



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 13, 2024 – 03:16 PM JST

PDB ID : 4ZLF  
Title : Cellobionic acid phosphorylase - cellobionic acid complex  
Authors : Nam, Y.W.; Arakawa, T.; Fushinobu, S.  
Deposited on : 2015-05-01  
Resolution : 1.60 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.

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 : 2.36  
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) : 2.36

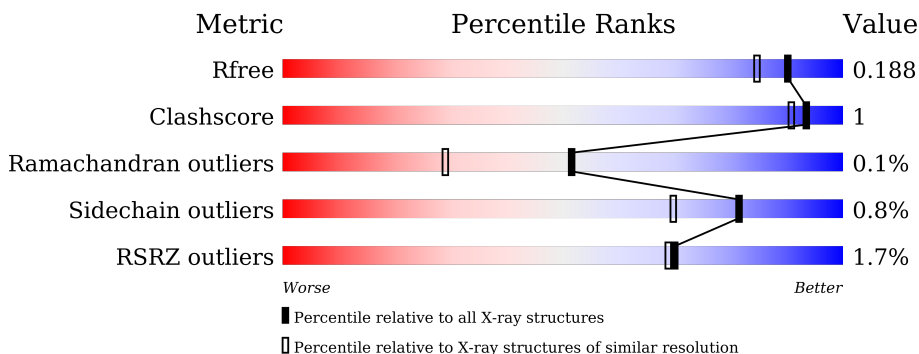
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

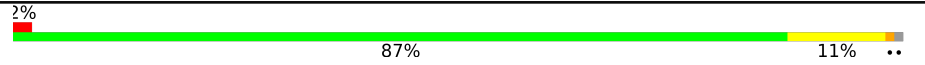
The reported resolution of this entry is 1.60 Å.

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	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

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 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	796	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 7117 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.

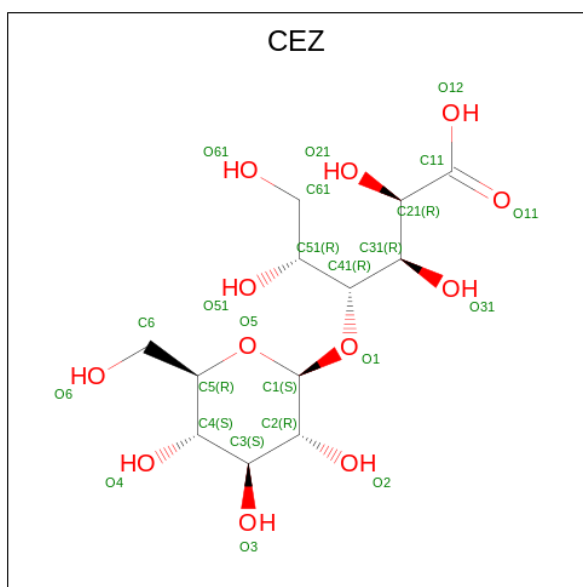
- Molecule 1 is a protein called Putative b-glycan phosphorylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	785	6244	3981	1060	1171	32	0	2	0

There are 9 discrepancies between the modelled and reference sequences:

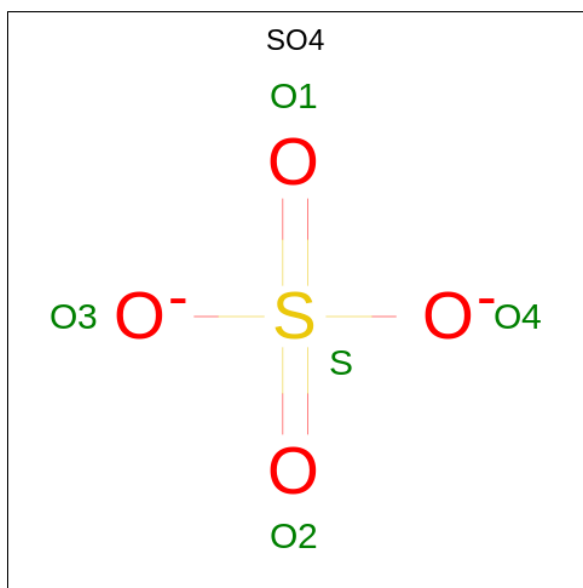
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	MET	engineered mutation	UNP Q21MB1
A	789	LEU	-	expression tag	UNP Q21MB1
A	790	GLU	-	expression tag	UNP Q21MB1
A	791	HIS	-	expression tag	UNP Q21MB1
A	792	HIS	-	expression tag	UNP Q21MB1
A	793	HIS	-	expression tag	UNP Q21MB1
A	794	HIS	-	expression tag	UNP Q21MB1
A	795	HIS	-	expression tag	UNP Q21MB1
A	796	HIS	-	expression tag	UNP Q21MB1

- Molecule 2 is 4-O-beta-D-glucopyranosyl-D-gluconic acid (three-letter code: CEZ) (formula: C<sub>12</sub>H<sub>22</sub>O<sub>12</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
			Total	C			O
2	A	1	24	12	12	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
			Total	O			S
3	A	1	5	4	1	0	0
3	A	1	5	4	1	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Cl 1 1	0	0

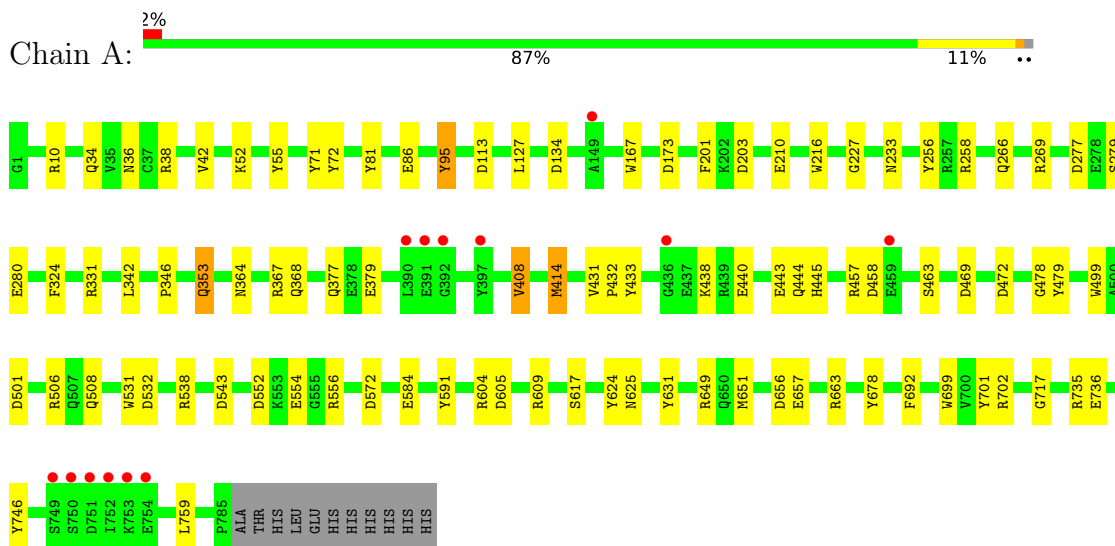
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	808	Total O 808 808	0	0

### 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: Putative b-glycan phosphorylase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	107.19Å 107.19Å 186.82Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	31.14 – 1.60 31.14 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.6 (31.14-1.60) 99.7 (31.14-1.60)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.04	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.87 (at 1.60Å)	Xtrriage
Refinement program	REFMAC 5.8.0107	Depositor
R, $R_{free}$	0.156 , 0.177 0.169 , 0.188	Depositor DCC
$R_{free}$ test set	8191 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	19.1	Xtrriage
Anisotropy	0.004	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 45.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.36$	Xtrriage
Estimated twinning fraction	0.010 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	7117	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% 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: SO4, GOL, CEZ, CL

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	1.52	40/6417 (0.6%)	1.43	67/8715 (0.8%)

All (40) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	414	MET	CB-CG	10.11	1.83	1.51
1	A	508	GLN	CD-OE1	10.11	1.46	1.24
1	A	701	TYR	CG-CD1	-7.58	1.29	1.39
1	A	736	GLU	CG-CD	-7.32	1.41	1.51
1	A	414	MET	CG-SD	-7.13	1.62	1.81
1	A	736	GLU	CD-OE2	6.90	1.33	1.25
1	A	631	TYR	CG-CD2	-6.63	1.30	1.39
1	A	364	ASN	CB-CG	6.27	1.65	1.51
1	A	71	TYR	CG-CD1	-6.20	1.31	1.39
1	A	55	TYR	CE1-CZ	-6.16	1.30	1.38
1	A	631	TYR	CZ-OH	6.11	1.48	1.37
1	A	72	TYR	CE2-CZ	6.06	1.46	1.38
1	A	463	SER	CB-OG	6.02	1.50	1.42
1	A	678	TYR	CE2-CZ	-5.95	1.30	1.38
1	A	216	TRP	CE3-CZ3	5.93	1.48	1.38
1	A	584	GLU	CD-OE1	-5.87	1.19	1.25
1	A	657	GLU	CD-OE1	5.87	1.32	1.25
1	A	167	TRP	CB-CG	-5.82	1.39	1.50
1	A	701	TYR	CE2-CZ	-5.72	1.31	1.38
1	A	604	ARG	CZ-NH1	-5.67	1.25	1.33
1	A	457	ARG	CZ-NH2	-5.61	1.25	1.33
1	A	280	GLU	CD-OE1	-5.60	1.19	1.25
1	A	625	ASN	CG-OD1	5.55	1.36	1.24
1	A	717	GLY	C-O	5.46	1.32	1.23
1	A	631	TYR	CE1-CZ	-5.42	1.31	1.38
1	A	216	TRP	CG-CD1	5.38	1.44	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	408	VAL	CB-CG1	-5.27	1.41	1.52
1	A	499	TRP	CB-CG	-5.20	1.40	1.50
1	A	379	GLU	CD-OE1	-5.20	1.20	1.25
1	A	81	TYR	CE1-CZ	5.19	1.45	1.38
1	A	279	SER	CB-OG	-5.18	1.35	1.42
1	A	478	GLY	CA-C	-5.16	1.43	1.51
1	A	216	TRP	CD2-CE3	-5.12	1.32	1.40
1	A	617	SER	CB-OG	5.09	1.48	1.42
1	A	353	GLN	CD-OE1	5.07	1.35	1.24
1	A	368	GLN	CD-OE1	5.07	1.35	1.24
1	A	657	GLU	CD-OE2	5.05	1.31	1.25
1	A	210	GLU	CD-OE1	-5.05	1.20	1.25
1	A	10	ARG	CZ-NH1	5.03	1.39	1.33
1	A	531	TRP	CB-CG	-5.00	1.41	1.50

All (67) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	331	ARG	NE-CZ-NH2	-11.57	114.52	120.30
1	A	538	ARG	NE-CZ-NH1	11.07	125.83	120.30
1	A	269	ARG	NE-CZ-NH2	-10.95	114.82	120.30
1	A	203	ASP	CB-CG-OD2	-10.29	109.04	118.30
1	A	656	ASP	CB-CG-OD2	9.46	126.81	118.30
1	A	735	ARG	NE-CZ-NH1	9.36	124.98	120.30
1	A	472	ASP	CB-CG-OD2	-8.94	110.25	118.30
1	A	457	ARG	NE-CZ-NH2	-8.59	116.00	120.30
1	A	414	MET	N-CA-CB	8.37	125.67	110.60
1	A	609	ARG	NE-CZ-NH1	8.31	124.45	120.30
1	A	604	ARG	NE-CZ-NH2	-8.26	116.17	120.30
1	A	367	ARG	NE-CZ-NH1	8.21	124.40	120.30
1	A	331	ARG	NE-CZ-NH1	8.20	124.40	120.30
1	A	701	TYR	CB-CG-CD2	-8.19	116.09	121.00
1	A	543	ASP	CB-CG-OD2	8.15	125.63	118.30
1	A	277	ASP	CB-CG-OD1	8.09	125.58	118.30
1	A	201	PHE	CB-CG-CD2	-7.94	115.24	120.80
1	A	469	ASP	CB-CG-OD1	7.82	125.34	118.30
1	A	651	MET	CG-SD-CE	-7.72	87.84	100.20
1	A	572	ASP	CB-CG-OD1	7.63	125.17	118.30
1	A	532	ASP	CB-CG-OD1	-7.58	111.48	118.30
1	A	443	GLU	OE1-CD-OE2	7.48	132.28	123.30
1	A	609	ARG	NE-CZ-NH2	-7.38	116.61	120.30
1	A	10	ARG	NE-CZ-NH1	-7.37	116.61	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	414	MET	CB-CG-SD	-7.12	91.03	112.40
1	A	95	TYR	CB-CG-CD1	-7.11	116.73	121.00
1	A	663	ARG	NE-CZ-NH1	7.03	123.81	120.30
1	A	457	ARG	NE-CZ-NH1	6.99	123.79	120.30
1	A	258	ARG	NE-CZ-NH1	-6.85	116.88	120.30
1	A	113	ASP	CB-CG-OD2	-6.81	112.17	118.30
1	A	556	ARG	NE-CZ-NH1	6.62	123.61	120.30
1	A	746	TYR	CD1-CE1-CZ	-6.32	114.11	119.80
1	A	113	ASP	CB-CG-OD1	6.20	123.88	118.30
1	A	605	ASP	CB-CG-OD2	-6.17	112.75	118.30
1	A	134	ASP	CB-CG-OD2	-6.11	112.80	118.30
1	A	572	ASP	CB-CG-OD2	-6.11	112.80	118.30
1	A	203	ASP	OD1-CG-OD2	6.10	134.88	123.30
1	A	127	LEU	CA-CB-CG	6.05	129.23	115.30
1	A	342	LEU	CB-CG-CD1	-5.91	100.95	111.00
1	A	702	ARG	NE-CZ-NH2	5.88	123.24	120.30
1	A	649	ARG	NE-CZ-NH2	5.85	123.22	120.30
1	A	127	LEU	CB-CG-CD1	-5.77	101.19	111.00
1	A	501	ASP	CB-CG-OD2	-5.77	113.11	118.30
1	A	440	GLU	CG-CD-OE1	5.77	129.83	118.30
1	A	266	GLN	O-C-N	5.68	131.79	122.70
1	A	701	TYR	CD1-CE1-CZ	-5.59	114.77	119.80
1	A	479	TYR	CZ-CE2-CD2	-5.58	114.78	119.80
1	A	552	ASP	CB-CG-OD1	5.58	123.32	118.30
1	A	692[A]	PHE	CB-CG-CD2	-5.54	116.92	120.80
1	A	692[B]	PHE	CB-CG-CD2	-5.54	116.92	120.80
1	A	591	TYR	CB-CG-CD1	5.48	124.29	121.00
1	A	554	GLU	OE1-CD-OE2	5.48	129.88	123.30
1	A	506	ARG	NE-CZ-NH2	5.46	123.03	120.30
1	A	173	ASP	CB-CG-OD1	5.35	123.12	118.30
1	A	458	ASP	CB-CG-OD1	5.32	123.09	118.30
1	A	324	PHE	CB-CG-CD1	-5.30	117.09	120.80
1	A	624	TYR	CB-CG-CD2	5.26	124.16	121.00
1	A	479	TYR	CG-CD1-CE1	-5.23	117.11	121.30
1	A	277	ASP	OD1-CG-OD2	-5.20	113.42	123.30
1	A	367	ARG	NE-CZ-NH2	-5.20	117.70	120.30
1	A	433	TYR	CD1-CE1-CZ	-5.13	115.18	119.80
1	A	433	TYR	CB-CG-CD2	-5.12	117.92	121.00
1	A	256	TYR	CB-CG-CD1	5.12	124.07	121.00
1	A	736	GLU	OE1-CD-OE2	5.12	129.44	123.30
1	A	552	ASP	OD1-CG-OD2	-5.09	113.62	123.30
1	A	746	TYR	CG-CD2-CE2	-5.01	117.29	121.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	552	ASP	CB-CG-OD2	5.01	122.81	118.30

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	6244	0	6021	16	0
2	A	24	0	21	1	0
3	A	10	0	0	1	0
4	A	30	0	38	0	0
5	A	1	0	0	0	0
6	A	808	0	0	4	0
All	All	7117	0	6080	17	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 1.

All (17) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:414:MET:CB	1:A:414:MET:CG	1.83	1.56
1:A:414:MET:CB	1:A:414:MET:SD	2.47	1.01
1:A:444:GLN:HG2	6:A:1525:HOH:O	1.80	0.81
1:A:353:GLN:HE21	1:A:699:TRP:HE1	1.30	0.80
1:A:42:VAL:HG13	6:A:1512:HOH:O	1.93	0.68
1:A:431:VAL:O	1:A:445:HIS:HE1	1.90	0.55
1:A:227:GLY:H	1:A:233:ASN:HD22	1.55	0.55
1:A:377:GLN:OE1	1:A:445:HIS:HD2	1.91	0.54
1:A:431:VAL:HG23	1:A:445:HIS:CE1	2.45	0.51
1:A:86:GLU:HG3	6:A:1638:HOH:O	2.10	0.51
1:A:431:VAL:HB	1:A:432:PRO:HD2	1.95	0.49
1:A:36:ASN:ND2	1:A:38:ARG:H	2.13	0.46
1:A:227:GLY:H	1:A:233:ASN:ND2	2.15	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:377:GLN:OE1	1:A:445:HIS:CD2	2.70	0.44
1:A:414:MET:SD	1:A:414:MET:HB2	2.52	0.42
1:A:759:LEU:HD21	6:A:1087:HOH:O	2.20	0.41
2:A:801:CEZ:H1	3:A:802:SO4:O3	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	785/796 (99%)	766 (98%)	18 (2%)	1 (0%)	51 29

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	95	TYR

### 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	657/665 (99%)	652 (99%)	5 (1%)	81 70

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	34	GLN
1	A	52	LYS
1	A	346	PRO
1	A	408	VAL
1	A	438	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	12	GLN
1	A	34	GLN
1	A	36	ASN
1	A	108	ASN
1	A	233	ASN
1	A	313	GLN
1	A	347	GLN
1	A	353	GLN
1	A	445	HIS
1	A	560	ASN
1	A	625	ASN

### 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 9 ligands modelled in this entry, 1 is monoatomic - leaving 8 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	SO4	A	802	-	4,4,4	0.72	0	6,6,6	0.95	0
2	CEZ	A	801	-	24,24,24	2.13	7 (29%)	33,34,34	2.81	17 (51%)
4	GOL	A	806	-	5,5,5	1.03	0	5,5,5	0.47	0
3	SO4	A	803	-	4,4,4	0.62	0	6,6,6	0.66	0
4	GOL	A	807	-	5,5,5	0.56	0	5,5,5	0.59	0
4	GOL	A	805	-	5,5,5	1.68	1 (20%)	5,5,5	0.37	0
4	GOL	A	808	-	5,5,5	1.40	1 (20%)	5,5,5	0.69	0
4	GOL	A	804	-	5,5,5	0.79	0	5,5,5	1.08	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
2	CEZ	A	801	-	-	1/24/44/44	0/1/1/1
4	GOL	A	806	-	-	0/4/4/4	-
4	GOL	A	807	-	-	0/4/4/4	-
4	GOL	A	805	-	-	0/4/4/4	-
4	GOL	A	808	-	-	0/4/4/4	-
4	GOL	A	804	-	-	2/4/4/4	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	801	CEZ	O51-C51	5.25	1.54	1.43
2	A	801	CEZ	C51-C41	3.98	1.61	1.52
2	A	801	CEZ	C31-C21	3.58	1.61	1.53
2	A	801	CEZ	C21-C11	-3.40	1.48	1.52
2	A	801	CEZ	O2-C2	3.24	1.50	1.43
4	A	805	GOL	O2-C2	-3.22	1.33	1.43
2	A	801	CEZ	C31-C41	2.34	1.55	1.53
4	A	808	GOL	O3-C3	2.31	1.52	1.42
2	A	801	CEZ	O61-C61	2.29	1.52	1.42

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	CEZ	O11-C11-C21	-7.61	101.63	121.63
2	A	801	CEZ	O1-C41-C51	4.93	114.78	107.98
2	A	801	CEZ	O12-C11-C21	4.36	125.07	113.27
2	A	801	CEZ	O31-C31-C21	-4.30	101.38	109.21
2	A	801	CEZ	C4-C3-C2	-4.01	103.82	110.82
2	A	801	CEZ	O2-C2-C1	-3.80	100.82	110.05
2	A	801	CEZ	C51-C41-C31	3.52	121.21	113.60
2	A	801	CEZ	O61-C61-C51	-3.39	103.69	111.07
2	A	801	CEZ	O21-C21-C31	-3.34	103.37	110.45
2	A	801	CEZ	O21-C21-C11	3.25	117.48	110.66
2	A	801	CEZ	O12-C11-O11	2.93	130.73	124.09
2	A	801	CEZ	O2-C2-C3	-2.92	103.60	110.35
2	A	801	CEZ	O1-C1-C2	-2.86	100.68	108.10
2	A	801	CEZ	O5-C5-C4	-2.78	104.65	109.69
2	A	801	CEZ	O4-C4-C3	-2.38	104.86	110.35
2	A	801	CEZ	O1-C41-C31	-2.12	103.59	108.23
2	A	801	CEZ	C6-C5-C4	2.10	117.92	113.00

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	804	GOL	C1-C2-C3-O3
4	A	804	GOL	O2-C2-C3-O3
2	A	801	CEZ	O5-C1-O1-C41

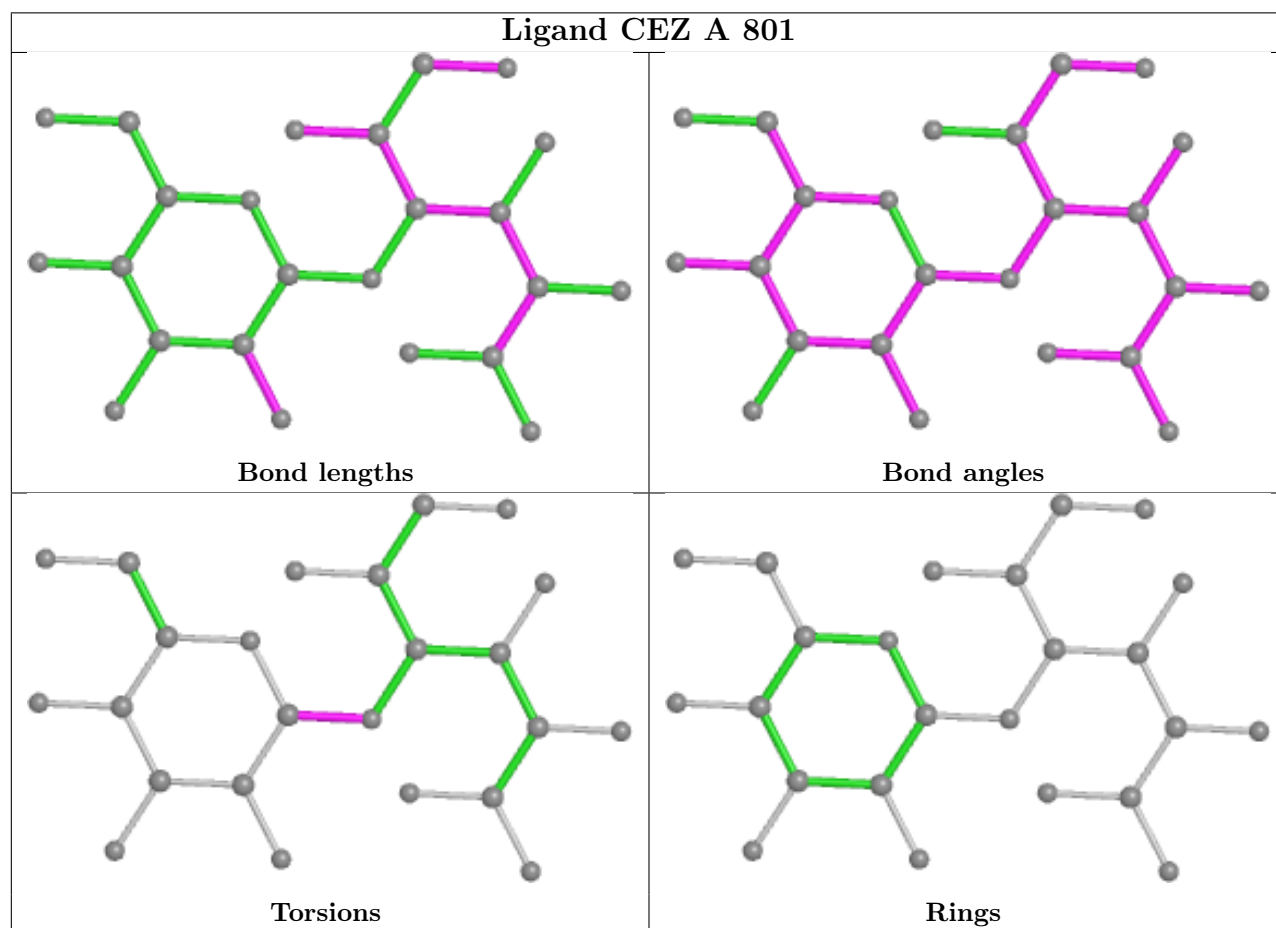
There are no ring outliers.

2 monomers are involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	802	SO4	1	0
2	A	801	CEZ	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, 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	785/796 (98%)	-0.48	13 (1%) 70 69	15, 20, 35, 73	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	750	SER	5.5
1	A	753	LYS	4.9
1	A	751	ASP	4.1
1	A	752	ILE	3.7
1	A	754	GLU	3.3
1	A	391	GLU	2.6
1	A	390	LEU	2.4
1	A	436	GLY	2.4
1	A	749	SER	2.2
1	A	149	ALA	2.2
1	A	397	TYR	2.1
1	A	392	GLY	2.1
1	A	459	GLU	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](#)

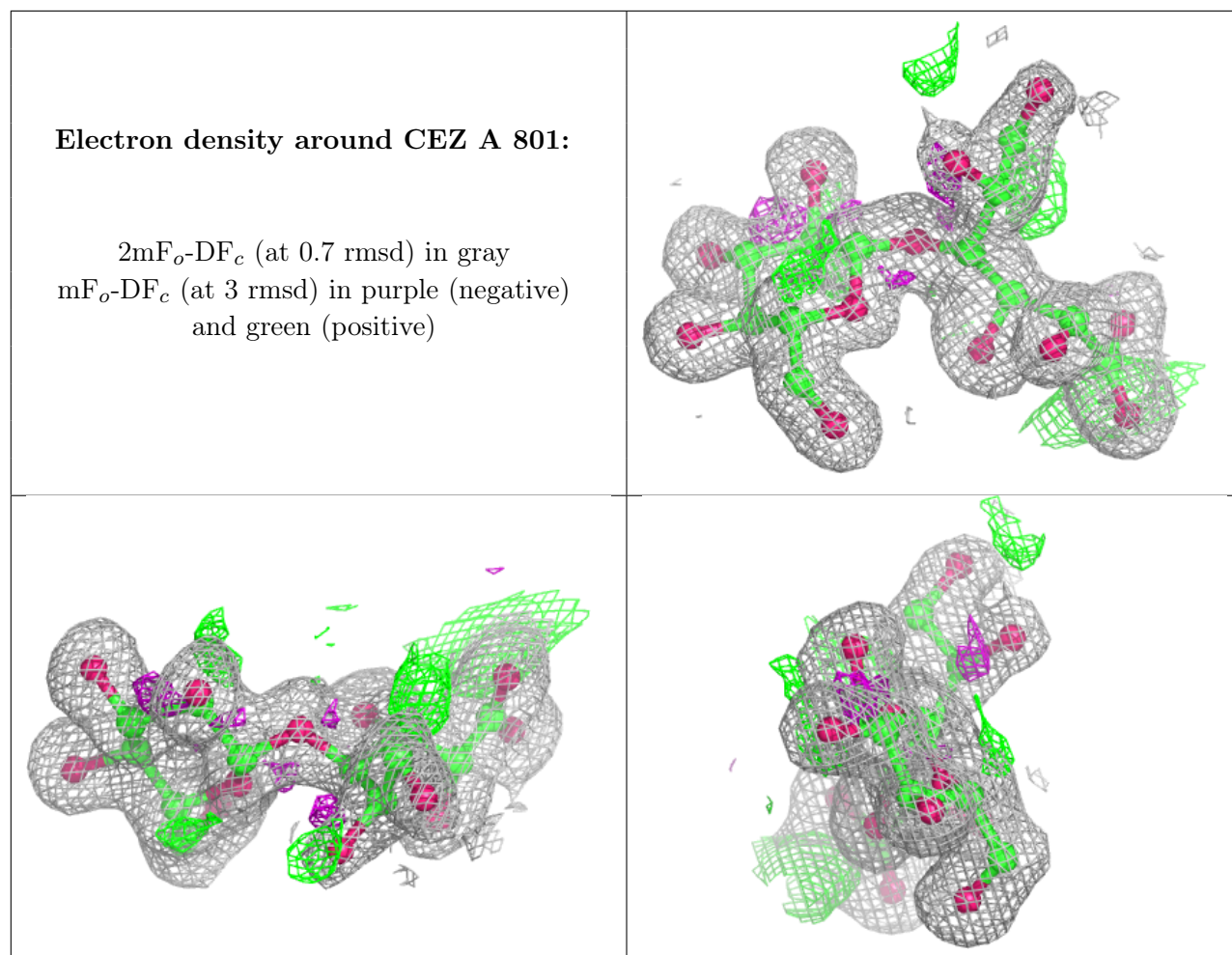
There are no monosaccharides in this entry.

## 6.4 Ligands

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
4	GOL	A	804	6/6	0.91	0.14	29,38,40,44	0
4	GOL	A	807	6/6	0.91	0.10	39,43,46,49	0
4	GOL	A	808	6/6	0.91	0.16	26,30,33,35	0
2	CEZ	A	801	24/24	0.94	0.09	17,24,35,40	0
4	GOL	A	805	6/6	0.95	0.06	26,30,35,37	0
4	GOL	A	806	6/6	0.97	0.08	22,24,24,26	0
3	SO4	A	803	5/5	0.99	0.13	28,29,30,32	0
5	CL	A	809	1/1	0.99	0.11	19,19,19,19	0
3	SO4	A	802	5/5	1.00	0.07	19,20,22,26	0

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



## 6.5 Other polymers [i](#)

There are no such residues in this entry.