Full wwPDB X-ray Structure Validation Report (i)

Oct 7, 2024 – 10:11 AM JST

PDB ID	:	8ZIN
Title	:	Terephthalate 1,2-cis-dihydrodioldehydrogenase/Decarboxylase in complex with 2,4-dihydroxybenzoate.
Authors	:	Kumar, K.A.; Pahwa, D.; Kumar, P.
Deposited on	:	2024-05-14
Resolution	:	2.50 Å(reported)

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

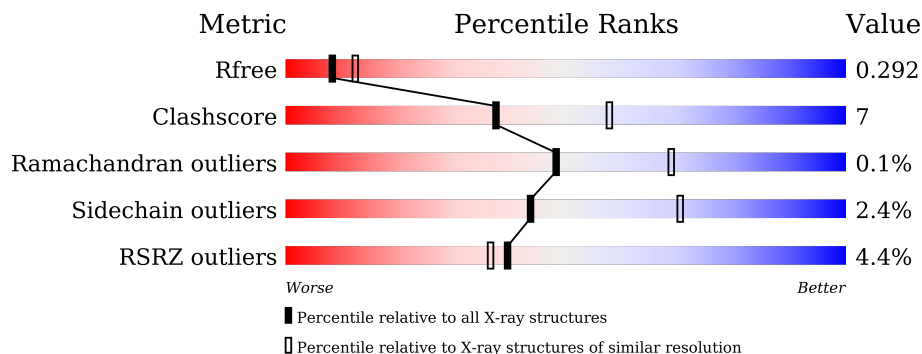|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.50 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		0.292
Clashscore		7
Ramachandran outliers		0.1%
Sidechain outliers		2.4%
RSRZ outliers		4.4%

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	5504 (2.50-2.50)
Clashscore	180529	6282 (2.50-2.50)
Ramachandran outliers	177936	6191 (2.50-2.50)
Sidechain outliers	177891	6193 (2.50-2.50)
RSRZ outliers	164620	5504 (2.50-2.50)

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	335	.% · 80% 12% · 7%
1	B	335	9% · 79% 14% · 7%
1	C	335	7% · 83% 10% · 7%
1	D	335	80% 13% · 6%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 9363 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 4-hydroxythreonine-4-phosphate dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	313	Total	C	N	O	S	0	0	0
			2294	1440	411	431	12			
1	B	312	Total	C	N	O	S	0	0	0
			2286	1436	409	429	12			
1	C	313	Total	C	N	O	S	0	0	0
			2295	1440	411	431	13			
1	D	314	Total	C	N	O	S	0	0	0
			2302	1445	412	432	13			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP B7WRJ7
A	-18	GLY	-	expression tag	UNP B7WRJ7
A	-17	SER	-	expression tag	UNP B7WRJ7
A	-16	SER	-	expression tag	UNP B7WRJ7
A	-15	HIS	-	expression tag	UNP B7WRJ7
A	-14	HIS	-	expression tag	UNP B7WRJ7
A	-13	HIS	-	expression tag	UNP B7WRJ7
A	-12	HIS	-	expression tag	UNP B7WRJ7
A	-11	HIS	-	expression tag	UNP B7WRJ7
A	-10	HIS	-	expression tag	UNP B7WRJ7
A	-9	SER	-	expression tag	UNP B7WRJ7
A	-8	SER	-	expression tag	UNP B7WRJ7
A	-7	GLY	-	expression tag	UNP B7WRJ7
A	-6	LEU	-	expression tag	UNP B7WRJ7
A	-5	VAL	-	expression tag	UNP B7WRJ7
A	-4	PRO	-	expression tag	UNP B7WRJ7
A	-3	ARG	-	expression tag	UNP B7WRJ7
A	-2	GLY	-	expression tag	UNP B7WRJ7
A	-1	SER	-	expression tag	UNP B7WRJ7
A	0	HIS	-	expression tag	UNP B7WRJ7
B	-19	MET	-	initiating methionine	UNP B7WRJ7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	expression tag	UNP B7WRJ7
B	-17	SER	-	expression tag	UNP B7WRJ7
B	-16	SER	-	expression tag	UNP B7WRJ7
B	-15	HIS	-	expression tag	UNP B7WRJ7
B	-14	HIS	-	expression tag	UNP B7WRJ7
B	-13	HIS	-	expression tag	UNP B7WRJ7
B	-12	HIS	-	expression tag	UNP B7WRJ7
B	-11	HIS	-	expression tag	UNP B7WRJ7
B	-10	HIS	-	expression tag	UNP B7WRJ7
B	-9	SER	-	expression tag	UNP B7WRJ7
B	-8	SER	-	expression tag	UNP B7WRJ7
B	-7	GLY	-	expression tag	UNP B7WRJ7
B	-6	LEU	-	expression tag	UNP B7WRJ7
B	-5	VAL	-	expression tag	UNP B7WRJ7
B	-4	PRO	-	expression tag	UNP B7WRJ7
B	-3	ARG	-	expression tag	UNP B7WRJ7
B	-2	GLY	-	expression tag	UNP B7WRJ7
B	-1	SER	-	expression tag	UNP B7WRJ7
B	0	HIS	-	expression tag	UNP B7WRJ7
C	-19	MET	-	initiating methionine	UNP B7WRJ7
C	-18	GLY	-	expression tag	UNP B7WRJ7
C	-17	SER	-	expression tag	UNP B7WRJ7
C	-16	SER	-	expression tag	UNP B7WRJ7
C	-15	HIS	-	expression tag	UNP B7WRJ7
C	-14	HIS	-	expression tag	UNP B7WRJ7
C	-13	HIS	-	expression tag	UNP B7WRJ7
C	-12	HIS	-	expression tag	UNP B7WRJ7
C	-11	HIS	-	expression tag	UNP B7WRJ7
C	-10	HIS	-	expression tag	UNP B7WRJ7
C	-9	SER	-	expression tag	UNP B7WRJ7
C	-8	SER	-	expression tag	UNP B7WRJ7
C	-7	GLY	-	expression tag	UNP B7WRJ7
C	-6	LEU	-	expression tag	UNP B7WRJ7
C	-5	VAL	-	expression tag	UNP B7WRJ7
C	-4	PRO	-	expression tag	UNP B7WRJ7
C	-3	ARG	-	expression tag	UNP B7WRJ7
C	-2	GLY	-	expression tag	UNP B7WRJ7
C	-1	SER	-	expression tag	UNP B7WRJ7
C	0	HIS	-	expression tag	UNP B7WRJ7
D	-19	MET	-	initiating methionine	UNP B7WRJ7
D	-18	GLY	-	expression tag	UNP B7WRJ7
D	-17	SER	-	expression tag	UNP B7WRJ7

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	expression tag	UNP B7WRJ7
D	-15	HIS	-	expression tag	UNP B7WRJ7
D	-14	HIS	-	expression tag	UNP B7WRJ7
D	-13	HIS	-	expression tag	UNP B7WRJ7
D	-12	HIS	-	expression tag	UNP B7WRJ7
D	-11	HIS	-	expression tag	UNP B7WRJ7
D	-10	HIS	-	expression tag	UNP B7WRJ7
D	-9	SER	-	expression tag	UNP B7WRJ7
D	-8	SER	-	expression tag	UNP B7WRJ7
D	-7	GLY	-	expression tag	UNP B7WRJ7
D	-6	LEU	-	expression tag	UNP B7WRJ7
D	-5	VAL	-	expression tag	UNP B7WRJ7
D	-4	PRO	-	expression tag	UNP B7WRJ7
D	-3	ARG	-	expression tag	UNP B7WRJ7
D	-2	GLY	-	expression tag	UNP B7WRJ7
D	-1	SER	-	expression tag	UNP B7WRJ7
D	0	HIS	-	expression tag	UNP B7WRJ7

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).
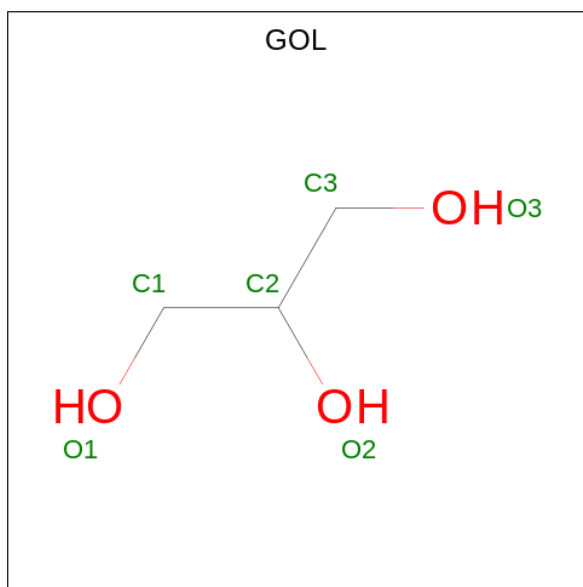
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 6	C 3	O 3	0	0

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

EDO

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 4	C 2	O 2	0	0
3	A	1	Total 4	C 2	O 2	0	0
3	A	1	Total 4	C 2	O 2	0	0
3	A	1	Total 4	C 2	O 2	0	0
3	A	1	Total 4	C 2	O 2	0	0
3	D	1	Total 4	C 2	O 2	0	0

- Molecule 4 is 2,4-DIHYDROXYBENZOIC ACID (three-letter code: DOB) (formula: $C_7H_6O_4$) (labeled as "Ligand of Interest" by depositor).

DOB
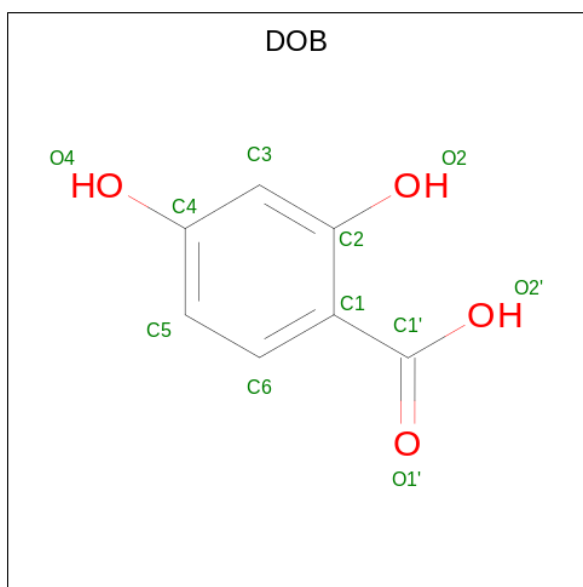
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 11	C 7	O 4	0	0
4	D	1	Total 11	C 7	O 4	0	0

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Zn 1	0	0
5	B	1	Total 1	Zn 1	0	0
5	C	1	Total 1	Zn 1	0	0
5	D	1	Total 1	Zn 1	0	0

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	1	Total 1	Cl 1	0	0

- Molecule 7 is CARBON DIOXIDE (three-letter code: CO2) (formula: CO_2).

```
                        CO2



      O2  O ══════ C ══════ O  O1
                    C
```
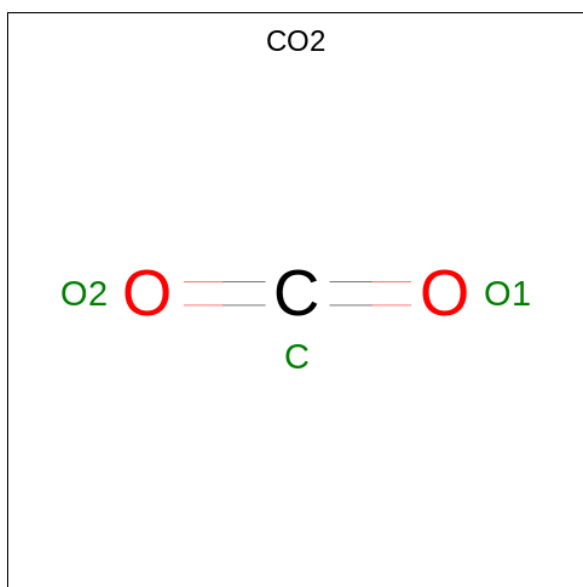
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	D	1	Total C O 3 1 2			0	0
7	D	1	Total C O 3 1 2			0	0

• Molecule 8 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	29	Total O 29 29		0	0
8	B	25	Total O 25 25		0	0
8	C	22	Total O 22 22		0	0
8	D	47	Total O 47 47		0	0

W O R L D W I D E
PDB
PROTEIN DATA BANK

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.
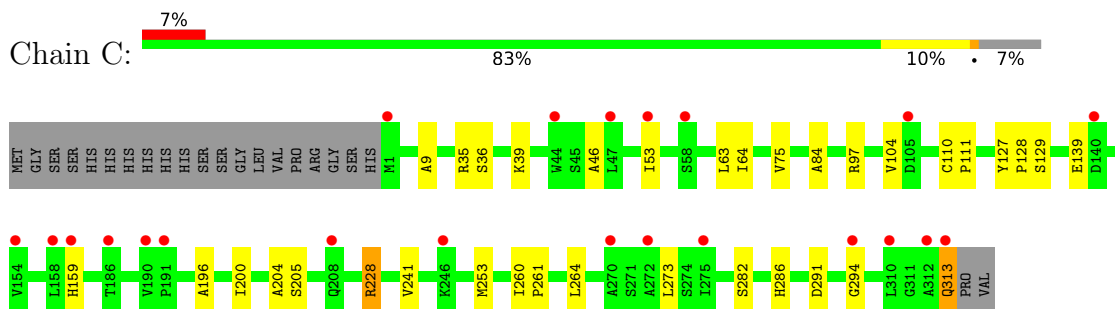
- Molecule 1: 4-hydroxythreonine-4-phosphate dehydrogenase
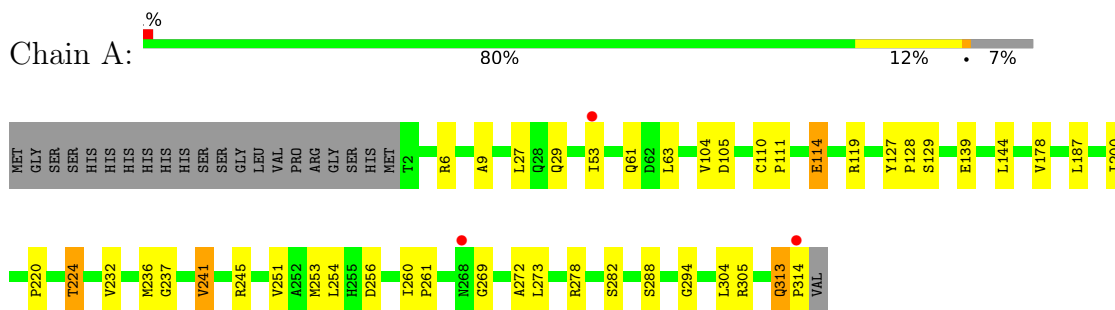
Chain A:
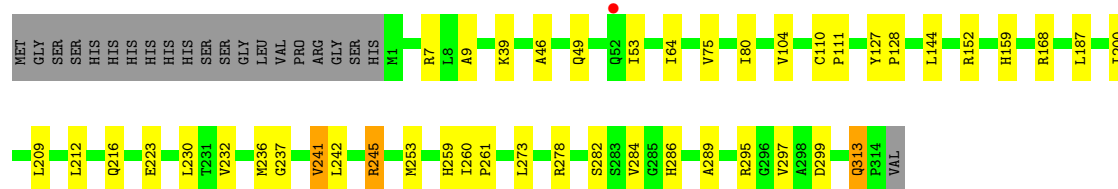

- Molecule 1: 4-hydroxythreonine-4-phosphate dehydrogenase
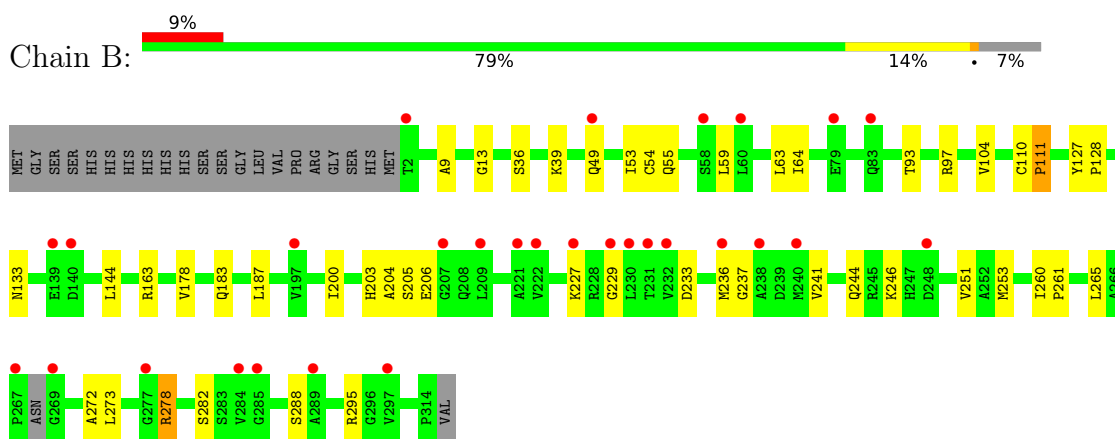
Chain B:

- Molecule 1: 4-hydroxythreonine-4-phosphate dehydrogenase

Chain C:

- Molecule 1: 4-hydroxythreonine-4-phosphate dehydrogenase

Chain D:

80%   13%   • 6%

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α, β, γ	86.30Å 93.63Å 165.59Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.93 – 2.50 24.93 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.5 (24.93-2.50) 99.5 (24.93-2.50)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.17 (at 2.50Å)	Xtriage
Refinement program	REFMAC 5.8.0415	Depositor
R, R_{free}	0.253 , 0.290 0.254 , 0.292	Depositor DCC
R_{free} test set	2358 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	29.8	Xtriage
Anisotropy	0.150	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 25.9	EDS
L-test for twinning [2]	$< |L| > = 0.43, < L^2 > = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.89	EDS
Total number of atoms	9363	wwPDB-VP
Average B, all atoms (Å^2)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 30.53 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.2871e-03.*

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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 (i)

5.1   Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: DOB, EDO, ZN, CL, GOL, CO2

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	0.45	1/2331 (0.0%)	0.74	0/3173
1	B	0.36	0/2322	0.69	0/3159
1	C	0.36	0/2331	0.71	0/3171
1	D	0.44	0/2339	0.80	0/3183
All	All	0.41	1/9323 (0.0%)	0.74	0/12686

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	1
1	B	0	2
1	C	0	1
1	D	0	3
All	All	0	7

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	114	GLU	CD-OE1	5.18	1.31	1.25

There are no bond angle outliers.

There are no chirality outliers.

All (7) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	278	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	B	163	ARG	Sidechain
1	B	278	ARG	Sidechain
1	C	35	ARG	Sidechain
1	D	152	ARG	Sidechain
1	D	245	ARG	Sidechain
1	D	7	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	2294	0	2345	33	0
1	B	2286	0	2338	37	0
1	C	2295	0	2350	30	0
1	D	2302	0	2357	37	0
2	A	6	0	8	3	0
3	A	20	0	30	5	0
3	D	4	0	6	0	0
4	A	11	0	4	0	0
4	D	11	0	3	3	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	C	1	0	0	0	0
7	D	6	0	0	0	0
8	A	29	0	0	0	0
8	B	25	0	0	4	0
8	C	22	0	0	1	0
8	D	47	0	0	2	0
All	All	9363	0	9441	129	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 7.

All (129) 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:C:228:ARG:HH21	1:C:228:ARG:HG3	1.22	1.02
1:B:241:VAL:HG21	8:B:519:HOH:O	1.66	0.95
1:B:236:MET:HB2	8:B:519:HOH:O	1.65	0.94
1:D:259:HIS:NE2	4:D:401:DOB:O2	2.05	0.89
1:A:256:ASP:CG	3:A:407:EDO:H22	1.91	0.89
1:C:53:ILE:HD13	1:C:294:GLY:HA2	1.63	0.79
1:B:244:GLN:HB3	1:B:246:LYS:HE3	1.65	0.78
1:A:254:LEU:HD22	3:A:408:EDO:H22	1.66	0.78
1:D:236:MET:HB3	1:D:241:VAL:HG22	1.68	0.75
1:A:29:GLN:HG3	1:A:304:LEU:HD11	1.69	0.74
1:A:313:GLN:HB3	1:A:314:PRO:HD3	1.71	0.72
1:D:144:LEU:HD22	4:D:401:DOB:H3	1.73	0.70
1:D:273:LEU:HD22	1:D:282:SER:HB2	1.75	0.68
1:C:273:LEU:HD22	1:C:282:SER:HB2	1.76	0.67
1:C:228:ARG:HG3	1:C:228:ARG:NH2	2.01	0.67
1:D:242:LEU:O	1:D:245:ARG:HG2	1.95	0.67
1:A:273:LEU:HD22	1:A:282:SER:HB2	1.77	0.65
1:A:236:MET:HB3	1:A:241:VAL:HG22	1.77	0.65
1:A:119:ARG:CZ	1:B:229:GLY:O	2.45	0.64
1:B:273:LEU:HD22	1:B:282:SER:HB2	1.79	0.64
1:A:256:ASP:OD2	3:A:407:EDO:H22	1.96	0.64
1:C:36:SER:HA	1:C:64:ILE:HD13	1.80	0.64
1:B:64:ILE:HD12	1:B:64:ILE:N	2.14	0.62
1:D:49:GLN:HE21	1:D:53:ILE:CD1	2.12	0.62
1:C:313:GLN:HE21	1:C:313:GLN:HA	1.65	0.61
1:D:39:LYS:HG3	1:D:64:ILE:HG22	1.82	0.61
1:A:220:PRO:O	1:A:224:THR:HG22	2.01	0.60
1:B:236:MET:HB2	1:B:241:VAL:HG21	1.83	0.60
1:D:236:MET:CB	1:D:241:VAL:HG22	2.30	0.60
1:A:27:LEU:HD13	1:A:63:LEU:HD11	1.84	0.60
1:D:284:VAL:HG12	1:D:286:HIS:CD2	2.37	0.59
1:B:9:ALA:HB2	1:B:104:VAL:HG21	1.85	0.59
1:A:236:MET:CB	1:A:241:VAL:HG22	2.33	0.59
1:C:286:HIS:ND1	1:D:297:VAL:HG11	2.18	0.58
1:B:265:LEU:HD11	1:C:264:LEU:HD11	1.86	0.58
1:D:46:ALA:HA	1:D:75:VAL:HG21	1.86	0.58
1:A:256:ASP:H	3:A:407:EDO:HO1	1.53	0.57
1:B:39:LYS:HG3	1:B:64:ILE:HG22	1.86	0.57
1:B:54:CYS:HB3	8:B:513:HOH:O	2.05	0.56
1:A:114:GLU:HB2	2:A:401:GOL:H31	1.88	0.56
1:B:110:CYS:HB3	1:B:111:PRO:CD	2.36	0.55
1:B:237:GLY:O	1:B:241:VAL:HG23	2.07	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:64:ILE:HD12	1:D:64:ILE:N	2.21	0.55
1:C:64:ILE:N	1:C:64:ILE:HD12	2.21	0.54
1:D:49:GLN:HE21	1:D:53:ILE:HD12	1.72	0.54
1:A:269:GLY:HA2	1:A:305:ARG:NH2	2.23	0.54
1:A:236:MET:HB2	1:A:241:VAL:CG2	2.38	0.53
1:B:203:HIS:CE1	1:C:159:HIS:CD2	2.97	0.53
1:B:203:HIS:CE1	1:C:159:HIS:NE2	2.76	0.53
1:D:236:MET:HB2	1:D:241:VAL:HG21	1.91	0.53
1:C:196:ALA:HB1	1:C:241:VAL:HG21	1.89	0.53
1:D:236:MET:CB	1:D:241:VAL:CG2	2.87	0.52
1:D:49:GLN:NE2	1:D:53:ILE:HD11	2.24	0.52
1:A:200:ILE:HG12	1:A:253:MET:HG3	1.92	0.52
1:A:236:MET:HB2	1:A:241:VAL:HG21	1.90	0.52
1:C:264:LEU:C	1:C:264:LEU:HD13	2.31	0.52
1:A:236:MET:CB	1:A:241:VAL:CG2	2.88	0.52
1:D:236:MET:HB2	1:D:241:VAL:CG2	2.41	0.51
1:C:9:ALA:HB2	1:C:104:VAL:HG21	1.93	0.51
1:D:9:ALA:HB2	1:D:104:VAL:HG21	1.94	0.50
1:A:273:LEU:N	1:A:273:LEU:HD23	2.27	0.50
1:C:110:CYS:HB3	1:C:111:PRO:CD	2.42	0.49
1:D:110:CYS:HB3	1:D:111:PRO:CD	2.42	0.49
1:B:273:LEU:HD23	1:B:273:LEU:N	2.27	0.49
1:B:236:MET:HB3	1:B:241:VAL:CG2	2.42	0.49
1:C:286:HIS:CG	1:D:297:VAL:HG11	2.47	0.49
1:D:273:LEU:N	1:D:273:LEU:HD23	2.28	0.49
1:A:9:ALA:HB2	1:A:104:VAL:HG21	1.95	0.49
1:B:49:GLN:HE21	1:B:53:ILE:HD11	1.77	0.48
1:A:6:ARG:HD3	1:A:105:ASP:HB2	1.95	0.48
1:A:110:CYS:HB3	1:A:111:PRO:CD	2.43	0.48
1:B:144:LEU:HD11	1:B:272:ALA:HB1	1.95	0.48
1:C:228:ARG:HH21	1:C:228:ARG:CG	2.06	0.48
1:D:159:HIS:HE1	4:D:401:DOB:C3	2.26	0.48
1:B:236:MET:CB	1:B:241:VAL:CG2	2.91	0.48
1:B:295:ARG:CB	1:B:295:ARG:HH21	2.26	0.48
1:A:237:GLY:O	1:A:241:VAL:HG23	2.14	0.48
1:B:59:LEU:O	1:B:63:LEU:HG	2.13	0.48
1:D:49:GLN:HE21	1:D:53:ILE:HD11	1.78	0.48
1:C:200:ILE:HG12	1:C:253:MET:HG3	1.96	0.47
1:B:93:THR:O	1:B:97:ARG:HG3	2.14	0.47
1:C:46:ALA:HA	1:C:75:VAL:HG21	1.96	0.47
1:D:200:ILE:HG12	1:D:253:MET:HG3	1.96	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:127:TYR:N	1:A:128:PRO:CD	2.79	0.46
1:A:129:SER:HB3	1:A:139:GLU:OE2	2.15	0.46
1:C:273:LEU:HD23	1:C:273:LEU:N	2.30	0.46
1:D:278:ARG:HG2	8:D:524:HOH:O	2.15	0.46
1:C:36:SER:HA	1:C:64:ILE:CD1	2.44	0.46
1:A:53:ILE:HD13	1:A:294:GLY:HA2	1.98	0.45
1:D:127:TYR:N	1:D:128:PRO:CD	2.80	0.45
1:D:168:ARG:HG3	1:D:168:ARG:HH11	1.81	0.45
1:B:200:ILE:HG12	1:B:253:MET:HG3	1.98	0.45
1:B:183:GLN:HE22	1:B:278:ARG:HA	1.81	0.45
1:D:230:LEU:HD23	1:D:232:VAL:HG22	1.99	0.45
1:B:260:ILE:N	1:B:261:PRO:HD2	2.32	0.44
1:A:260:ILE:N	1:A:261:PRO:HD2	2.32	0.44
1:C:264:LEU:HD13	1:C:264:LEU:O	2.18	0.44
1:D:237:GLY:O	1:D:241:VAL:HG23	2.18	0.44
1:B:64:ILE:N	1:B:64:ILE:CD1	2.81	0.44
1:B:127:TYR:N	1:B:128:PRO:CD	2.80	0.44
1:C:127:TYR:N	1:C:128:PRO:CD	2.80	0.44
1:B:36:SER:HA	1:B:64:ILE:HD13	2.01	0.43
1:C:204:ALA:O	1:C:205:SER:HB2	2.19	0.43
1:C:39:LYS:HG3	1:C:64:ILE:HG22	2.00	0.43
1:B:236:MET:HB3	1:B:241:VAL:HG22	2.00	0.43
1:A:114:GLU:H	2:A:401:GOL:C3	2.32	0.43
1:B:111:PRO:HB2	1:B:288:SER:HA	2.00	0.42
1:A:114:GLU:H	2:A:401:GOL:H31	1.83	0.42
1:B:236:MET:HB2	1:B:241:VAL:CG2	2.49	0.42
1:C:260:ILE:N	1:C:261:PRO:HD2	2.33	0.42
1:D:260:ILE:N	1:D:261:PRO:HD2	2.35	0.42
1:A:144:LEU:HD11	1:A:272:ALA:HB1	2.02	0.42
1:C:129:SER:OG	1:C:139:GLU:OE2	2.38	0.42
1:C:286:HIS:CE1	1:D:297:VAL:HG11	2.54	0.42
1:B:49:GLN:HE21	1:B:53:ILE:CD1	2.33	0.41
1:C:291:ASP:HB2	1:D:289:ALA:HA	2.02	0.41
1:D:212:LEU:O	1:D:216:GLN:HG3	2.20	0.41
1:A:178:VAL:HG22	1:A:251:VAL:HG21	2.01	0.41
1:B:13:GLY:HA2	8:B:515:HOH:O	2.20	0.41
1:B:110:CYS:HB3	1:B:111:PRO:HD2	2.01	0.41
1:D:313:GLN:HE21	1:D:313:GLN:HB2	1.59	0.41
1:C:84:ALA:HB3	8:C:511:HOH:O	2.20	0.41
1:A:254:LEU:CD2	3:A:408:EDO:H22	2.44	0.41
1:B:204:ALA:O	1:B:205:SER:HB2	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:111:PRO:HB2	1:A:288:SER:HA	2.04	0.40
1:D:80:ILE:HA	8:D:527:HOH:O	2.21	0.40
1:D:295:ARG:HH11	1:D:295:ARG:HG3	1.86	0.40
1:B:178:VAL:HG22	1:B:251:VAL:HG21	2.03	0.40
1:D:49:GLN:NE2	1:D:53:ILE:CD1	2.81	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	311/335 (93%)	302 (97%)	8 (3%)	1 (0%)	37	56
1	B	308/335 (92%)	301 (98%)	7 (2%)	0	100	100
1	C	311/335 (93%)	304 (98%)	7 (2%)	0	100	100
1	D	312/335 (93%)	303 (97%)	9 (3%)	0	100	100
All	All	1242/1340 (93%)	1210 (97%)	31 (2%)	1 (0%)	48	69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	313	GLN

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	242/261 (93%)	236 (98%)	6 (2%)	42	69
1	B	241/261 (92%)	234 (97%)	7 (3%)	37	64
1	C	242/261 (93%)	238 (98%)	4 (2%)	56	79
1	D	243/261 (93%)	237 (98%)	6 (2%)	42	69
All	All	968/1044 (93%)	945 (98%)	23 (2%)	44	70

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	61	GLN
1	A	187	LEU
1	A	224	THR
1	A	232	VAL
1	A	241	VAL
1	A	245	ARG
1	B	55	GLN
1	B	111	PRO
1	B	133	ASN
1	B	187	LEU
1	B	206	GLU
1	B	227	LYS
1	B	233	ASP
1	C	63	LEU
1	C	97	ARG
1	C	228	ARG
1	C	313	GLN
1	D	187	LEU
1	D	209	LEU
1	D	223	GLU
1	D	241	VAL
1	D	299	ASP
1	D	313	GLN

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	118	HIS
1	A	313	GLN
1	B	49	GLN
1	B	73	GLN

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Mol	Chain	Res	Type
1	B	183	GLN
1	B	247	HIS
1	B	286	HIS
1	C	313	GLN
1	D	49	GLN
1	D	201	ASN
1	D	313	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 16 ligands modelled in this entry, 5 are monoatomic - leaving 11 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	$\#|Z| > 2$
7	CO2	D	403	-	2,2,2	0.21	0	1,1,1	0.08	0
4	DOB	A	403	5	11,11,11	1.86	2 (18%)	15,15,15	1.69	3 (20%)
3	EDO	A	405	-	3,3,3	0.11	0	2,2,2	0.24	0
3	EDO	A	402	-	3,3,3	0.51	0	2,2,2	0.64	0
4	DOB	D	401	5	11,11,11	1.95	2 (18%)	15,15,15	1.15	2 (13%)
7	CO2	D	402	-	2,2,2	0.43	0	1,1,1	0.30	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z|$ > 2	Counts	RMSZ	#$|Z|$ > 2
3	EDO	A	406	-	3,3,3	0.36	0	2,2,2	0.55	0
3	EDO	A	408	-	3,3,3	0.41	0	2,2,2	0.08	0
2	GOL	A	401	-	5,5,5	0.23	0	5,5,5	0.61	0
3	EDO	D	405	-	3,3,3	0.12	0	2,2,2	0.32	0
3	EDO	A	407	-	3,3,3	0.19	0	2,2,2	0.76	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
4	DOB	A	403	5	-	3/4/4/4	0/1/1/1
3	EDO	A	405	-	-	0/1/1/1	-
3	EDO	A	402	-	-	1/1/1/1	-
4	DOB	D	401	5	-	4/4/4/4	0/1/1/1
3	EDO	A	406	-	-	1/1/1/1	-
3	EDO	A	408	-	-	0/1/1/1	-
2	GOL	A	401	-	-	2/4/4/4	-
3	EDO	D	405	-	-	0/1/1/1	-
3	EDO	A	407	-	-	1/1/1/1	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	401	DOB	O2-C2	-5.40	1.25	1.36
4	A	403	DOB	C3-C2	4.88	1.45	1.38
4	A	403	DOB	O2-C2	-2.91	1.30	1.36
4	D	401	DOB	C3-C2	2.76	1.42	1.38

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	403	DOB	C3-C2-C1	-4.28	116.21	120.60
4	A	403	DOB	C2-C3-C4	2.55	122.01	119.70
4	D	401	DOB	C3-C2-C1	-2.20	118.34	120.60
4	A	403	DOB	C6-C1-C2	2.07	120.74	118.15
4	D	401	DOB	O1'-C1'-C1	-2.04	116.97	121.94

There are no chirality outliers.
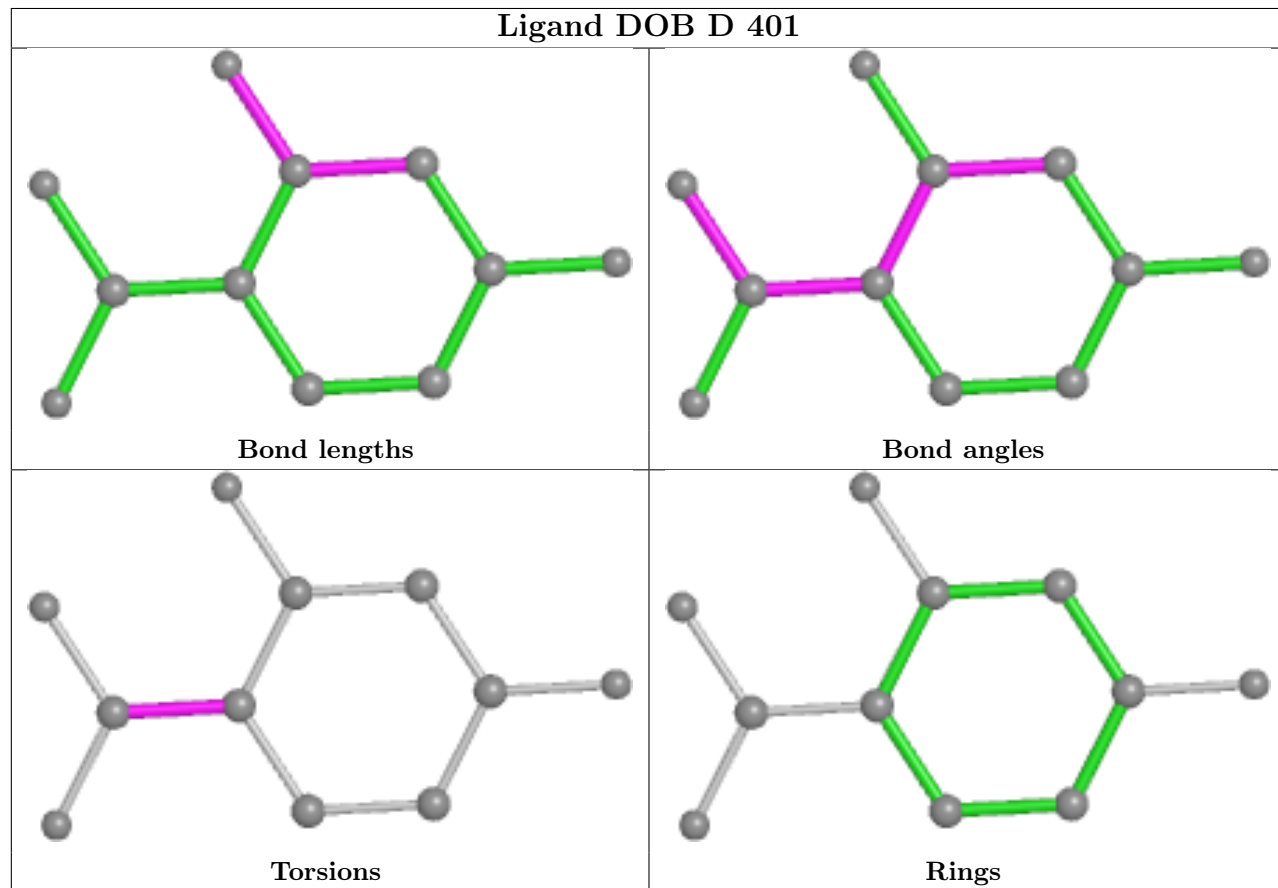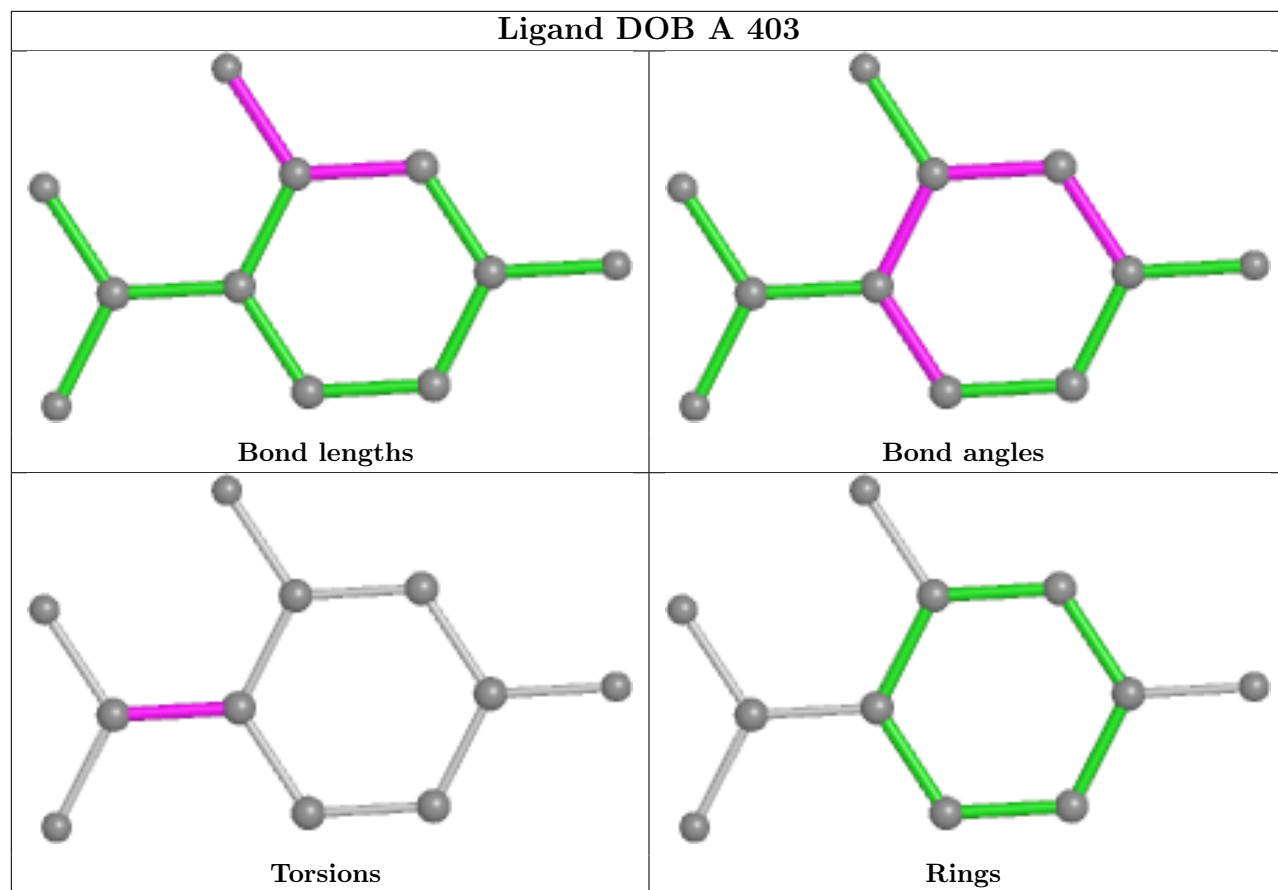
All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	D	401	DOB	C2-C1-C1'-O1'
4	D	401	DOB	C2-C1-C1'-O2'
4	A	403	DOB	C2-C1-C1'-O1'
4	A	403	DOB	C2-C1-C1'-O2'
2	A	401	GOL	O1-C1-C2-C3
2	A	401	GOL	O1-C1-C2-O2
3	A	407	EDO	O1-C1-C2-O2
3	A	402	EDO	O1-C1-C2-O2
3	A	406	EDO	O1-C1-C2-O2
4	D	401	DOB	C6-C1-C1'-O2'
4	D	401	DOB	C6-C1-C1'-O1'
4	A	403	DOB	C6-C1-C1'-O2'

There are no ring outliers.

4 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	401	DOB	3	0
3	A	408	EDO	2	0
2	A	401	GOL	3	0
3	A	407	EDO	3	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 then 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.

Ligand DOB A 403

Bond lengths

Bond angles

Torsions

Rings

Ligand DOB D 401

Bond lengths

Bond angles

Torsions

Rings

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	313/335 (93%)	-0.04	3 (0%)	79	76	10, 24, 43, 62	0
1	B	312/335 (93%)	0.93	29 (9%)	16	15	25, 47, 66, 81	0
1	C	313/335 (93%)	0.92	22 (7%)	24	22	26, 43, 63, 79	0
1	D	314/335 (93%)	-0.08	1 (0%)	90	88	10, 23, 44, 58	0
All	All	1252/1340 (93%)	0.43	55 (4%)	39	36	10, 34, 61, 81	0

All (55) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	236	MET	4.3
1	C	47	LEU	4.3
1	B	285	GLY	4.0
1	B	238	ALA	3.2
1	C	1	MET	3.2
1	B	222	VAL	3.2
1	B	2	THR	3.1
1	B	83	GLN	3.1
1	B	229	GLY	3.0
1	B	269	GLY	3.0
1	B	240	MET	3.0
1	B	284	VAL	2.9
1	C	313	GLN	2.9
1	B	297	VAL	2.9
1	B	60	LEU	2.8
1	C	53	ILE	2.8
1	C	208	GLN	2.8
1	C	270	ALA	2.8
1	B	267	PRO	2.7
1	C	158	LEU	2.7
1	B	231	THR	2.7

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Mol	Chain	Res	Type	RSRZ
1	C	294	GLY	2.7
1	A	314	PRO	2.6
1	C	275	ILE	2.6
1	C	190	VAL	2.6
1	B	289	ALA	2.5
1	B	79	GLU	2.5
1	B	197	VAL	2.4
1	B	232	VAL	2.4
1	B	139	GLU	2.4
1	C	312	ALA	2.4
1	B	277	GLY	2.4
1	B	230	LEU	2.3
1	C	159	HIS	2.3
1	C	154	VAL	2.3
1	B	58	SER	2.3
1	C	310	LEU	2.3
1	D	52	GLN	2.3
1	B	209	LEU	2.3
1	C	58	SER	2.3
1	C	140	ASP	2.3
1	B	227	LYS	2.2
1	B	49	GLN	2.2
1	C	272	ALA	2.1
1	B	207	GLY	2.1
1	C	105	ASP	2.1
1	A	53	ILE	2.1
1	A	268	ASN	2.1
1	C	44	TRP	2.1
1	C	191	PRO	2.1
1	B	140	ASP	2.1
1	B	248	ASP	2.1
1	B	221	ALA	2.0
1	C	246	LYS	2.0
1	C	186	THR	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 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, 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
2	GOL	A	401	6/6	0.80	0.17	34,41,42,42	0
4	DOB	A	403	11/11	0.80	0.17	37,41,53,53	0
6	CL	C	402	1/1	0.82	0.20	76,76,76,76	0
7	CO2	D	403	3/3	0.82	0.13	40,40,42,43	0
3	EDO	A	402	4/4	0.83	0.13	31,34,34,36	0
3	EDO	D	405	4/4	0.85	0.16	42,43,43,46	0
3	EDO	A	406	4/4	0.86	0.15	33,34,36,38	0
4	DOB	D	401	11/11	0.88	0.12	33,38,41,41	0
3	EDO	A	405	4/4	0.91	0.09	23,24,24,25	0
3	EDO	A	408	4/4	0.92	0.12	6,6,6,6	4
5	ZN	A	404	1/1	0.94	0.05	22,22,22,22	0
7	CO2	D	402	3/3	0.95	0.06	22,22,22,22	0
5	ZN	D	404	1/1	0.95	0.04	25,25,25,25	0
3	EDO	A	407	4/4	0.97	0.09	12,13,13,14	4
5	ZN	B	401	1/1	0.97	0.04	43,43,43,43	0
5	ZN	C	401	1/1	0.98	0.04	39,39,39,39	0

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

Electron density around DOB A 403:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
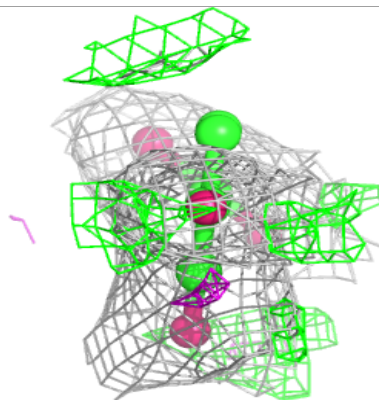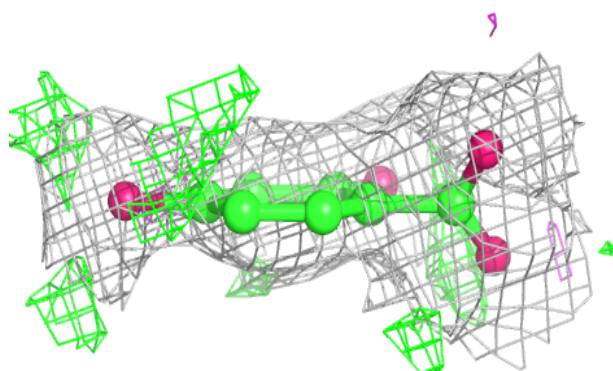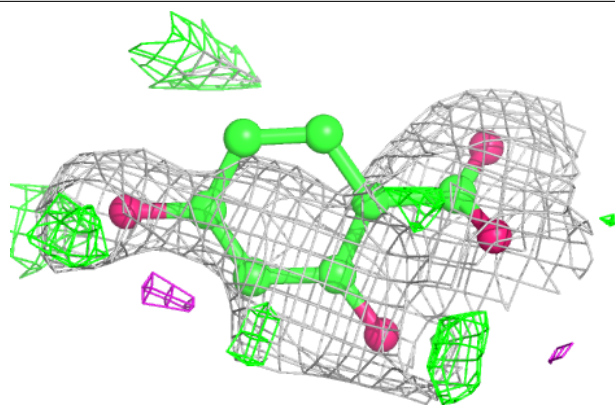
Electron density around DOB D 401:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
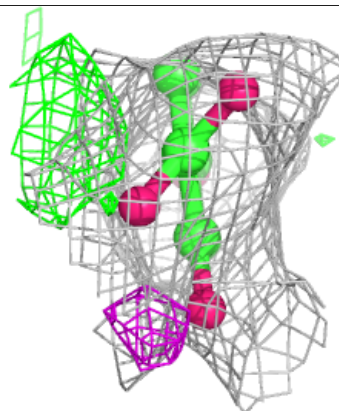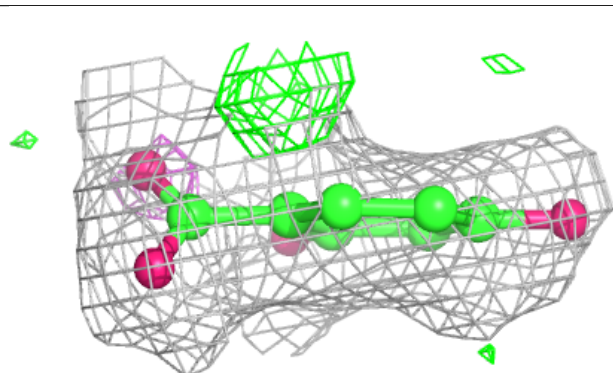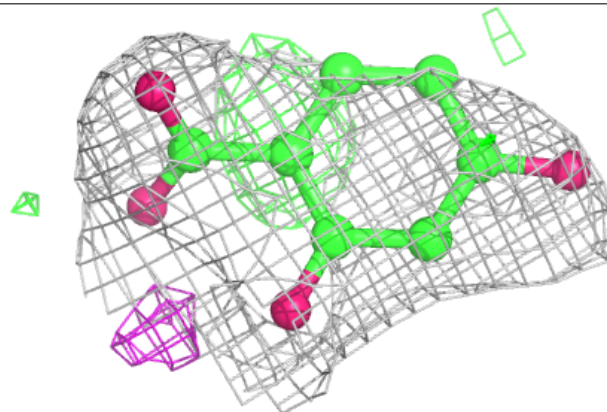
6.5 Other polymers (i)

There are no such residues in this entry.