Full wwPDB X-ray Structure Validation Report ⓘ

Sep 24, 2025 – 03:07 am BST

PDB ID	:	2BHU / pdb_00002bhu
Title	:	Crystal structure of Deinococcus radiodurans maltooligosyltrehalose trehalo-hydrolase
Authors	:	Timmins, J.; Leiros, H.-K.S.; Leonard, G.; Leiros, I.; McSweeney, S.
Deposited on	:	2005-01-18
Resolution	:	1.10 Å(reported)

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

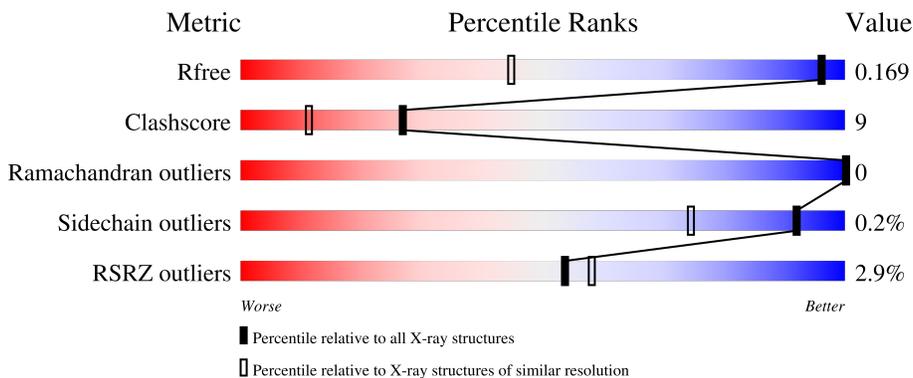|		
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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	Percentile Ranks	Value
Rfree		0.169
Clashscore		9
Ramachandran outliers		0
Sidechain outliers		0.2%
RSRZ outliers		2.9%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1365 (1.12-1.08)
Clashscore	180529	1561 (1.12-1.08)
Ramachandran outliers	177936	1524 (1.12-1.08)
Sidechain outliers	177891	1520 (1.12-1.08)
RSRZ outliers	164620	1365 (1.12-1.08)

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 <=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	3% / 87% / 8% ·· ·

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 ⓘ

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
1	A	580	Total 5005	C 3162	N 895	O 937	S 11	52	43	0

- Molecule 2 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: $C_4H_{12}NO_3$).
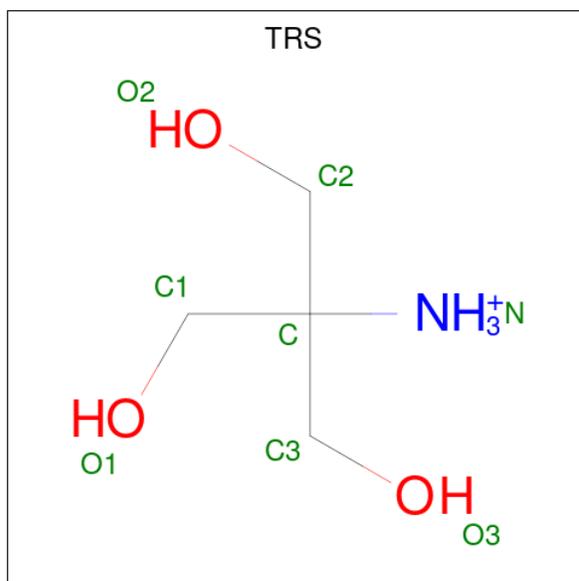
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total 16	C 8	N 2	O 6	0	1

- Molecule 3 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).

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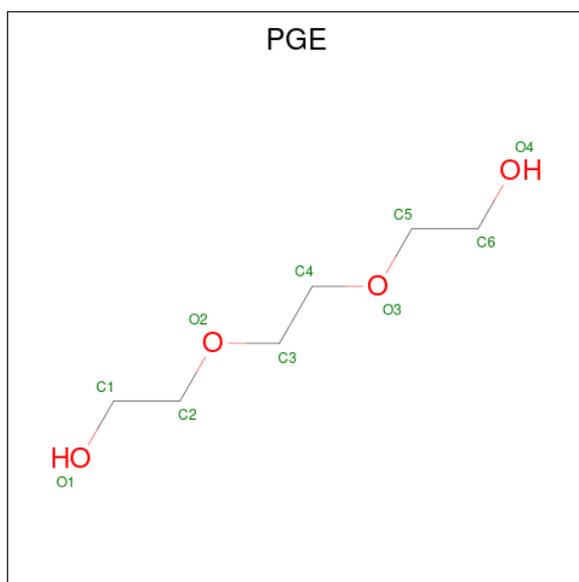
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 20	C 12	O 8	0	1

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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

- Molecule 5 is water.

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

3   Residue-property plots ⓘ

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 TREHALOHYDROLASE
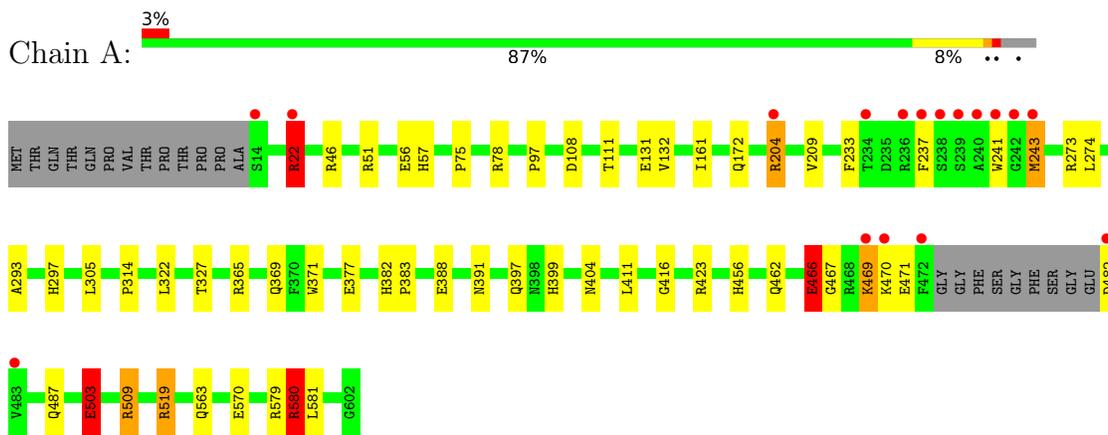
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	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) 88.1 (44.41-1.10)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.50 (at 1.10Å)	Xtriage
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^2)	7.9	Xtriage
Anisotropy	0.134	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 59.6	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	6172	wwPDB-VP
Average B, all atoms (Å^2)	12.0	wwPDB-VP

Xtriage'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.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: PGE, MG, TRS

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	3.74	27/5142 (0.5%)	2.02	26/6994 (0.4%)

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 (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	22[A]	ARG	CZ-NH1	94.64	2.65	1.32
1	A	22[B]	ARG	CZ-NH1	94.64	2.65	1.32
1	A	503[A]	GLU	CD-OE2	93.29	3.02	1.25
1	A	503[B]	GLU	CD-OE2	93.29	3.02	1.25
1	A	503[A]	GLU	CD-OE1	80.39	2.78	1.25
1	A	503[B]	GLU	CD-OE1	80.39	2.78	1.25
1	A	466	GLU	CD-OE2	63.36	2.45	1.25
1	A	22[A]	ARG	CZ-NH2	63.19	2.15	1.33
1	A	22[B]	ARG	CZ-NH2	63.19	2.15	1.33
1	A	580	ARG	CZ-NH2	45.48	1.92	1.33
1	A	243[A]	MET	SD-CE	29.68	2.53	1.79
1	A	243[B]	MET	SD-CE	29.68	2.53	1.79
1	A	482	ASP	CB-CG	24.11	2.12	1.52
1	A	519[A]	ARG	NE-CZ	21.38	1.56	1.33
1	A	519[B]	ARG	NE-CZ	21.38	1.56	1.33
1	A	503[A]	GLU	CG-CD	17.53	1.95	1.52
1	A	503[B]	GLU	CG-CD	17.53	1.95	1.52
1	A	243[A]	MET	CG-SD	17.16	2.23	1.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	243[B]	MET	CG-SD	17.16	2.23	1.80
1	A	579	ARG	CD-NE	-9.46	1.33	1.46
1	A	462	GLN	CD-NE2	8.76	1.51	1.33
1	A	469	LYS	CD-CE	7.66	1.75	1.52
1	A	470	LYS	CG-CD	-7.14	1.31	1.52
1	A	580	ARG	CZ-NH1	-5.48	1.25	1.32
1	A	22[A]	ARG	CA-CB	5.20	1.62	1.53
1	A	22[B]	ARG	CA-CB	5.20	1.62	1.53
1	A	273	ARG	NE-CZ	-5.05	1.27	1.33

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	22[A]	ARG	NE-CZ-NH1	-51.34	70.16	121.50
1	A	22[B]	ARG	NE-CZ-NH1	-51.34	70.16	121.50
1	A	22[A]	ARG	NH1-CZ-NH2	-48.69	56.01	119.30
1	A	22[B]	ARG	NH1-CZ-NH2	-48.69	56.01	119.30
1	A	22[A]	ARG	NE-CZ-NH2	-41.40	81.94	119.20
1	A	22[B]	ARG	NE-CZ-NH2	-41.40	81.94	119.20
1	A	503[A]	GLU	OE1-CD-OE2	-35.92	36.70	122.90
1	A	503[B]	GLU	OE1-CD-OE2	-35.92	36.70	122.90
1	A	503[A]	GLU	CG-CD-OE2	-29.30	51.01	118.40
1	A	503[B]	GLU	CG-CD-OE2	-29.30	51.01	118.40
1	A	482	ASP	CA-CB-CG	-27.35	85.25	112.60
1	A	503[A]	GLU	CG-CD-OE1	-27.19	55.87	118.40
1	A	503[B]	GLU	CG-CD-OE1	-27.19	55.87	118.40
1	A	580	ARG	NE-CZ-NH1	27.02	148.52	121.50
1	A	580	ARG	NH1-CZ-NH2	-22.27	90.35	119.30
1	A	519[A]	ARG	CD-NE-CZ	15.14	145.60	124.40
1	A	519[B]	ARG	CD-NE-CZ	15.14	145.60	124.40
1	A	469	LYS	CD-CE-NZ	-14.15	66.62	111.90
1	A	519[A]	ARG	NE-CZ-NH2	12.75	130.67	119.20
1	A	519[B]	ARG	NE-CZ-NH2	12.75	130.67	119.20
1	A	519[A]	ARG	NE-CZ-NH1	-11.36	110.14	121.50
1	A	519[B]	ARG	NE-CZ-NH1	-11.36	110.14	121.50
1	A	580	ARG	NE-CZ-NH2	-8.62	111.44	119.20
1	A	462	GLN	OE1-CD-NE2	7.05	129.65	122.60
1	A	579	ARG	CG-CD-NE	6.41	126.10	112.00
1	A	469	LYS	CB-CG-CD	6.33	125.86	111.30

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	89	0
2	A	16	0	24	1	0
3	A	20	0	28	12	0
4	A	1	0	0	0	0
5	A	1130	0	0	26	1
All	All	6172	0	4781	89	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 (89) 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	1.39
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:NE2	3:A:1604[B]:PGE:C3	2.01	1.24
1:A:369[B]:GLN:HE21	3:A:1604[B]:PGE:C3	1.51	1.22
1:A:503[A]:GLU:CD	1:A:503[A]:GLU:CG	2.12	1.22
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: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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:503[B]:GLU:CD	1:A:503[B]:GLU:CB	2.46	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
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: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:503[B]:GLU:CD	1:A:503[B]:GLU:HB2	2.31	0.56
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:293:ALA:O	1:A:297[A]:HIS:HD2	1.94	0.50
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: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:237:PHE:C	5:A:2595:HOH:O	2.59	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:581[A]:LEU:C	1:A:581[A]:LEU:HD23	2.45	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: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%)	511 (100%)	2 (0%)	89	72

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	204[A]	ARG
1	A	204[B]	ARG

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
1	A	382	HIS
1	A	391	ASN
1	A	397	GLN

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Mol	Chain	Res	Type
1	A	399	HIS
1	A	487	GLN

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 oligosaccharides in this entry.

5.6   Ligand geometry ⓘ

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	#$|Z| > 2$
2	TRS	A	1603[B]	-	7,7,7	0.26	0	9,9,9	0.81	0
3	PGE	A	1604[B]	-	9,9,9	0.99	0	8,8,8	1.03	1 (12%)
3	PGE	A	1604[A]	-	9,9,9	1.50	3 (33%)	8,8,8	1.22	1 (12%)
2	TRS	A	1603[A]	-	7,7,7	0.86	0	9,9,9	1.25	1 (11%)

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	TRS	A	1603[B]	-	-	5/9/9/9	-
3	PGE	A	1604[B]	-	-	2/7/7/7	-
3	PGE	A	1604[A]	-	-	4/7/7/7	-
2	TRS	A	1603[A]	-	-	1/9/9/9	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1604[A]	PGE	C5-C6	2.50	1.62	1.49
3	A	1604[A]	PGE	O3-C4	2.24	1.51	1.42
3	A	1604[A]	PGE	O3-C5	2.19	1.51	1.42

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1603[A]	TRS	C3-C-N	-2.83	99.53	107.98
3	A	1604[A]	PGE	O4-C6-C5	2.10	124.00	111.81
3	A	1604[B]	PGE	O3-C4-C3	2.01	119.45	110.39

There are no chirality outliers.

All (12) torsion outliers are listed below:

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

There are no ring outliers.

3 monomers are involved in 13 short contacts:

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

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1604[B]	PGE	10	0
3	A	1604[A]	PGE	2	0

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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(Å²)	Q<0.9
1	A	580/602 (96%)	-0.27	17 (2%)	54	58	2, 8, 16, 36	67 (11%)

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	241	TRP	6.3
1	A	22[A]	ARG	6.0
1	A	240	ALA	4.9
1	A	242	GLY	4.8
1	A	236[A]	ARG	4.5
1	A	472	PHE	4.2
1	A	239[A]	SER	4.0
1	A	237	PHE	3.9
1	A	14	SER	3.8
1	A	483	VAL	3.0
1	A	204[A]	ARG	2.9
1	A	243[A]	MET	2.8
1	A	238	SER	2.7
1	A	482	ASP	2.3
1	A	469	LYS	2.2
1	A	234	THR	2.1
1	A	470	LYS	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides 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, 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(Å^2)	Q<0.9
3	PGE	A	1604[A]	10/10	0.82	0.17	14,19,30,32	10
3	PGE	A	1604[B]	10/10	0.82	0.17	0,0,0,0	10
2	TRS	A	1603[A]	8/8	0.96	0.07	9,11,13,15	8
2	TRS	A	1603[B]	8/8	0.96	0.07	15,17,17,18	8
4	MG	A	1606	1/1	1.00	0.08	10,10,10,10	1

6.5 Other polymers ⓘ

There are no such residues in this entry.