



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 15, 2024 – 11:11 AM EDT

PDB ID : 2BHU  
Title : Crystal structure of Deinococcus radiodurans maltooligosyltrehalose trehalohydrolase  
Authors : Timmins, J.; Leiros, H.-K.S.; Leonard, G.; Leiros, I.; McSweeney, S.  
Deposited on : 2005-01-18  
Resolution : 1.10 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 : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 2.37.1  
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

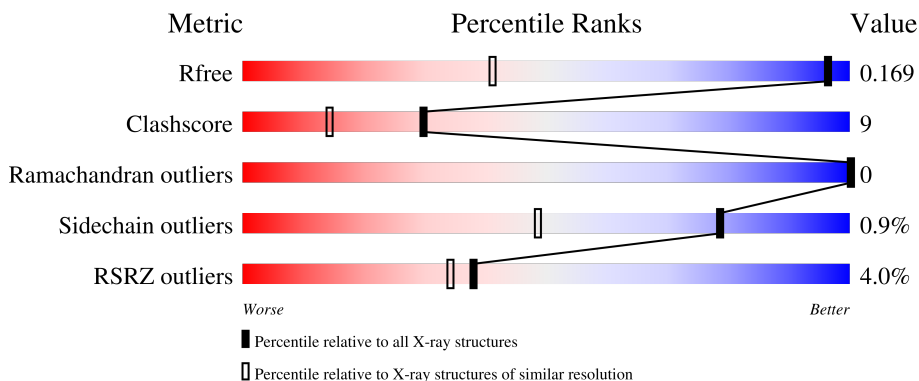
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


The reported resolution of this entry is 1.10 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	1619 (1.14-1.06)
Clashscore	141614	1671 (1.14-1.06)
Ramachandran outliers	138981	1615 (1.14-1.06)
Sidechain outliers	138945	1613 (1.14-1.06)
RSRZ outliers	127900	1588 (1.14-1.06)

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	602	

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	PGE	A	1604[B]	-	-	X	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6172 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 MALTOOLIGOSYLTREHALOSE TREHALOHYDROLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	580	5005	3162	895	937	11	52	43	0

- Molecule 2 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C<sub>4</sub>H<sub>12</sub>NO<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	16	8	2	6	0	1

- Molecule 3 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	C O	0	1
			20	12 8		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	0
			1	1		

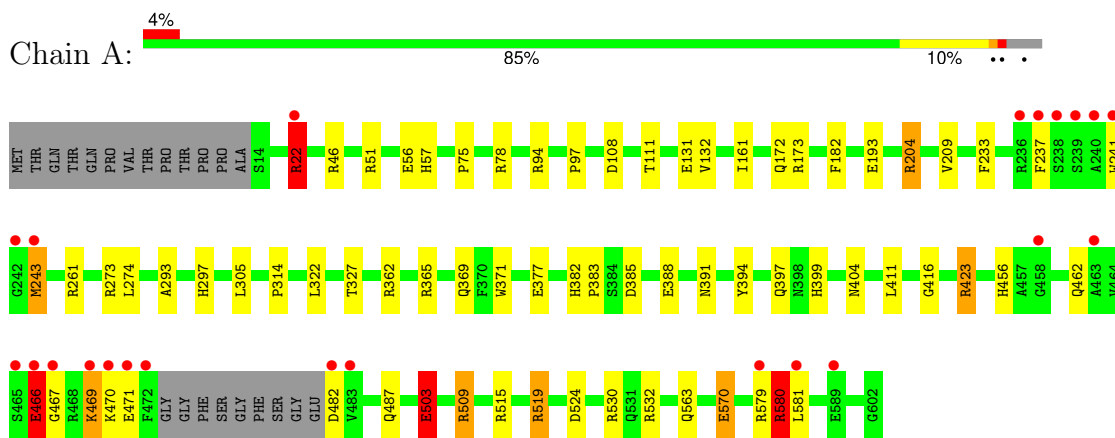
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1130	Total	O	0	0
			1130	1130		

### 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: MALTOOLIGOSYLTREHALOSE TREHALOXYDROLASE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	59.58Å 66.62Å 152.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.41 – 1.10 44.41 – 1.10	Depositor EDS
% Data completeness (in resolution range)	88.2 (44.41-1.10) 88.2 (44.41-1.10)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.50 (at 1.10Å)	Xtrriage
Refinement program	REFMAC 5.2.0003	Depositor
R, $R_{free}$	0.128 , 0.159 0.143 , 0.169	Depositor DCC
$R_{free}$ test set	10891 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	7.9	Xtrriage
Anisotropy	0.134	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 58.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.98	EDS
Total number of atoms	6172	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	12.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.43% 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: TRS, MG, 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	17.97	33/5142 (0.6%)	5.15	51/6994 (0.7%)

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	6

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	22[A]	ARG	CZ-NH2	642.51	9.68	1.33
1	A	22[B]	ARG	CZ-NH2	642.51	9.68	1.33
1	A	22[A]	ARG	CZ-NH1	575.45	8.81	1.33
1	A	22[B]	ARG	CZ-NH1	575.45	8.81	1.33
1	A	503[A]	GLU	CD-OE2	232.20	3.81	1.25
1	A	503[B]	GLU	CD-OE2	232.20	3.81	1.25
1	A	503[A]	GLU	CD-OE1	138.59	2.78	1.25
1	A	503[B]	GLU	CD-OE1	138.59	2.78	1.25
1	A	466	GLU	CD-OE2	109.17	2.45	1.25
1	A	580	ARG	CZ-NH2	45.79	1.92	1.33
1	A	503[A]	GLU	CG-CD	40.58	2.12	1.51
1	A	503[B]	GLU	CG-CD	40.58	2.12	1.51
1	A	482	ASP	CB-CG	28.85	2.12	1.51
1	A	243[A]	MET	CG-SD	27.26	2.52	1.81
1	A	243[B]	MET	CG-SD	27.26	2.52	1.81
1	A	243[A]	MET	SD-CE	20.13	2.90	1.77
1	A	243[B]	MET	SD-CE	20.13	2.90	1.77
1	A	519[A]	ARG	NE-CZ	18.09	1.56	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	519[B]	ARG	NE-CZ	18.09	1.56	1.33
1	A	193[A]	GLU	CD-OE2	14.10	1.41	1.25
1	A	193[B]	GLU	CD-OE2	14.10	1.41	1.25
1	A	22[A]	ARG	CB-CG	9.73	1.78	1.52
1	A	22[B]	ARG	CB-CG	9.73	1.78	1.52
1	A	469	LYS	CD-CE	9.67	1.75	1.51
1	A	579	ARG	CD-NE	-7.91	1.33	1.46
1	A	462	GLN	CD-NE2	7.52	1.51	1.32
1	A	22[A]	ARG	CA-CB	-6.96	1.38	1.53
1	A	22[B]	ARG	CA-CB	-6.96	1.38	1.53
1	A	193[A]	GLU	CD-OE1	6.90	1.33	1.25
1	A	193[B]	GLU	CD-OE1	6.90	1.33	1.25
1	A	466	GLU	CG-CD	-6.33	1.42	1.51
1	A	470	LYS	CG-CD	-6.30	1.31	1.52
1	A	580	ARG	CZ-NH1	-6.13	1.25	1.33

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	22[A]	ARG	NE-CZ-NH1	-187.50	26.55	120.30
1	A	22[B]	ARG	NE-CZ-NH1	-187.50	26.55	120.30
1	A	22[A]	ARG	NE-CZ-NH2	-178.16	31.22	120.30
1	A	22[B]	ARG	NE-CZ-NH2	-178.16	31.22	120.30
1	A	22[A]	ARG	NH1-CZ-NH2	-96.56	13.18	119.40
1	A	22[B]	ARG	NH1-CZ-NH2	-96.56	13.18	119.40
1	A	503[A]	GLU	OE1-CD-OE2	-73.93	34.59	123.30
1	A	503[B]	GLU	OE1-CD-OE2	-73.93	34.59	123.30
1	A	580	ARG	NE-CZ-NH1	56.44	148.52	120.30
1	A	503[A]	GLU	CG-CD-OE2	-42.34	33.61	118.30
1	A	503[B]	GLU	CG-CD-OE2	-42.34	33.61	118.30
1	A	519[A]	ARG	NE-CZ-NH1	-31.91	104.35	120.30
1	A	519[B]	ARG	NE-CZ-NH1	-31.91	104.35	120.30
1	A	503[A]	GLU	CG-CD-OE1	-31.21	55.87	118.30
1	A	503[B]	GLU	CG-CD-OE1	-31.21	55.87	118.30
1	A	519[A]	ARG	NE-CZ-NH2	30.27	135.44	120.30
1	A	519[B]	ARG	NE-CZ-NH2	30.27	135.44	120.30
1	A	580	ARG	NH1-CZ-NH2	-26.41	90.35	119.40
1	A	469	LYS	CD-CE-NZ	-19.60	66.62	111.70
1	A	243[A]	MET	CG-SD-CE	-19.20	69.48	100.20
1	A	243[B]	MET	CG-SD-CE	-19.20	69.48	100.20
1	A	580	ARG	NE-CZ-NH2	-17.71	111.44	120.30
1	A	519[A]	ARG	CD-NE-CZ	15.71	145.60	123.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	519[B]	ARG	CD-NE-CZ	15.71	145.60	123.60
1	A	482	ASP	CA-CB-CG	-12.80	85.25	113.40
1	A	243[A]	MET	CB-CG-SD	-10.60	80.61	112.40
1	A	243[B]	MET	CB-CG-SD	-10.60	80.61	112.40
1	A	22[A]	ARG	CB-CG-CD	-9.52	86.86	111.60
1	A	22[B]	ARG	CB-CG-CD	-9.52	86.86	111.60
1	A	570	GLU	OE1-CD-OE2	-9.22	112.24	123.30
1	A	22[A]	ARG	CB-CA-C	6.87	124.15	110.40
1	A	22[B]	ARG	CB-CA-C	6.87	124.15	110.40
1	A	579	ARG	CG-CD-NE	6.81	126.10	111.80
1	A	193[A]	GLU	CG-CD-OE1	-6.66	104.97	118.30
1	A	193[B]	GLU	CG-CD-OE1	-6.66	104.97	118.30
1	A	94	ARG	NE-CZ-NH2	-6.33	117.14	120.30
1	A	530	ARG	NE-CZ-NH1	6.12	123.36	120.30
1	A	182	PHE	CB-CG-CD1	6.07	125.05	120.80
1	A	362	ARG	NE-CZ-NH2	-5.92	117.34	120.30
1	A	394	TYR	CB-CG-CD1	5.68	124.41	121.00
1	A	362	ARG	NE-CZ-NH1	5.51	123.06	120.30
1	A	423	ARG	NE-CZ-NH2	-5.50	117.55	120.30
1	A	469	LYS	CB-CG-CD	5.49	125.86	111.60
1	A	532	ARG	NE-CZ-NH1	5.46	123.03	120.30
1	A	515	ARG	NE-CZ-NH2	-5.39	117.61	120.30
1	A	193[A]	GLU	CG-CD-OE2	5.37	129.03	118.30
1	A	193[B]	GLU	CG-CD-OE2	5.37	129.03	118.30
1	A	261	ARG	NE-CZ-NH2	-5.25	117.68	120.30
1	A	423	ARG	NE-CZ-NH1	5.20	122.90	120.30
1	A	524	ASP	CB-CG-OD2	5.20	122.97	118.30
1	A	394	TYR	CB-CG-CD2	-5.17	117.89	121.00

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	22[A]	ARG	Sidechain
1	A	466	GLU	Sidechain
1	A	503[A]	GLU	Sidechain
1	A	509[A]	ARG	Sidechain
1	A	570	GLU	Sidechain
1	A	580	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	5005	0	4729	91	0
2	A	16	0	24	1	0
3	A	20	0	28	11	0
4	A	1	0	0	0	0
5	A	1130	0	0	30	1
All	All	6172	0	4781	91	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 9.

All (91) 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:22[A]:ARG:CB	1:A:22[A]:ARG:CG	1.78	1.58
1:A:503[B]:GLU:CD	1:A:503[B]:GLU:CG	1.95	1.34
1:A:369[B]:GLN:NE2	3:A:1604[B]:PGE:H3	1.43	1.31
1:A:243[B]:MET:CG	1:A:243[B]:MET:SD	2.23	1.25
1:A:369[B]:GLN:HE21	3:A:1604[B]:PGE:C3	1.51	1.22
1:A:204[A]:ARG:HG2	5:A:2519:HOH:O	1.37	1.21
1:A:503[A]:GLU:CD	1:A:503[A]:GLU:CG	2.12	1.17
1:A:404[B]:ASN:OD1	5:A:2834:HOH:O	1.62	1.13
1:A:22[A]:ARG:CB	1:A:22[A]:ARG:CD	2.27	1.12
1:A:503[A]:GLU:OE2	1:A:503[A]:GLU:HG3	1.47	1.12
1:A:327[B]:THR:HG23	5:A:2710:HOH:O	1.55	1.07
1:A:581[A]:LEU:HD11	5:A:3112:HOH:O	1.54	1.05
1:A:503[B]:GLU:OE1	1:A:503[B]:GLU:HG2	1.57	1.04
1:A:369[B]:GLN:HE21	3:A:1604[B]:PGE:C4	1.71	1.02
1:A:172:GLN:OE1	5:A:2453:HOH:O	1.81	0.98
1:A:503[B]:GLU:HG2	1:A:503[B]:GLU:OE2	1.61	0.98
1:A:243[A]:MET:SD	1:A:243[A]:MET:CG	2.52	0.98
1:A:423:ARG:CD	5:A:2863:HOH:O	2.16	0.94
1:A:503[A]:GLU:HG3	1:A:503[A]:GLU:OE1	1.71	0.89
1:A:369[B]:GLN:HE21	3:A:1604[B]:PGE:H42	1.37	0.88
1:A:365:ARG:HH11	3:A:1604[A]:PGE:H4	1.40	0.86
1:A:456:HIS:H	1:A:487:GLN:HE22	1.26	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:503[B]:GLU:CD	1:A:503[B]:GLU:CB	2.46	0.83
1:A:581[A]:LEU:CD1	5:A:3112:HOH:O	2.17	0.83
1:A:423:ARG:HD3	5:A:2863:HOH:O	1.76	0.82
1:A:243[A]:MET:SD	1:A:243[A]:MET:CB	2.70	0.80
1:A:580:ARG:CZ	5:A:3089:HOH:O	2.30	0.79
1:A:22[A]:ARG:NH2	1:A:22[A]:ARG:NH1	2.29	0.79
1:A:22[A]:ARG:CD	1:A:22[A]:ARG:HB2	2.15	0.76
1:A:503[B]:GLU:CG	1:A:503[B]:GLU:OE2	2.35	0.74
1:A:563:GLN:HG3	5:A:3037:HOH:O	1.88	0.73
1:A:503[B]:GLU:CG	1:A:503[B]:GLU:OE1	2.36	0.72
1:A:131:GLU:OE2	1:A:399:HIS:HD2	1.72	0.72
1:A:503[A]:GLU:CG	1:A:503[A]:GLU:OE1	2.37	0.72
1:A:369[B]:GLN:NE2	3:A:1604[B]:PGE:H32	2.06	0.71
1:A:388:GLU:H	1:A:391:ASN:HD22	1.40	0.69
1:A:56[B]:GLU:OE2	5:A:2171:HOH:O	2.10	0.68
1:A:22[A]:ARG:CG	1:A:22[A]:ARG:CA	2.64	0.67
1:A:503[A]:GLU:CG	1:A:503[A]:GLU:OE2	2.35	0.66
1:A:243[A]:MET:SD	1:A:243[A]:MET:HB2	2.35	0.65
1:A:327[B]:THR:CG2	5:A:2710:HOH:O	2.26	0.65
1:A:469:LYS:CE	1:A:469:LYS:CG	2.75	0.64
1:A:111[A]:THR:HG22	5:A:2302:HOH:O	2.00	0.62
1:A:56[A]:GLU:OE2	5:A:2169:HOH:O	2.16	0.61
1:A:204[A]:ARG:NH1	5:A:2535:HOH:O	2.32	0.61
1:A:365:ARG:HH11	3:A:1604[A]:PGE:C4	2.13	0.60
1:A:131:GLU:OE2	1:A:399:HIS:CD2	2.54	0.60
1:A:503[A]:GLU:OE2	1:A:503[A]:GLU:OE1	2.19	0.59
1:A:22[A]:ARG:CB	1:A:22[A]:ARG:HD2	2.31	0.58
1:A:204[A]:ARG:HH11	1:A:204[A]:ARG:HG3	1.69	0.58
1:A:503[B]:GLU:OE1	1:A:503[B]:GLU:OE2	2.20	0.58
1:A:509[A]:ARG:HG2	5:A:2863:HOH:O	2.04	0.58
1:A:22[A]:ARG:HB2	1:A:22[A]:ARG:HD3	1.85	0.57
1:A:369[B]:GLN:HE22	3:A:1604[B]:PGE:C3	2.14	0.54
1:A:78:ARG:CZ	1:A:97:PRO:HG2	2.37	0.54
1:A:388:GLU:H	1:A:391:ASN:ND2	2.06	0.54
1:A:416[B]:GLY:HA3	2:A:1603[B]:TRS:O1	2.08	0.53
1:A:22[A]:ARG:CB	1:A:22[A]:ARG:HD3	2.30	0.53
1:A:274:LEU:HD21	1:A:305[B]:LEU:HD11	1.89	0.53
1:A:161[C]:ILE:CG2	1:A:209:VAL:HG13	2.39	0.52
1:A:382:HIS:HD2	5:A:2403:HOH:O	1.92	0.52
1:A:503[B]:GLU:CD	1:A:503[B]:GLU:HB2	2.31	0.51
1:A:293:ALA:O	1:A:297[A]:HIS:HD2	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:397:GLN:NE2	1:A:411:LEU:H	2.09	0.50
1:A:243[B]:MET:SD	1:A:243[B]:MET:CB	2.99	0.47
1:A:56[B]:GLU:CG	5:A:2171:HOH:O	2.62	0.47
1:A:519[B]:ARG:HD2	5:A:2971:HOH:O	2.15	0.47
1:A:297[A]:HIS:HE1	5:A:2675:HOH:O	1.98	0.47
1:A:369[B]:GLN:NE2	3:A:1604[B]:PGE:H42	2.17	0.46
1:A:57:HIS:HE1	5:A:2142:HOH:O	1.98	0.46
1:A:466:GLU:HG3	5:A:2888:HOH:O	2.15	0.46
1:A:204[A]:ARG:CG	5:A:2519:HOH:O	2.21	0.45
1:A:314[B]:PRO:HG2	1:A:383:PRO:O	2.16	0.45
1:A:365:ARG:HD3	3:A:1604[B]:PGE:O4	2.16	0.45
1:A:233:PHE:HB3	1:A:243[B]:MET:HG2	1.99	0.45
1:A:456:HIS:N	1:A:487:GLN:HE22	2.06	0.45
1:A:327[B]:THR:HG22	5:A:2781:HOH:O	2.17	0.44
1:A:241:TRP:CZ2	5:A:2297:HOH:O	2.70	0.44
1:A:365:ARG:HD3	3:A:1604[B]:PGE:O3	2.18	0.43
1:A:46:ARG:HG2	5:A:2051:HOH:O	2.19	0.43
1:A:423:ARG:HD2	5:A:2863:HOH:O	2.00	0.43
1:A:397:GLN:HE22	1:A:411:LEU:H	1.67	0.43
1:A:51:ARG:HD3	5:A:2171:HOH:O	2.19	0.42
1:A:172:GLN:HG3	5:A:2216:HOH:O	2.19	0.42
1:A:204[A]:ARG:NH1	1:A:204[A]:ARG:HG3	2.32	0.42
1:A:467:GLY:O	1:A:471:GLU:HG2	2.19	0.42
1:A:75:PRO:HG3	1:A:108:ASP:HB2	2.01	0.42
1:A:371:TRP:O	1:A:377:GLU:HA	2.19	0.42
1:A:237:PHE:C	5:A:2595:HOH:O	2.59	0.41
1:A:305[B]:LEU:CG	1:A:322:LEU:HD22	2.50	0.41
1:A:132[B]:VAL:O	1:A:132[B]:VAL:HG23	2.21	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:2202:HOH:O	5:A:2818:HOH:O[4_455]	2.11	0.09

## 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	623/602 (104%)	617 (99%)	6 (1%)	0	100 100

There are no Ramachandran outliers to report.

### 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	513/484 (106%)	508 (99%)	5 (1%)	76 44

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

Mol	Chain	Res	Type
1	A	173	ARG
1	A	204[A]	ARG
1	A	204[B]	ARG
1	A	273	ARG
1	A	385	ASP

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

Mol	Chain	Res	Type
1	A	57	HIS
1	A	172	GLN
1	A	342	GLN

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	A	382	HIS
1	A	391	ASN
1	A	397	GLN
1	A	399	HIS
1	A	487	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 5 ligands modelled in this entry, 1 is monoatomic - leaving 4 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	PGE	A	1604[A]	-	9,9,9	1.51	3 (33%)	8,8,8	1.21	1 (12%)
2	TRS	A	1603[A]	-	7,7,7	0.95	1 (14%)	9,9,9	1.46	2 (22%)
2	TRS	A	1603[B]	-	7,7,7	0.28	0	9,9,9	0.92	1 (11%)
3	PGE	A	1604[B]	1	9,9,9	1.00	0	8,8,8	1.02	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	PGE	A	1604[A]	-	-	4/7/7/7	-
2	TRS	A	1603[A]	-	-	3/9/9/9	-
2	TRS	A	1603[B]	-	-	6/9/9/9	-
3	PGE	A	1604[B]	1	-	2/7/7/7	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1604[A]	PGE	C5-C6	2.52	1.62	1.49
3	A	1604[A]	PGE	O3-C4	2.24	1.51	1.42
3	A	1604[A]	PGE	O3-C5	2.18	1.51	1.42
2	A	1603[A]	TRS	C3-C	-2.07	1.47	1.53

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1603[A]	TRS	C3-C-N	-3.39	99.53	108.17
2	A	1603[B]	TRS	C3-C-N	2.23	113.86	108.17
3	A	1604[A]	PGE	O4-C6-C5	2.07	124.00	111.82
2	A	1603[A]	TRS	C2-C-N	2.03	113.35	108.17

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1604[A]	PGE	C6-C5-O3-C4
3	A	1604[A]	PGE	O2-C3-C4-O3
3	A	1604[B]	PGE	O1-C1-C2-O2
3	A	1604[A]	PGE	O1-C1-C2-O2
2	A	1603[B]	TRS	C2-C-C3-O3
2	A	1603[B]	TRS	N-C-C2-O2
2	A	1603[B]	TRS	N-C-C3-O3
3	A	1604[B]	PGE	O3-C5-C6-O4
2	A	1603[B]	TRS	C1-C-C3-O3
2	A	1603[A]	TRS	C2-C-C3-O3
2	A	1603[B]	TRS	N-C-C1-O1
2	A	1603[A]	TRS	C3-C-C1-O1
2	A	1603[B]	TRS	C3-C-C2-O2
3	A	1604[A]	PGE	O3-C5-C6-O4
2	A	1603[A]	TRS	N-C-C3-O3

There are no ring outliers.

3 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1604[A]	PGE	2	0
2	A	1603[B]	TRS	1	0
3	A	1604[B]	PGE	9	0

## 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	580/602 (96%)	-0.17	23 (3%) 38 34	4, 8, 18, 40	34 (5%)

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	22[A]	ARG	6.8
1	A	236[A]	ARG	6.4
1	A	241	TRP	5.4
1	A	472	PHE	5.0
1	A	482	ASP	4.3
1	A	469	LYS	4.3
1	A	470	LYS	4.2
1	A	240	ALA	4.0
1	A	239[A]	SER	3.8
1	A	243[A]	MET	3.3
1	A	237	PHE	3.1
1	A	242	GLY	3.1
1	A	238	SER	3.0
1	A	467	GLY	2.9
1	A	463	ALA	2.8
1	A	465	SER	2.7
1	A	483	VAL	2.7
1	A	471	GLU	2.4
1	A	581[A]	LEU	2.3
1	A	466	GLU	2.3
1	A	579	ARG	2.2
1	A	458	GLY	2.1
1	A	589	GLU	2.0

## 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 [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	PGE	A	1604[A]	10/10	0.76	0.25	14,19,30,32	10
3	PGE	A	1604[B]	10/10	0.76	0.25	0,0,0,0	10
2	TRS	A	1603[A]	8/8	0.95	0.11	9,11,13,15	8
2	TRS	A	1603[B]	8/8	0.95	0.11	15,17,17,18	8
4	MG	A	1606	1/1	1.00	0.11	10,10,10,10	1

## 6.5 Other polymers [i](#)

There are no such residues in this entry.