



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 01:04 PM UTC

PDB ID : 6OOI / pdb_00006ooi
Title : Crystal structure of triosephosphate isomerase from *Schistosoma mansoni* in complex with 2PG
Authors : Jimenez-Sandoval, P.; Briebe, L.
Deposited on : 2019-04-23
Resolution : 2.14 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:

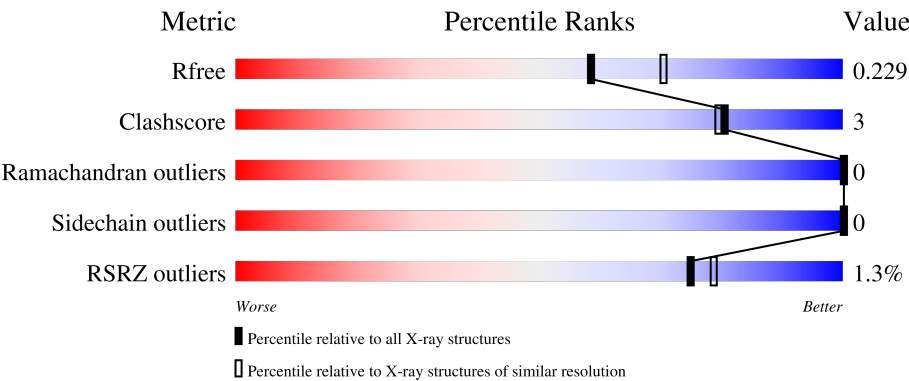
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry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

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.14 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	3689 (2.16-2.12)
Clashscore	190562	3812 (2.16-2.12)
Ramachandran outliers	187476	3773 (2.16-2.12)
Sidechain outliers	187428	3772 (2.16-2.12)
RSRZ outliers	180081	3691 (2.16-2.12)

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	256	92%5%
1	B	256	94%
1	C	256	2% 93%7%
1	D	256	% 90%8%
1	E	256	4% 91%6%

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Mol	Chain	Length	Quality of chain
1	F	256	% 89% 9%
1	G	256	93%
1	H	256	% 89% 9%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 16312 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 Triosephosphate isomerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	250	Total	C	N	O	S	0	1	0
			1890	1195	330	357	8			
1	B	249	Total	C	N	O	S	0	0	0
			1897	1205	328	356	8			
1	C	255	Total	C	N	O	S	0	1	0
			1935	1223	337	366	9			
1	D	251	Total	C	N	O	S	0	0	0
			1881	1192	327	354	8			
1	E	249	Total	C	N	O	S	0	1	0
			1865	1181	324	352	8			
1	F	250	Total	C	N	O	S	0	0	0
			1897	1202	332	355	8			
1	G	249	Total	C	N	O	S	0	0	0
			1892	1202	327	355	8			
1	H	250	Total	C	N	O	S	0	0	0
			1882	1196	325	353	8			

There are 24 discrepancies between the modelled and reference sequences:

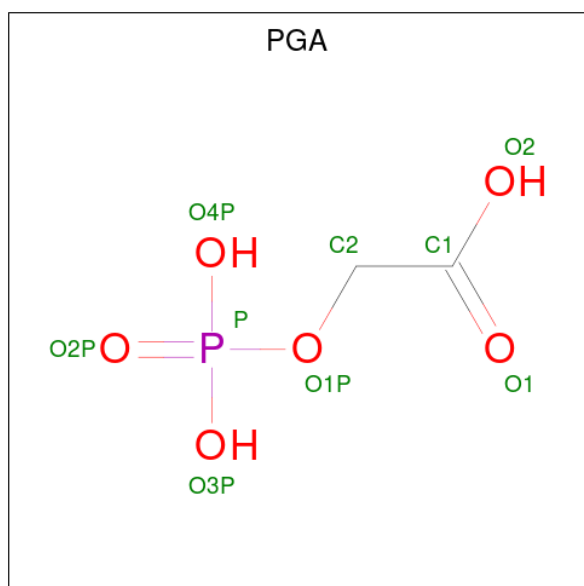
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP P48501
A	-1	PRO	-	expression tag	UNP P48501
A	0	HIS	-	expression tag	UNP P48501
B	-2	GLY	-	expression tag	UNP P48501
B	-1	PRO	-	expression tag	UNP P48501
B	0	HIS	-	expression tag	UNP P48501
C	-2	GLY	-	expression tag	UNP P48501
C	-1	PRO	-	expression tag	UNP P48501
C	0	HIS	-	expression tag	UNP P48501
D	-2	GLY	-	expression tag	UNP P48501
D	-1	PRO	-	expression tag	UNP P48501
D	0	HIS	-	expression tag	UNP P48501
E	-2	GLY	-	expression tag	UNP P48501

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-1	PRO	-	expression tag	UNP P48501
E	0	HIS	-	expression tag	UNP P48501
F	-2	GLY	-	expression tag	UNP P48501
F	-1	PRO	-	expression tag	UNP P48501
F	0	HIS	-	expression tag	UNP P48501
G	-2	GLY	-	expression tag	UNP P48501
G	-1	PRO	-	expression tag	UNP P48501
G	0	HIS	-	expression tag	UNP P48501
H	-2	GLY	-	expression tag	UNP P48501
H	-1	PRO	-	expression tag	UNP P48501
H	0	HIS	-	expression tag	UNP P48501

- Molecule 2 is 2-PHOSPHOGLYCOLIC ACID (CCD ID: PGA) (formula: $C_2H_5O_6P$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O	P	0	0
			9	2	6	1		
2	B	1	Total	C	O	P	0	0
			9	2	6	1		
2	C	1	Total	C	O	P	0	0
			9	2	6	1		
2	D	1	Total	C	O	P	0	0
			9	2	6	1		
2	E	1	Total	C	O	P	0	0
			9	2	6	1		
2	F	1	Total	C	O	P	0	0
			9	2	6	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	G	1	Total	C	O	P	0	0
			9	2	6	1		
2	H	1	Total	C	O	P	0	0
			9	2	6	1		

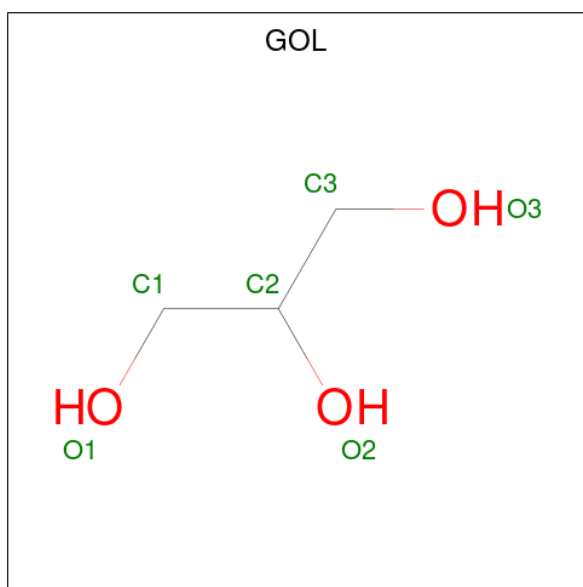
- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	B	1	Total	Cl	0	0
			1	1		
3	C	1	Total	Cl	0	0
			1	1		
3	D	1	Total	Cl	0	0
			1	1		
3	F	1	Total	Cl	0	0
			1	1		
3	G	1	Total	Cl	0	0
			1	1		

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Na	0	0
			2	2		
4	B	1	Total	Na	0	0
			1	1		
4	C	2	Total	Na	0	0
			2	2		
4	E	2	Total	Na	0	0
			2	2		
4	H	1	Total	Na	0	0
			1	1		

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	141	Total	O	0	0
			141	141		
6	B	154	Total	O	0	0
			154	154		
6	C	150	Total	O	0	0
			150	150		
6	D	136	Total	O	0	0
			136	136		
6	E	101	Total	O	0	0
			101	101		
6	F	137	Total	O	0	0
			137	137		
6	G	118	Total	O	0	0
			118	118		
6	H	138	Total	O	0	0
			138	138		

3 Residue-property plots [i](#)

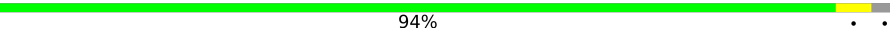
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Triosephosphate isomerase

Chain A:  92% 5% .

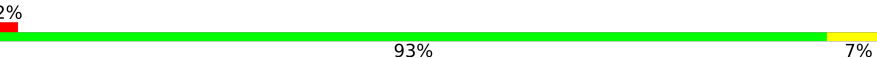


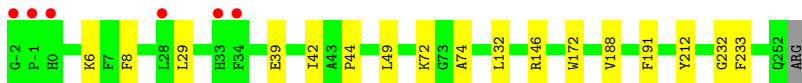
- Molecule 1: Triosephosphate isomerase

Chain B:  94% . .

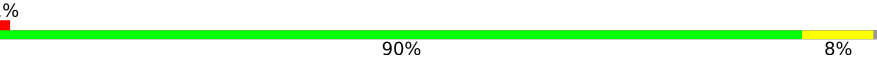


- Molecule 1: Triosephosphate isomerase

Chain C:  93% 7% .

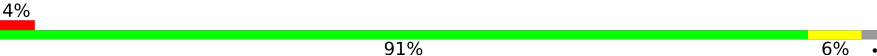


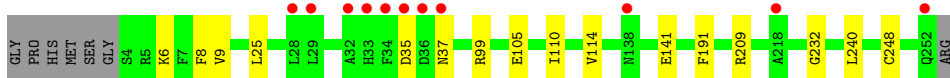
- Molecule 1: Triosephosphate isomerase

Chain D:  90% 8% .

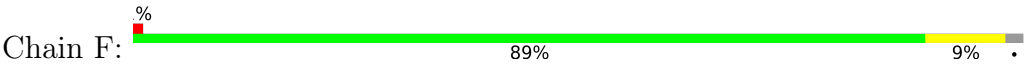


- Molecule 1: Triosephosphate isomerase

Chain E:  91% 6% .



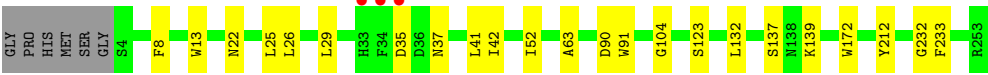
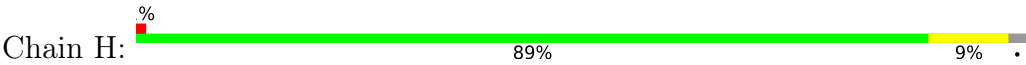
- Molecule 1: Triosephosphate isomerase



● Molecule 1: Triosephosphate isomerase



● Molecule 1: Triosephosphate isomerase



4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α , β , γ	108.05Å 108.05Å 182.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	58.61 – 2.14 58.61 – 2.14	Depositor EDS
% Data completeness (in resolution range)	100.0 (58.61-2.14) 94.0 (58.61-2.14)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.61 (at 2.14Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.180 , 0.229 0.180 , 0.229	Depositor DCC
R_{free} test set	2015 reflections (1.75%)	wwPDB-VP
Wilson B-factor (Å ²)	18.9	Xtriage
Anisotropy	0.245	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 39.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.035 for h,-k,-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	16312	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.92% 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: PGA, NA, CL, GOL

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	0.35	0/1925	0.51	0/2608
1	B	0.35	0/1933	0.49	0/2616
1	C	0.34	0/1972	0.51	0/2671
1	D	0.34	0/1916	0.53	0/2599
1	E	0.33	0/1900	0.49	0/2579
1	F	0.34	0/1933	0.52	0/2616
1	G	0.34	0/1928	0.49	0/2610
1	H	0.35	0/1918	0.50	0/2601
All	All	0.34	0/15425	0.50	0/20900

There are no bond length outliers.

There are no bond angle outliers.

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	1890	0	1798	8	0
1	B	1897	0	1842	6	0
1	C	1935	0	1861	10	0
1	D	1881	0	1793	12	0
1	E	1865	0	1762	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	1897	0	1846	13	0
1	G	1892	0	1831	6	0
1	H	1882	0	1796	14	0
2	A	9	0	2	0	0
2	B	9	0	2	0	0
2	C	9	0	2	0	0
2	D	9	0	2	0	0
2	E	9	0	2	0	0
2	F	9	0	2	0	0
2	G	9	0	2	0	0
2	H	9	0	2	0	0
3	A	1	0	0	1	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
4	A	2	0	0	0	0
4	B	1	0	0	0	0
4	C	2	0	0	0	0
4	E	2	0	0	0	0
4	H	1	0	0	0	0
5	C	6	0	7	0	0
5	H	6	0	7	2	0
6	A	141	0	0	2	0
6	B	154	0	0	1	0
6	C	150	0	0	1	0
6	D	136	0	0	0	0
6	E	101	0	0	0	0
6	F	137	0	0	0	0
6	G	118	0	0	1	0
6	H	138	0	0	1	0
All	All	16312	0	14559	77	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 3.

All (77) 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:H:13:TRP:CZ2	1:H:25:LEU:HD22	2.37	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:137:SER:HB2	1:H:139:LYS:HD3	1.84	0.59
1:F:99:ARG:O	1:F:105:GLU:HG3	2.04	0.57
1:E:110:ILE:O	1:E:114:VAL:HG23	2.06	0.56
1:H:26:LEU:HD11	1:H:52:ILE:HG12	1.86	0.55
1:G:44:PRO:HG2	1:G:49:LEU:HD23	1.90	0.53
1:C:6:LYS:HD3	1:C:39:GLU:HB2	1.92	0.52
1:C:8:PHE:O	1:C:232:GLY:HA3	2.10	0.52
1:G:110:ILE:O	1:G:114:VAL:HG23	2.09	0.52
1:D:141:GLU:HG2	1:D:191:PHE:CD2	2.45	0.51
1:E:8:PHE:O	1:E:232:GLY:HA3	2.10	0.51
1:C:132:LEU:HB2	1:C:172:TRP:HB3	1.93	0.51
1:E:141:GLU:HG2	1:E:191:PHE:CE1	2.44	0.51
1:F:41:LEU:HD11	1:F:63:ALA:HB2	1.92	0.50
1:H:90:ASP:OD2	6:H:401:HOH:O	2.19	0.50
1:F:212:TYR:O	1:F:233:PHE:HA	2.12	0.49
1:H:29:LEU:HD21	1:H:42:ILE:HG21	1.93	0.49
1:D:81:PRO:HB2	1:D:120:GLU:HG3	1.94	0.49
1:A:95:GLY:HA2	1:A:110:ILE:HD12	1.93	0.49
1:B:95:GLY:HA2	1:B:110:ILE:HD12	1.93	0.49
1:B:8:PHE:O	1:B:232:GLY:HA3	2.12	0.49
3:A:302:CL:CL	6:A:450:HOH:O	2.57	0.49
1:E:141:GLU:HG2	1:E:191:PHE:CD1	2.48	0.48
1:H:41:LEU:HD11	1:H:63:ALA:HB2	1.95	0.48
1:B:157:SER:HB2	6:B:528:HOH:O	2.14	0.48
1:C:74:ALA:HA	1:D:14:LYS:HD3	1.95	0.48
1:E:35:ASP:C	1:E:37:ASN:H	2.21	0.48
1:F:141:GLU:HG3	1:F:191:PHE:CE1	2.49	0.48
1:F:27:LYS:NZ	1:F:31:GLU:OE2	2.47	0.47
1:A:131:THR:HA	1:A:171:VAL:HB	1.96	0.47
1:F:9:VAL:HG21	1:F:248:CYS:HA	1.96	0.47
1:H:8:PHE:O	1:H:232:GLY:HA3	2.13	0.47
1:B:58:LYS:HD3	1:F:53:ARG:HD3	1.96	0.47
1:D:95:GLY:HA2	1:D:110:ILE:HD12	1.98	0.46
1:E:25:LEU:HD21	1:E:240:LEU:HA	1.97	0.46
1:D:205:ASP:OD1	1:D:206:GLU:N	2.49	0.45
1:D:85:ARG:HD3	1:D:122:LEU:HD23	1.96	0.45
1:C:188:VAL:HA	1:C:191:PHE:CE2	2.51	0.45
1:D:106:SER:O	1:D:110:ILE:HG12	2.17	0.45
1:H:132:LEU:HB2	1:H:172:TRP:HB3	1.99	0.45
1:G:212:TYR:O	1:G:233:PHE:HA	2.16	0.45
1:H:22:ASN:O	1:H:26:LEU:HG	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:146:ARG:NH2	6:C:404:HOH:O	2.36	0.44
1:B:249:LYS:O	1:B:252:GLN:HG2	2.17	0.44
1:D:212:TYR:O	1:D:233:PHE:HA	2.18	0.44
1:E:99:ARG:O	1:E:105:GLU:HG3	2.17	0.44
1:H:212:TYR:O	1:H:233:PHE:HA	2.18	0.44
1:F:191:PHE:C	1:F:191:PHE:CD1	2.95	0.44
1:E:9:VAL:HG21	1:E:248:CYS:HA	2.00	0.43
1:H:104:GLY:HA3	5:H:301:GOL:H12	2.00	0.43
1:A:9:VAL:HG21	1:A:248:CYS:HA	2.01	0.43
1:A:251:ARG:NH2	6:A:408:HOH:O	2.50	0.43
1:G:8:PHE:O	1:G:232:GLY:HA3	2.18	0.42
1:B:106:SER:O	1:B:110:ILE:HG12	2.19	0.42
1:C:212:TYR:O	1:C:233:PHE:HA	2.19	0.42
1:D:217:THR:O	1:D:221:CYS:HB3	2.19	0.42
1:A:91:TRP:CD2	1:A:123:SER:HB2	2.55	0.42
1:C:29:LEU:HD11	1:C:42:ILE:HG21	2.02	0.42
1:D:115:GLN:HB2	1:D:154:LYS:HB3	2.02	0.42
1:F:13:TRP:CZ3	1:F:44:PRO:HB3	2.55	0.42
1:F:85:ARG:HG2	1:F:122:LEU:HD21	2.01	0.42
1:A:8:PHE:O	1:A:232:GLY:HA3	2.20	0.42
1:G:181:THR:HG1	1:G:184:GLN:HG3	1.84	0.42
1:A:212:TYR:O	1:A:233:PHE:HA	2.20	0.41
1:D:41:LEU:HD11	1:D:63:ALA:HB2	2.02	0.41
1:H:104:GLY:HA3	5:H:301:GOL:H31	2.02	0.41
1:C:44:PRO:HG2	1:C:49:LEU:HD23	2.02	0.41
1:C:72:LYS:HD3	6:G:500:HOH:O	2.20	0.41
1:F:171:VAL:HA	1:F:174:ILE:HD12	2.02	0.41
1:F:193:ARG:NH2	1:F:231:ASP:OD2	2.53	0.41
1:H:91:TRP:CE2	1:H:123:SER:HB2	2.56	0.40
1:A:191:PHE:CD1	1:A:191:PHE:C	2.98	0.40
1:D:14:LYS:NZ	1:D:98:GLU:OE2	2.44	0.40
1:E:6:LYS:HB3	1:E:209:ARG:NH1	2.36	0.40
1:F:131:THR:HA	1:F:171:VAL:HB	2.02	0.40
1:G:191:PHE:CD1	1:G:191:PHE:C	2.99	0.40
1:H:35:ASP:C	1:H:37:ASN:N	2.78	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	249/256 (97%)	244 (98%)	5 (2%)	0	100	100
1	B	247/256 (96%)	243 (98%)	4 (2%)	0	100	100
1	C	254/256 (99%)	246 (97%)	8 (3%)	0	100	100
1	D	249/256 (97%)	241 (97%)	8 (3%)	0	100	100
1	E	248/256 (97%)	239 (96%)	9 (4%)	0	100	100
1	F	248/256 (97%)	241 (97%)	7 (3%)	0	100	100
1	G	247/256 (96%)	241 (98%)	6 (2%)	0	100	100
1	H	248/256 (97%)	241 (97%)	7 (3%)	0	100	100
All	All	1990/2048 (97%)	1936 (97%)	54 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	185/213 (87%)	185 (100%)	0	100	100
1	B	191/213 (90%)	191 (100%)	0	100	100
1	C	194/213 (91%)	194 (100%)	0	100	100
1	D	184/213 (86%)	184 (100%)	0	100	100
1	E	181/213 (85%)	181 (100%)	0	100	100
1	F	192/213 (90%)	192 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	189/213 (89%)	189 (100%)	0	100	100
1	H	184/213 (86%)	184 (100%)	0	100	100
All	All	1500/1704 (88%)	1500 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	115	GLN
1	C	190	ASN
1	C	199	ASN
1	D	115	GLN
1	D	183	GLN
1	E	190	ASN
1	F	202	ASN
1	G	199	ASN
1	H	115	GLN
1	H	202	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 24 ligands modelled in this entry, 14 are monoatomic - leaving 10 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	PGA	H	302	-	8,8,8	0.89	0	10,11,11	1.24	1 (10%)
2	PGA	E	301	-	8,8,8	1.08	0	10,11,11	1.04	1 (10%)
2	PGA	C	302	-	8,8,8	0.99	1 (12%)	10,11,11	1.34	2 (20%)
2	PGA	F	301	-	8,8,8	1.01	0	10,11,11	1.27	2 (20%)
2	PGA	G	301	-	8,8,8	0.86	0	10,11,11	0.99	0
5	GOL	C	301	-	5,5,5	2.15	1 (20%)	5,5,5	1.14	1 (20%)
2	PGA	A	301	-	8,8,8	0.97	0	10,11,11	1.33	3 (30%)
5	GOL	H	301	-	5,5,5	1.48	1 (20%)	5,5,5	0.65	0
2	PGA	D	301	-	8,8,8	1.16	1 (12%)	10,11,11	1.20	1 (10%)
2	PGA	B	301	-	8,8,8	0.96	0	10,11,11	1.15	1 (10%)

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	PGA	H	302	-	-	2/6/6/6	-
2	PGA	E	301	-	-	2/6/6/6	-
2	PGA	C	302	-	-	0/6/6/6	-
2	PGA	F	301	-	-	2/6/6/6	-
2	PGA	G	301	-	-	2/6/6/6	-
5	GOL	C	301	-	-	1/4/4/4	-
2	PGA	A	301	-	-	2/6/6/6	-
5	GOL	H	301	-	-	0/4/4/4	-
2	PGA	D	301	-	-	0/6/6/6	-
2	PGA	B	301	-	-	0/6/6/6	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	301	GOL	O2-C2	-4.50	1.30	1.43
5	H	301	GOL	O2-C2	-2.72	1.35	1.43
2	D	301	PGA	O2-C1	-2.35	1.23	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	302	PGA	O2-C1	-2.05	1.24	1.30

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	PGA	O2-C1-O1	-2.84	116.03	123.33
2	C	302	PGA	O2-C1-O1	-2.64	116.54	123.33
2	A	301	PGA	O2-C1-O1	-2.31	117.40	123.33
2	B	301	PGA	O2-C1-O1	-2.29	117.44	123.33
2	F	301	PGA	O1P-C2-C1	-2.26	107.12	110.54
2	C	302	PGA	O3P-P-O1P	2.18	112.36	106.67
2	H	302	PGA	O2-C1-O1	-2.17	117.74	123.33
2	E	301	PGA	O2-C1-O1	-2.08	117.99	123.33
2	F	301	PGA	O2-C1-O1	-2.07	118.00	123.33
2	A	301	PGA	O1P-P-O2P	2.06	112.01	106.44
2	A	301	PGA	O4P-P-O3P	2.04	115.45	107.80
5	C	301	GOL	O1-C1-C2	-2.02	101.30	110.38

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	PGA	C2-O1P-P-O3P
2	A	301	PGA	C2-O1P-P-O4P
2	F	301	PGA	C2-O1P-P-O2P
2	F	301	PGA	C2-O1P-P-O4P
2	G	301	PGA	C2-O1P-P-O2P
2	G	301	PGA	C2-O1P-P-O4P
2	E	301	PGA	O1-C1-C2-O1P
2	E	301	PGA	O2-C1-C2-O1P
5	C	301	GOL	O2-C2-C3-O3
2	H	302	PGA	O2-C1-C2-O1P
2	H	302	PGA	O1-C1-C2-O1P

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	301	GOL	2	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 ⓘ

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(Å ²)	Q<0.9
1	A	250/256 (97%)	-0.33	1 (0%) 88 91	9, 21, 35, 53	1 (0%)
1	B	249/256 (97%)	-0.35	0 100 100	12, 21, 33, 47	0
1	C	255/256 (99%)	-0.19	6 (2%) 59 63	10, 22, 41, 58	1 (0%)
1	D	251/256 (98%)	-0.21	2 (0%) 82 85	12, 22, 39, 51	0
1	E	249/256 (97%)	0.08	11 (4%) 39 44	13, 26, 44, 62	1 (0%)
1	F	250/256 (97%)	-0.28	2 (0%) 82 85	14, 22, 35, 52	0
1	G	249/256 (97%)	-0.19	1 (0%) 88 91	15, 24, 35, 47	0
1	H	250/256 (97%)	-0.27	3 (1%) 76 80	14, 23, 37, 54	0
All	All	2003/2048 (97%)	-0.22	26 (1%) 75 79	9, 23, 38, 62	3 (0%)

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	33	HIS	4.4
1	H	35	ASP	3.2
1	E	35	ASP	3.1
1	D	3	GLY	3.0
1	E	34	PHE	2.8
1	C	34	PHE	2.8
1	E	29	LEU	2.8
1	D	2	SER	2.7
1	C	-2	GLY	2.7
1	F	3	GLY	2.7
1	E	33	HIS	2.7
1	E	36	ASP	2.6
1	F	252	GLN	2.6
1	H	34	PHE	2.5
1	H	33	HIS	2.5
1	E	138	ASN	2.5

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Mol	Chain	Res	Type	RSRZ
1	E	28	LEU	2.4
1	C	-1	PRO	2.4
1	C	0	HIS	2.4
1	C	28	LEU	2.3
1	E	252	GLN	2.3
1	E	37	ASN	2.3
1	E	32	ALA	2.3
1	A	4	SER	2.2
1	G	101	ASN	2.1
1	E	218	ALA	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(Å ²)	Q<0.9
5	GOL	H	301	6/6	0.83	0.13	26,31,35,39	0
5	GOL	C	301	6/6	0.89	0.13	13,27,35,40	0
4	NA	E	303	1/1	0.93	0.14	21,21,21,21	0
4	NA	E	302	1/1	0.95	0.13	25,25,25,25	0
2	PGA	E	301	9/9	0.96	0.08	21,29,33,39	0
4	NA	A	303	1/1	0.96	0.15	16,16,16,16	0
4	NA	C	304	1/1	0.97	0.13	13,13,13,13	0
4	NA	C	305	1/1	0.97	0.14	25,25,25,25	0
4	NA	A	304	1/1	0.97	0.13	9,9,9,9	0
3	CL	D	302	1/1	0.98	0.05	21,21,21,21	0
2	PGA	B	301	9/9	0.98	0.05	16,18,22,22	0
2	PGA	C	302	9/9	0.98	0.05	16,17,22,28	0
4	NA	B	303	1/1	0.98	0.13	18,18,18,18	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	PGA	D	301	9/9	0.98	0.06	19,20,23,24	0
2	PGA	A	301	9/9	0.98	0.05	14,19,20,23	0
2	PGA	F	301	9/9	0.98	0.06	19,21,23,25	0
2	PGA	G	301	9/9	0.98	0.05	19,22,26,26	0
2	PGA	H	302	9/9	0.98	0.06	17,21,23,26	0
3	CL	C	303	1/1	0.98	0.04	24,24,24,24	0
3	CL	A	302	1/1	0.99	0.04	23,23,23,23	0
4	NA	H	303	1/1	0.99	0.14	10,10,10,10	0
3	CL	B	302	1/1	0.99	0.04	19,19,19,19	0
3	CL	G	302	1/1	0.99	0.03	18,18,18,18	0
3	CL	F	302	1/1	1.00	0.02	19,19,19,19	0

6.5 Other polymers [i](#)

There are no such residues in this entry.