



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 09:39 PM UTC

PDB ID : 8BAZ / pdb_00008baz
Title : The surface-exposed lipo-protein of BtuG2 in complex with cyanocobalamin.
Authors : Whittaker, J.; Martinez-Felices, J.M.; Guskov, A.; Slotboom, D.J.
Deposited on : 2022-10-12
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

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>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

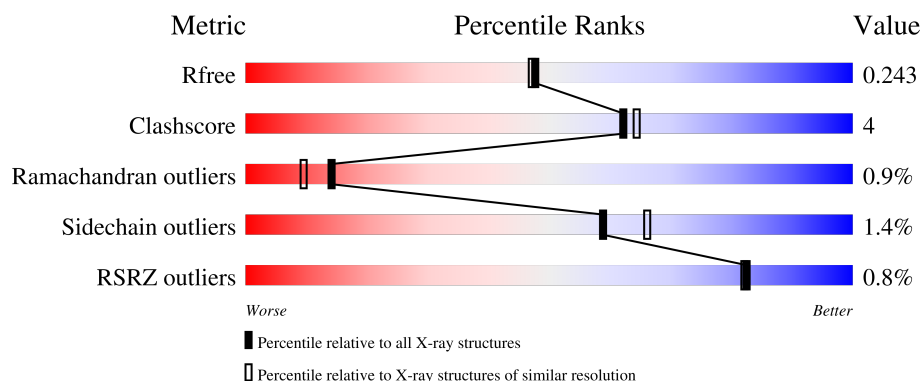
1 Overall quality at a glance

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))
R_{free}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (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 ≥ 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	327	 91% 6% ..
1	B	327	 90% 7% ..

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
4	PEG	A	413	-	-	X	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 11061 atoms, of which 5236 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.

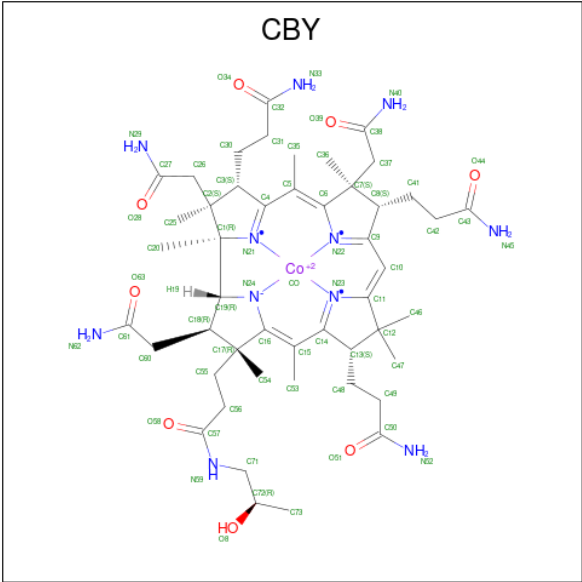
- Molecule 1 is a protein called Surface layer protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	320	Total	C	H	N	O	S	0	0	0
			5054	1693	2433	417	500	11			
1	B	321	Total	C	H	N	O	S	0	0	0
			5064	1696	2438	418	501	11			

There are 14 discrepancies between the modelled and reference sequences:

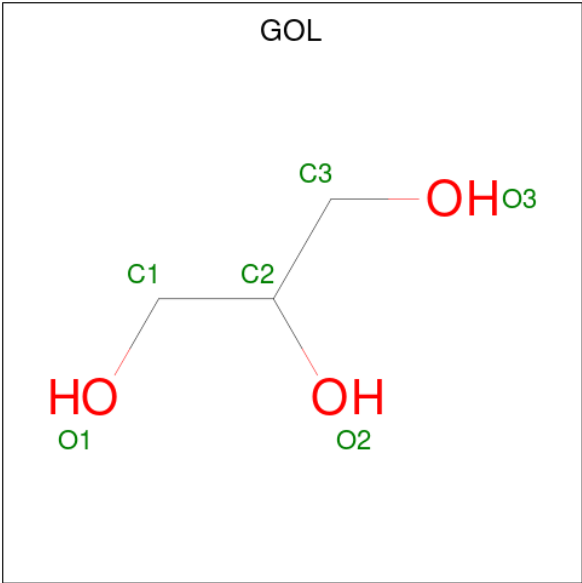
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP Q8A6D0
A	322	LEU	-	expression tag	UNP Q8A6D0
A	323	GLU	-	expression tag	UNP Q8A6D0
A	324	VAL	-	expression tag	UNP Q8A6D0
A	325	LEU	-	expression tag	UNP Q8A6D0
A	326	PHE	-	expression tag	UNP Q8A6D0
A	327	GLN	-	expression tag	UNP Q8A6D0
B	1	MET	-	initiating methionine	UNP Q8A6D0
B	322	LEU	-	expression tag	UNP Q8A6D0
B	323	GLU	-	expression tag	UNP Q8A6D0
B	324	VAL	-	expression tag	UNP Q8A6D0
B	325	LEU	-	expression tag	UNP Q8A6D0
B	326	PHE	-	expression tag	UNP Q8A6D0
B	327	GLN	-	expression tag	UNP Q8A6D0

- Molecule 2 is COB(II)INAMIDE (CCD ID: CBY) (formula: C₄₈H₇₂CoN₁₁O₈).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	Co	H	N	O	0	0
			139	48	1	71	11	8		
2	B	1	Total	C	Co	H	N	O	0	0
			139	48	1	71	11	8		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			12	3	6	3		
3	A	1	Total	C	H	O	0	0
			12	3	6	3		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			12	3	6	3		
3	A	1	Total	C	H	O	0	0
			12	3	6	3		
3	A	1	Total	C	H	O	0	0
			12	3	6	3		
3	B	1	Total	C	H	O	0	0
			12	3	6	3		
3	B	1	Total	C	H	O	0	0
			12	3	6	3		
3	B	1	Total	C	H	O	0	0
			12	3	6	3		

- Molecule 4 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			16	4	9	3		
4	A	1	Total	C	H	O	0	0
			16	4	9	3		
4	A	1	Total	C	H	O	0	0
			16	4	9	3		
4	A	1	Total	C	H	O	0	0
			16	4	9	3		

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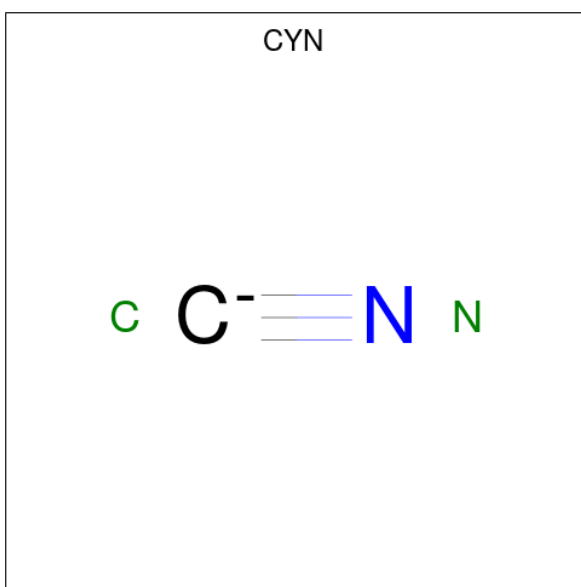
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			16	4	9	3		
4	A	1	Total	C	H	O	0	0
			16	4	9	3		
4	A	1	Total	C	H	O	0	0
			16	4	9	3		
4	B	1	Total	C	H	O	0	0
			16	4	9	3		
4	B	1	Total	C	H	O	0	0
			16	4	9	3		
4	B	1	Total	C	H	O	0	0
			16	4	9	3		
4	B	1	Total	C	H	O	0	0
			16	4	9	3		
4	B	1	Total	C	H	O	0	0
			16	4	9	3		

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na).

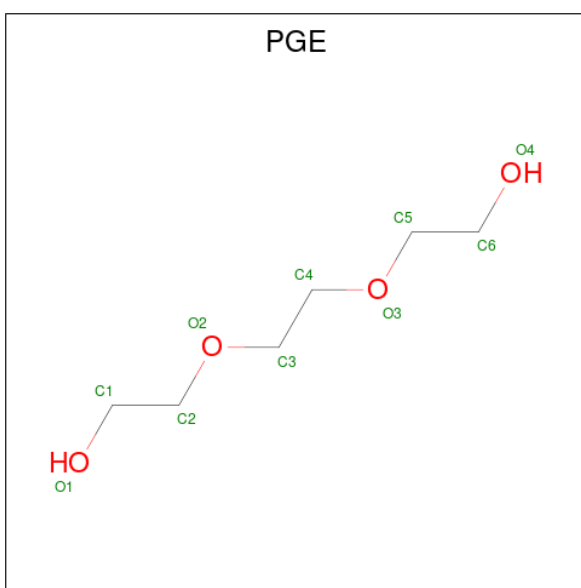
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	5	Total	Na	0	0
			5	5		
5	B	1	Total	Na	0	0
			1	1		

- Molecule 6 is CYANIDE ION (CCD ID: CYN) (formula: CN).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	N		0	0
			2	1	1			
6	B	1	Total	C	N		0	0
			2	1	1			

- Molecule 7 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: C₆H₁₄O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	B	1	Total	C	H	O	0	0
			23	6	13	4		
7	B	1	Total	C	H	O	0	0
			23	6	13	4		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	B	1	Total	C	H	O	0	0
			23	6	13	4		
7	B	1	Total	C	H	O	0	0
			23	6	13	4		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	94	Total	O	0	0
			94	94		
8	B	153	Total	O	0	0
			153	153		

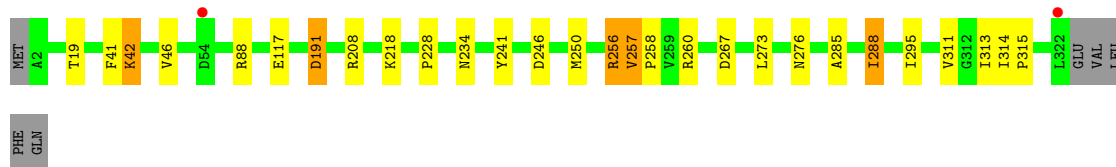
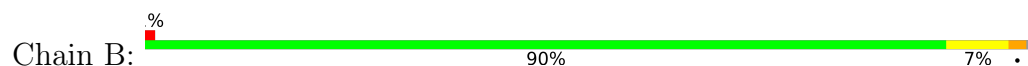
3 Residue-property plots [i](#)

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: Surface layer protein



- Molecule 1: Surface layer protein



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	49.18Å 100.59Å 79.58Å 90.00° 97.60° 90.00°	Depositor
Resolution (Å)	44.20 – 2.00 44.20 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (44.20-2.00) 99.9 (44.20-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.19 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.8.0415	Depositor
R, R_{free}	0.181 , 0.243 0.181 , 0.243	Depositor DCC
R_{free} test set	2531 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	27.0	Xtriage
Anisotropy	0.244	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.45 , 53.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11061	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 14.27% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, CBY, PGE, NA, PEG, CYN

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	0.62	0/2694	0.98	1/3667 (0.0%)
1	B	0.61	0/2699	0.98	1/3674 (0.0%)
All	All	0.61	0/5393	0.98	2/7341 (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	3
1	B	0	3
All	All	0	6

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	B	191	ASP	CA-CB-CG	5.90	118.50	112.60
1	A	191	ASP	CA-CB-CG	5.89	118.49	112.60

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	107	ARG	Sidechain
1	A	208	ARG	Sidechain
1	A	260	ARG	Sidechain
1	B	208	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	B	256	ARG	Sidechain
1	B	260	ARG	Sidechain

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	2621	2433	2501	11	0
1	B	2626	2438	2506	18	0
2	A	68	71	72	8	0
2	B	68	71	72	6	0
3	A	30	30	40	1	0
3	B	24	24	32	0	0
4	A	49	63	70	7	0
4	B	42	54	59	4	0
5	A	5	0	0	0	0
5	B	1	0	0	0	0
6	A	2	0	0	0	0
6	B	2	0	0	0	0
7	B	40	52	56	3	0
8	A	94	0	0	3	0
8	B	153	0	0	0	0
All	All	5825	5236	5408	45	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 4.

All (45) 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:234:ASN:HD22	7:B:414:PGE:H3	1.50	0.75
1:B:288:ILE:HD11	1:B:295:ILE:HG22	1.74	0.68
1:A:288:ILE:HD11	1:A:295:ILE:HG22	1.77	0.66
1:B:257:VAL:HG22	1:B:258:PRO:HD2	1.81	0.63
2:B:403:CBY:H36	2:B:403:CBY:H35A	1.86	0.56
2:B:403:CBY:H53A	2:B:403:CBY:H55	1.88	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:413:PEG:H41	8:A:503:HOH:O	2.08	0.54
1:B:88:ARG:HH22	2:B:403:CBY:HN2A	1.56	0.53
1:B:117:GLU:HG2	4:B:411:PEG:H22	1.91	0.52
4:A:413:PEG:C4	8:A:503:HOH:O	2.58	0.52
2:A:401:CBY:H35A	2:A:401:CBY:H36	1.91	0.52
1:A:317:ALA:HB2	4:A:413:PEG:H41	1.92	0.51
1:B:117:GLU:HA	4:B:411:PEG:H22	1.93	0.51
2:B:403:CBY:H3	2:B:403:CBY:N29	2.26	0.50
4:A:413:PEG:H31	8:A:548:HOH:O	2.11	0.49
2:B:403:CBY:H36	2:B:403:CBY:C35	2.42	0.49
1:B:234:ASN:HD22	7:B:414:PGE:H2	1.78	0.48
2:B:403:CBY:H26A	2:B:403:CBY:H60	1.95	0.47
1:A:317:ALA:HB2	4:A:413:PEG:C4	2.44	0.47
1:A:260:ARG:HD2	1:B:41:PHE:CD2	2.50	0.47
2:A:401:CBY:H53A	2:A:401:CBY:H55	1.97	0.47
1:B:285:ALA:HB1	1:B:315:PRO:HB2	1.98	0.46
1:B:19:THR:HG22	1:B:42:LYS:HE3	1.97	0.46
1:B:234:ASN:ND2	7:B:414:PGE:H2	2.30	0.45
1:A:285:ALA:HB1	1:A:315:PRO:HB2	1.98	0.45
1:B:246:ASP:OD1	4:B:409:PEG:H12	2.17	0.45
1:A:250:MET:HB3	1:A:258:PRO:HD3	1.99	0.44
1:B:257:VAL:CG2	1:B:258:PRO:HD2	2.48	0.44
1:B:241:TYR:HB3	1:B:273:LEU:HD21	2.00	0.44
1:A:317:ALA:HB2	4:A:413:PEG:O4	2.18	0.43
2:A:401:CBY:H36	2:A:401:CBY:C35	2.48	0.43
1:B:250:MET:HB3	1:B:258:PRO:HD3	2.01	0.43
2:A:401:CBY:H48A	2:A:401:CBY:H46B	1.82	0.43
1:A:241:TYR:HB3	1:A:273:LEU:HD21	2.01	0.42
1:A:271:TYR:O	4:A:413:PEG:H22	2.18	0.42
2:A:401:CBY:H3	2:A:401:CBY:H35	1.98	0.42
1:A:195:GLU:HG2	1:A:201:TYR:CE2	2.55	0.42
2:A:401:CBY:H36A	2:A:401:CBY:H41A	1.88	0.42
1:B:313:ILE:HG22	1:B:314:ILE:HG13	2.02	0.41
2:A:401:CBY:H26A	2:A:401:CBY:H19	1.80	0.41
2:A:401:CBY:H26A	2:A:401:CBY:H60	2.01	0.41
1:B:191:ASP:HA	1:B:228:PRO:HD2	2.02	0.41
1:A:191:ASP:HA	1:A:228:PRO:HD2	2.02	0.40
1:B:276:ASN:ND2	4:B:410:PEG:H41	2.35	0.40
3:A:405:GOL:O1	3:A:406:GOL:H31	2.21	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	318/327 (97%)	300 (94%)	15 (5%)	3 (1%)	14	9
1	B	319/327 (98%)	302 (95%)	14 (4%)	3 (1%)	14	9
All	All	637/654 (97%)	602 (94%)	29 (5%)	6 (1%)	14	9

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	288	ILE
1	B	288	ILE
1	A	311	VAL
1	B	311	VAL
1	A	46	VAL
1	B	46	VAL

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	284/290 (98%)	281 (99%)	3 (1%)	65	73
1	B	284/290 (98%)	279 (98%)	5 (2%)	51	58
All	All	568/580 (98%)	560 (99%)	8 (1%)	59	66

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	GLU
1	A	42	LYS
1	A	223	LYS
1	B	42	LYS
1	B	218	LYS
1	B	256	ARG
1	B	257	VAL
1	B	267	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	293	GLN
1	B	48	GLN
1	B	232	GLN
1	B	245	ASN
1	B	292	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 36 ligands modelled in this entry, 6 are monoatomic - leaving 30 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	GOL	A	404	-	5,5,5	0.14	0	5,5,5	0.38	0
4	PEG	B	408	-	6,6,6	0.88	0	5,5,5	0.54	0
3	GOL	A	402	-	5,5,5	0.23	0	5,5,5	0.33	0
4	PEG	A	411	-	6,6,6	0.29	0	5,5,5	0.22	0
4	PEG	B	411	-	6,6,6	0.49	0	5,5,5	0.73	0
3	GOL	A	405	-	5,5,5	0.10	0	5,5,5	0.43	0
4	PEG	B	407	-	6,6,6	0.26	0	5,5,5	0.15	0
7	PGE	B	414	-	9,9,9	0.39	0	8,8,8	0.50	0
3	GOL	B	402	-	5,5,5	0.14	0	5,5,5	0.39	0
6	CYN	B	417	-	1,1,1	1.03	0	-		
4	PEG	A	413	-	6,6,6	0.70	0	5,5,5	0.96	0
4	PEG	B	406	-	6,6,6	0.59	0	5,5,5	0.96	0
4	PEG	A	412	-	6,6,6	0.34	0	5,5,5	0.86	0
3	GOL	B	401	-	5,5,5	0.16	0	5,5,5	0.38	0
2	CBY	B	403	-	68,75,75	1.13	5 (7%)	110,125,125	1.82	22 (20%)
3	GOL	B	405	-	5,5,5	0.14	0	5,5,5	0.61	0
7	PGE	B	412	-	9,9,9	0.24	0	8,8,8	0.20	0
4	PEG	A	410	-	6,6,6	0.70	0	5,5,5	0.84	0
3	GOL	A	406	-	5,5,5	0.20	0	5,5,5	0.48	0
2	CBY	A	401	8	68,75,75	0.99	4 (5%)	110,125,125	1.56	16 (14%)
3	GOL	B	404	-	5,5,5	0.13	0	5,5,5	0.26	0
7	PGE	B	415	-	9,9,9	0.32	0	8,8,8	0.31	0
7	PGE	B	413	-	9,9,9	0.65	0	8,8,8	0.49	0
4	PEG	A	409	-	6,6,6	0.19	0	5,5,5	0.13	0
4	PEG	A	408	-	6,6,6	0.34	0	5,5,5	0.37	0
4	PEG	B	410	-	6,6,6	0.16	0	5,5,5	0.17	0
6	CYN	A	419	-	1,1,1	1.29	0	-		
3	GOL	A	403	-	5,5,5	0.13	0	5,5,5	0.34	0
4	PEG	A	407	-	6,6,6	0.37	0	5,5,5	0.51	0
4	PEG	B	409	-	6,6,6	0.19	0	5,5,5	0.16	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	GOL	A	404	-	-	0/4/4/4	-
4	PEG	B	408	-	-	2/4/4/4	-
3	GOL	A	402	-	-	2/4/4/4	-
4	PEG	A	411	-	-	1/4/4/4	-
4	PEG	B	411	-	-	1/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	A	405	-	-	1/4/4/4	-
4	PEG	B	407	-	-	1/4/4/4	-
7	PGE	B	414	-	-	6/7/7/7	-
3	GOL	B	402	-	-	2/4/4/4	-
4	PEG	A	413	-	-	2/4/4/4	-
4	PEG	B	406	-	-	2/4/4/4	-
4	PEG	A	412	-	-	4/4/4/4	-
3	GOL	B	401	-	-	2/4/4/4	-
2	CBY	B	403	-	-	7/40/191/191	-
3	GOL	B	405	-	-	4/4/4/4	-
7	PGE	B	412	-	-	2/7/7/7	-
4	PEG	A	410	-	-	3/4/4/4	-
3	GOL	A	406	-	-	1/4/4/4	-
2	CBY	A	401	8	-	10/40/191/191	-
3	GOL	B	404	-	-	0/4/4/4	-
7	PGE	B	415	-	-	3/7/7/7	-
7	PGE	B	413	-	-	2/7/7/7	-
4	PEG	A	409	-	-	2/4/4/4	-
4	PEG	A	408	-	-	3/4/4/4	-
4	PEG	B	410	-	-	2/4/4/4	-
3	GOL	A	403	-	-	2/4/4/4	-
4	PEG	A	407	-	-	2/4/4/4	-
4	PEG	B	409	-	-	2/4/4/4	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	403	CBY	C14-N23	3.57	1.39	1.30
2	A	401	CBY	C14-N23	3.43	1.39	1.30
2	B	403	CBY	C9-N22	3.30	1.38	1.30
2	B	403	CBY	C46-C12	3.07	1.60	1.54
2	B	403	CBY	C20-C1	2.86	1.59	1.53
2	A	401	CBY	C9-N22	2.85	1.37	1.30
2	A	401	CBY	C20-C1	2.60	1.58	1.53
2	B	403	CBY	C10-C11	-2.25	1.31	1.37
2	A	401	CBY	C10-C11	-2.22	1.31	1.37

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	403	CBY	C11-N23-C14	-8.90	102.94	106.31
2	B	403	CBY	C20-C1-N21	-6.44	99.62	110.26
2	A	401	CBY	C20-C1-N21	-5.73	100.78	110.26
2	A	401	CBY	C11-N23-C14	-5.42	104.26	106.31
2	B	403	CBY	C12-C11-N23	5.09	116.93	111.49
2	B	403	CBY	C15-C14-N23	-4.54	117.77	126.67
2	A	401	CBY	C12-C11-N23	4.26	116.05	111.49
2	A	401	CBY	C19-N24-C16	-3.85	105.81	111.96
2	A	401	CBY	C41-C8-C9	3.76	117.75	111.19
2	A	401	CBY	C72-C71-N59	-3.51	106.88	112.29
2	A	401	CBY	O63-C61-C60	3.40	127.96	120.87
2	A	401	CBY	C15-C14-N23	-3.36	120.09	126.67
2	B	403	CBY	C55-C56-C57	3.34	118.69	111.25
2	B	403	CBY	C19-N24-C16	-3.30	106.68	111.96
2	B	403	CBY	C41-C8-C9	3.12	116.63	111.19
2	B	403	CBY	C13-C14-N23	2.99	115.76	109.39
2	B	403	CBY	C19-C1-N21	2.76	105.16	101.69
2	B	403	CBY	C3-C4-N21	-2.67	108.66	111.98
2	B	403	CBY	C42-C41-C8	2.62	122.08	114.65
2	A	401	CBY	C2-C1-N21	2.52	105.28	101.78
2	B	403	CBY	C5-C6-N22	-2.52	120.07	123.88
2	B	403	CBY	C48-C13-C12	-2.49	109.40	116.52
2	A	401	CBY	C13-C14-N23	2.41	114.53	109.39
2	B	403	CBY	C10-C11-N23	-2.38	121.06	124.92
2	A	401	CBY	C60-C18-C19	2.37	119.67	114.08
2	B	403	CBY	C20-C1-C2	2.35	117.16	113.28
2	B	403	CBY	C60-C18-C19	2.32	119.55	114.08
2	B	403	CBY	C1-C19-C18	-2.31	118.28	121.75
2	A	401	CBY	C26-C2-C3	-2.29	103.42	107.42
2	B	403	CBY	C2-C1-N21	2.25	104.91	101.78
2	B	403	CBY	C17-C18-C19	-2.17	100.06	102.70
2	A	401	CBY	O63-C61-N62	-2.16	116.76	122.53
2	B	403	CBY	C49-C48-C13	2.15	120.74	114.65
2	B	403	CBY	O63-C61-C60	2.14	125.33	120.87
2	B	403	CBY	C10-C9-N22	2.12	128.16	125.74
2	A	401	CBY	C19-C1-N21	2.09	104.32	101.69
2	A	401	CBY	C12-C11-C10	-2.04	121.71	123.54
2	A	401	CBY	C5-C6-N22	-2.00	120.85	123.88

There are no chirality outliers.

All (71) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	CBY	C42-C41-C8-C9
2	B	403	CBY	C42-C41-C8-C9
2	B	403	CBY	N59-C71-C72-C73
3	B	405	GOL	O1-C1-C2-C3
4	B	406	PEG	C4-C3-O2-C2
2	B	403	CBY	C42-C41-C8-C7
7	B	414	PGE	O2-C3-C4-O3
7	B	413	PGE	O2-C3-C4-O3
7	B	415	PGE	O2-C3-C4-O3
2	B	403	CBY	C13-C48-C49-C50
2	B	403	CBY	C8-C41-C42-C43
4	A	410	PEG	C1-C2-O2-C3
3	B	405	GOL	O1-C1-C2-O2
7	B	412	PGE	O2-C3-C4-O3
4	A	410	PEG	O1-C1-C2-O2
4	B	409	PEG	O2-C3-C4-O4
7	B	414	PGE	O1-C1-C2-O2
7	B	414	PGE	O3-C5-C6-O4
2	A	401	CBY	C14-C13-C48-C49
4	A	409	PEG	O2-C3-C4-O4
3	A	402	GOL	C1-C2-C3-O3
3	A	403	GOL	C1-C2-C3-O3
3	B	401	GOL	O1-C1-C2-C3
3	B	402	GOL	O1-C1-C2-C3
3	B	405	GOL	C1-C2-C3-O3
7	B	415	PGE	O3-C5-C6-O4
3	B	405	GOL	O2-C2-C3-O3
4	A	408	PEG	O2-C3-C4-O4
4	A	412	PEG	O1-C1-C2-O2
4	A	413	PEG	O2-C3-C4-O4
4	B	409	PEG	O1-C1-C2-O2
4	B	410	PEG	O1-C1-C2-O2
4	A	407	PEG	O2-C3-C4-O4
2	A	401	CBY	C42-C41-C8-C7
4	A	408	PEG	O1-C1-C2-O2
4	A	412	PEG	O2-C3-C4-O4
4	B	406	PEG	O1-C1-C2-O2
4	B	411	PEG	O2-C3-C4-O4
3	B	402	GOL	O1-C1-C2-O2
4	B	410	PEG	O2-C3-C4-O4
3	A	403	GOL	O2-C2-C3-O3
3	B	401	GOL	O1-C1-C2-O2
4	A	411	PEG	O2-C3-C4-O4

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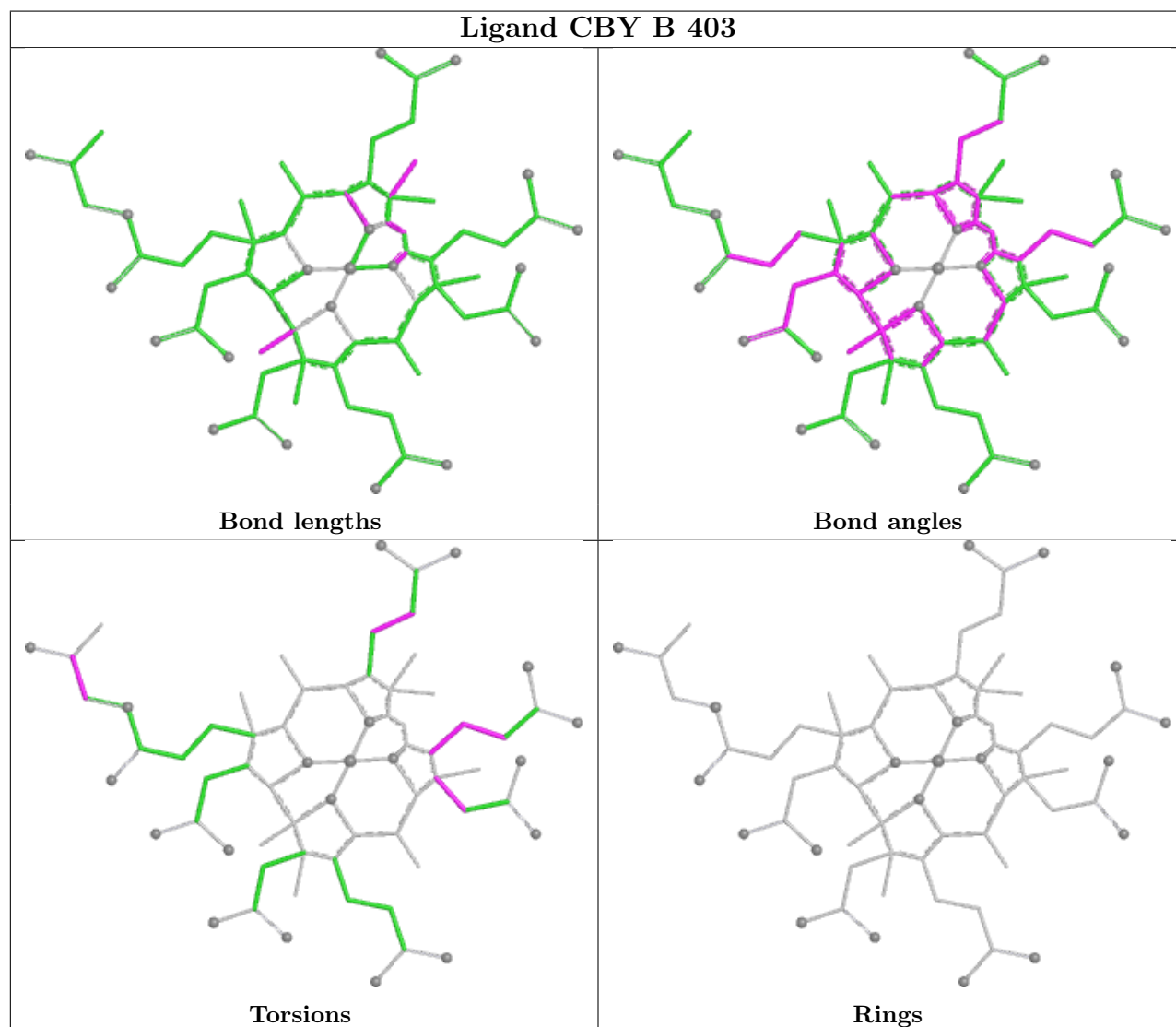
Mol	Chain	Res	Type	Atoms
2	A	401	CBY	N59-C71-C72-C73
2	A	401	CBY	C8-C41-C42-C43
4	B	408	PEG	C1-C2-O2-C3
2	A	401	CBY	C4-C3-C30-C31
7	B	414	PGE	C4-C3-O2-C2
3	A	406	GOL	O1-C1-C2-C3
4	A	413	PEG	C1-C2-O2-C3
4	B	408	PEG	O1-C1-C2-O2
7	B	414	PGE	C1-C2-O2-C3
4	A	410	PEG	O2-C3-C4-O4
2	A	401	CBY	C30-C31-C32-O34
4	A	412	PEG	C4-C3-O2-C2
2	A	401	CBY	C30-C31-C32-N33
2	A	401	CBY	C2-C3-C30-C31
2	B	403	CBY	C38-C37-C7-C6
4	A	412	PEG	C1-C2-O2-C3
7	B	413	PGE	C3-C4-O3-C5
7	B	415	PGE	C4-C3-O2-C2
7	B	412	PGE	O1-C1-C2-O2
3	A	402	GOL	O2-C2-C3-O3
3	A	405	GOL	O1-C1-C2-O2
4	A	408	PEG	C1-C2-O2-C3
4	A	407	PEG	C4-C3-O2-C2
4	B	407	PEG	O1-C1-C2-O2
2	B	403	CBY	C38-C37-C7-C8
4	A	409	PEG	C1-C2-O2-C3
7	B	414	PGE	C6-C5-O3-C4
2	A	401	CBY	C38-C37-C7-C6

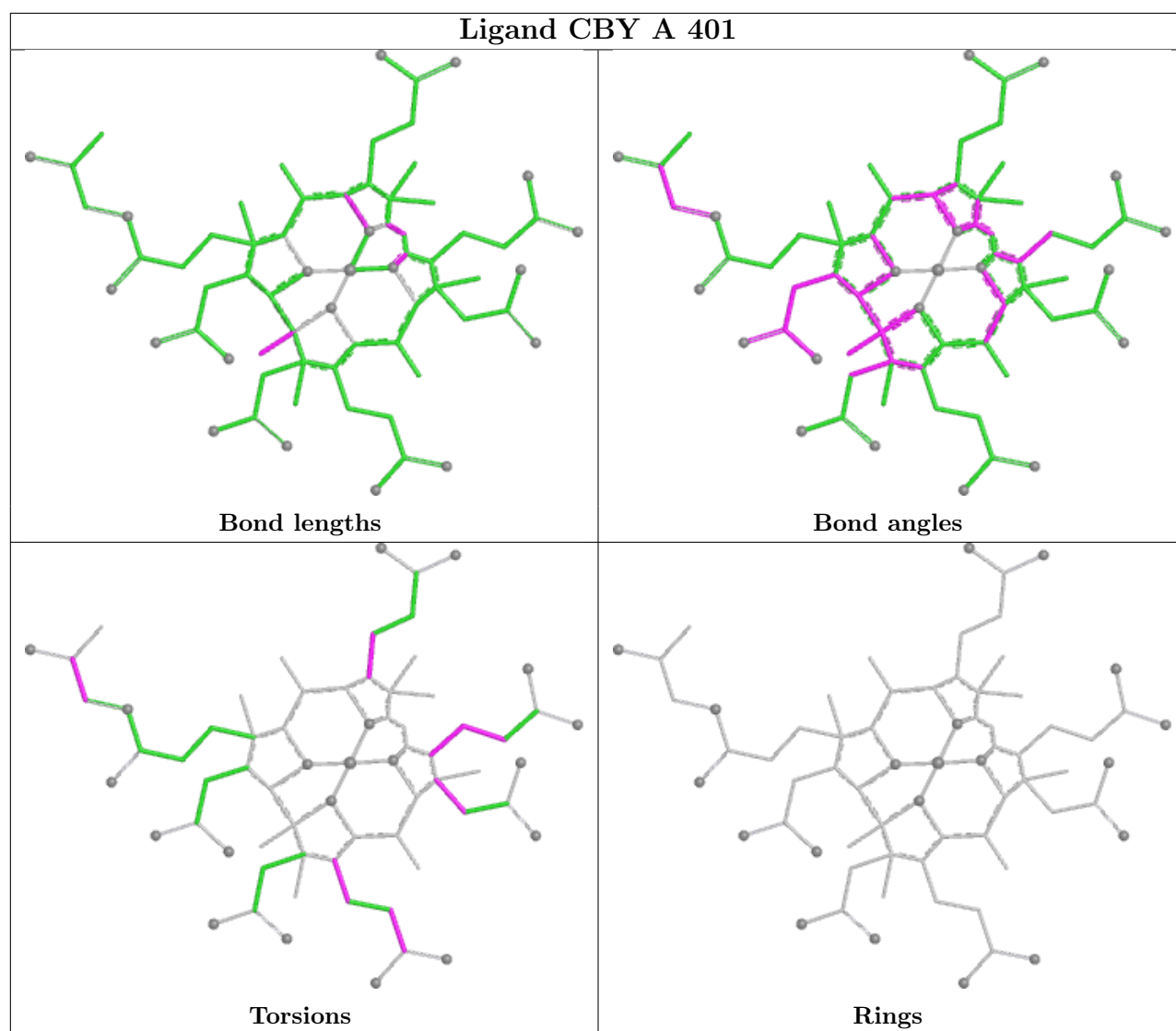
There are no ring outliers.

9 monomers are involved in 29 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	411	PEG	2	0
3	A	405	GOL	1	0
7	B	414	PGE	3	0
4	A	413	PEG	7	0
2	B	403	CBY	6	0
3	A	406	GOL	1	0
2	A	401	CBY	8	0
4	B	410	PEG	1	0
4	B	409	PEG	1	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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	320/327 (97%)	0.01	3 (0%) 81 80	21, 28, 40, 56	0
1	B	321/327 (98%)	-0.04	2 (0%) 85 85	21, 29, 40, 51	0
All	All	641/654 (98%)	-0.02	5 (0%) 82 82	21, 29, 40, 56	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	3	SER	2.4
1	B	322	LEU	2.4
1	A	322	LEU	2.3
1	A	42	LYS	2.1
1	B	54	ASP	2.1

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

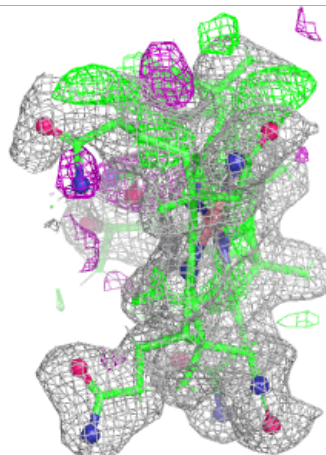
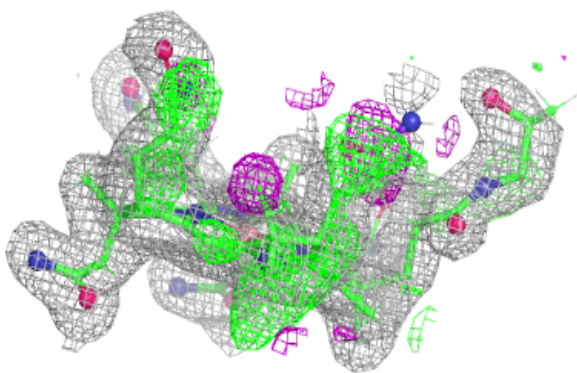
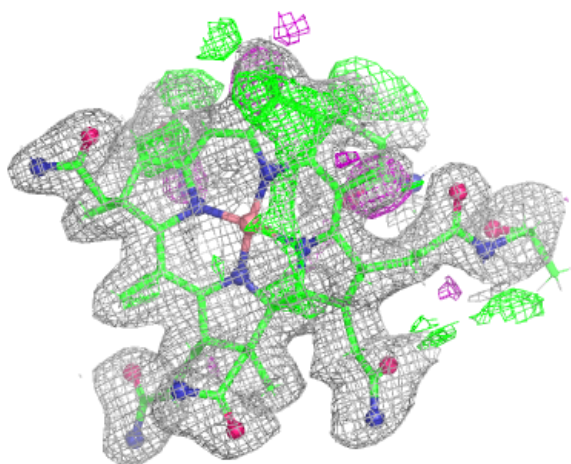
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
7	PGE	B	413	10/10	0.80	0.17	34,49,52,57	0
4	PEG	A	410	7/7	0.81	0.16	39,46,50,51	0
4	PEG	B	406	7/7	0.81	0.15	27,36,49,55	0
4	PEG	A	409	7/7	0.81	0.21	65,70,80,84	0
7	PGE	B	415	10/10	0.81	0.14	49,53,55,57	0
7	PGE	B	412	10/10	0.82	0.14	41,46,51,54	0
4	PEG	A	407	7/7	0.83	0.15	39,50,62,64	0
4	PEG	A	412	7/7	0.83	0.14	35,48,56,58	0
7	PGE	B	414	10/10	0.84	0.17	47,57,63,65	0
4	PEG	B	407	7/7	0.85	0.15	48,55,56,57	0
4	PEG	B	411	7/7	0.85	0.17	32,32,45,54	0
3	GOL	A	406	6/6	0.86	0.14	45,50,54,59	0
5	NA	A	418	1/1	0.86	0.17	46,46,46,46	0
4	PEG	B	410	7/7	0.86	0.14	38,42,49,55	0
4	PEG	A	413	7/7	0.87	0.12	35,38,43,44	0
4	PEG	A	408	7/7	0.87	0.15	29,43,62,68	0
4	PEG	A	411	7/7	0.88	0.14	40,50,53,54	0
3	GOL	B	404	6/6	0.88	0.13	46,52,58,59	0
4	PEG	B	409	7/7	0.89	0.13	54,56,57,57	0
3	GOL	A	402	6/6	0.89	0.12	34,44,49,53	0
3	GOL	A	404	6/6	0.90	0.12	41,50,52,55	0
3	GOL	A	405	6/6	0.91	0.10	35,42,43,44	0
3	GOL	B	402	6/6	0.92	0.10	33,40,46,55	0
4	PEG	B	408	7/7	0.93	0.14	16,35,51,51	0
3	GOL	B	405	6/6	0.93	0.10	38,53,58,59	0
2	CBY	B	403	68/68	0.93	0.13	22,25,53,74	0
3	GOL	A	403	6/6	0.94	0.09	27,30,34,34	0
3	GOL	B	401	6/6	0.95	0.07	28,30,33,34	0
2	CBY	A	401	68/68	0.95	0.11	19,25,49,56	0
5	NA	A	415	1/1	0.96	0.08	38,38,38,38	0
5	NA	A	414	1/1	0.96	0.09	33,33,33,33	0
6	CYN	A	419	2/2	0.98	0.12	20,20,20,24	0
6	CYN	B	417	2/2	0.98	0.10	21,21,21,23	0
5	NA	A	416	1/1	0.98	0.06	31,31,31,31	0
5	NA	A	417	1/1	0.99	0.12	27,27,27,27	0
5	NA	B	416	1/1	0.99	0.08	27,27,27,27	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.

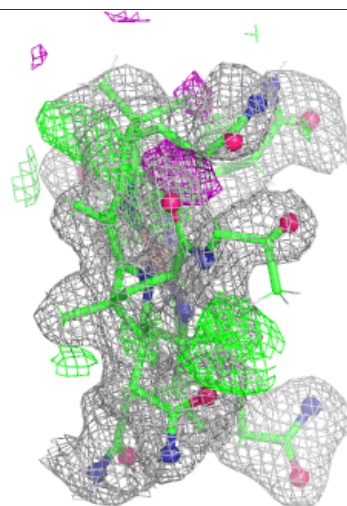
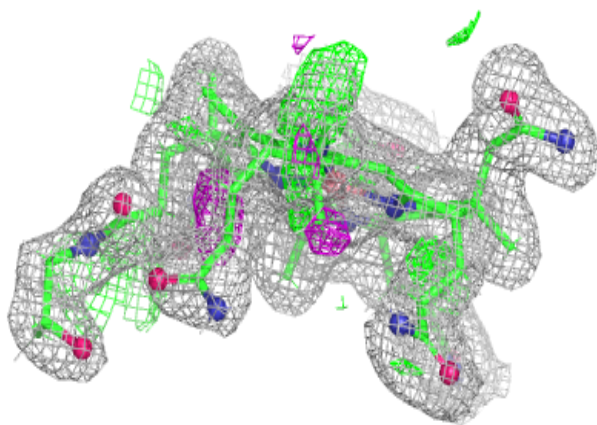
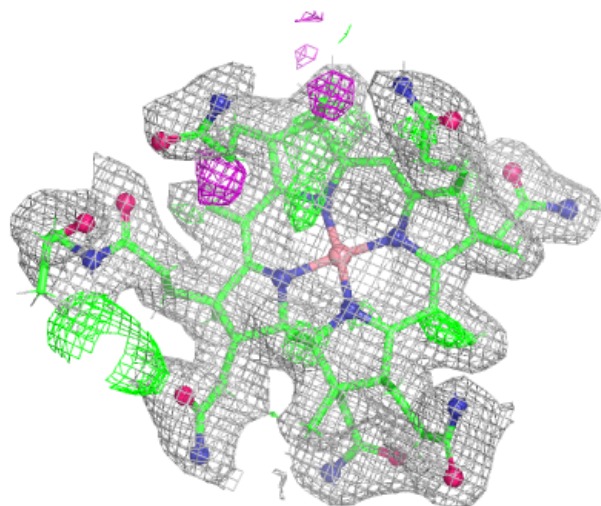
Electron density around CBY B 403:

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



Electron density around CBY A 401:

$2mF_o-DF_c$ (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.