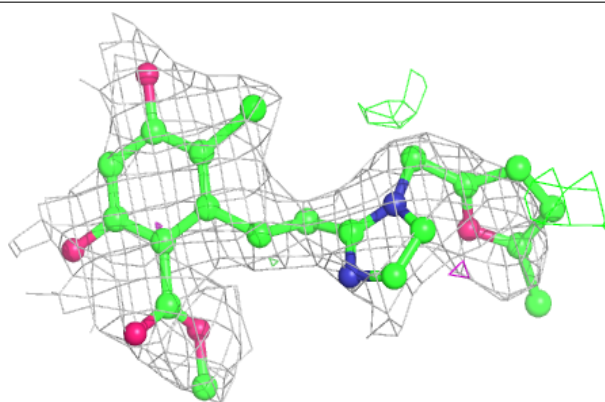
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	GOL	A	408	6/6	0.89	0.20	42,57,60,70	0
4	6C0	B	406	27/27	0.90	0.24	48,74,108,173	0
3	GOL	B	405	6/6	0.90	0.19	55,66,74,76	0
3	GOL	A	407	6/6	0.91	0.18	45,49,55,65	0
3	GOL	A	403	6/6	0.91	0.18	57,64,75,78	0
3	GOL	B	404	6/6	0.91	0.18	49,55,63,67	0
3	GOL	A	406	6/6	0.92	0.19	49,57,58,72	0
3	GOL	B	402	6/6	0.92	0.21	67,70,71,73	0
4	6C0	A	410	27/27	0.92	0.22	34,66,138,140	0
3	GOL	A	402	6/6	0.95	0.15	43,55,64,66	0
3	GOL	A	405	6/6	0.96	0.15	42,49,51,55	0
2	PGE	A	401	10/10	0.97	0.14	23,31,37,37	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.

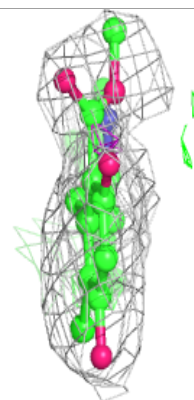
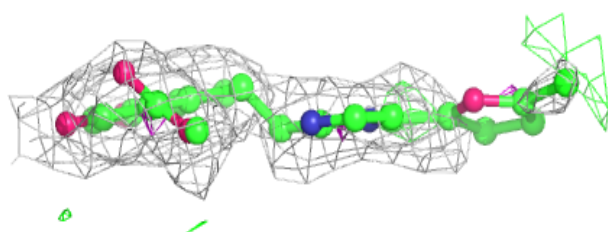
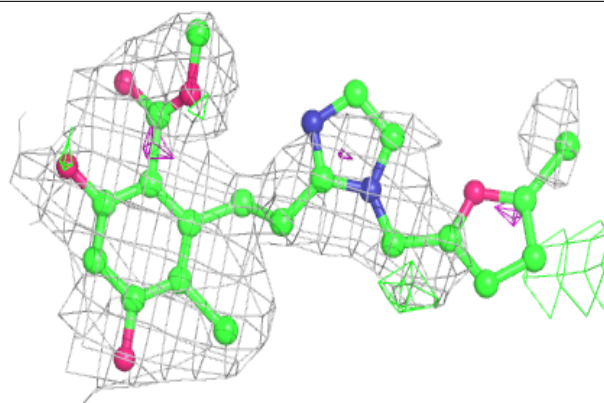
**Electron density around 6C0 B 406:**

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around 6C0 A 410:**

$2mF_o-DF_c$  (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.