



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 20, 2023 – 06:44 PM EDT

PDB ID : 2OOV  
Title : Crystal Structure of Hansenula polymorpha amine oxidase to 1.7 Angstroms  
Authors : Johnson, B.J.; Wilmot, C.M.  
Deposited on : 2007-01-26  
Resolution : 1.70 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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>.

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.35  
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) : 2.35

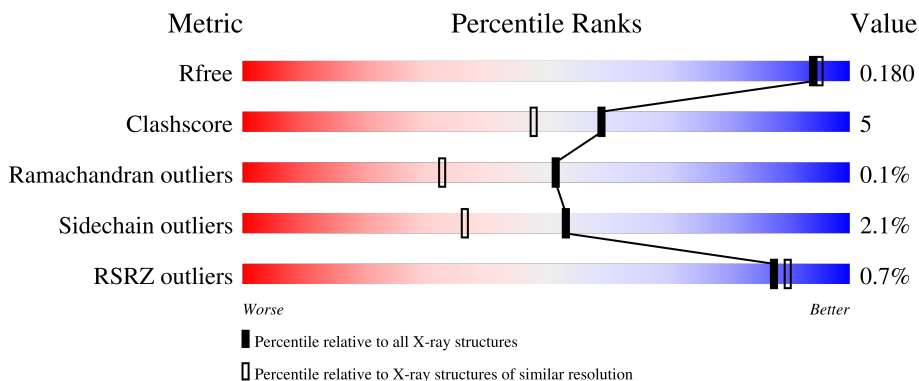
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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.



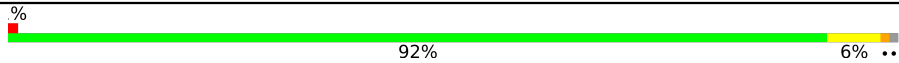
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	660	 91% 7% ..
1	B	660	 91% 7% ..
2	C	660	 91% 7% ..
2	D	660	 89% 9% ..
2	E	660	 92% 7% ..

Continued on next page...

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
2	F	660	 A horizontal bar chart representing the quality of the chain. The bar is primarily green, indicating a high quality score of 92%. A small yellow segment at the end indicates a lower quality score of 6%. Two red dots are present at the far right end of the bar, suggesting outliers or significant issues. The percentage values '92%' and '6% ..' are printed below the bar.

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
4	GOL	D	6028	-	-	X	-

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 36770 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 Peroxisomal copper amine oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	655	Total	C	N	O	S	0	13	0
			5253	3347	896	986	24			
1	B	655	Total	C	N	O	S	0	10	0
			5235	3333	894	982	26			

- Molecule 2 is a protein called Peroxisomal copper amine oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	655	Total	C	N	O	S	0	17	0
			5288	3369	899	991	29			
2	D	655	Total	C	N	O	S	0	14	0
			5266	3361	894	984	27			
2	E	655	Total	C	N	O	S	0	9	0
			5244	3338	895	986	25			
2	F	655	Total	C	N	O	S	0	10	0
			5245	3340	895	982	28			

- Molecule 3 is COPPER (II) ION (three-letter code: CU) (formula: Cu).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cu	0	0
			1	1		
3	B	1	Total	Cu	0	0
			1	1		
3	C	1	Total	Cu	0	0
			1	1		
3	D	1	Total	Cu	0	0
			1	1		
3	E	1	Total	Cu	0	0
			1	1		
3	F	1	Total	Cu	0	0
			1	1		

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



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

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	C	1	Total 6	C 3	O 3	0	0
4	C	1	Total 6	C 3	O 3	0	0
4	C	1	Total 6	C 3	O 3	0	0
4	D	1	Total 6	C 3	O 3	0	0
4	D	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	E	1	Total 6	C 3	O 3	0	0
4	F	1	Total 6	C 3	O 3	0	0
4	F	1	Total 6	C 3	O 3	0	0
4	F	1	Total 6	C 3	O 3	0	0
4	F	1	Total 6	C 3	O 3	0	0

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	O	P	0	0
			5	4	1		
5	F	1	Total	O	P	0	0
			5	4	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	852	Total	O	0	0
			852	852		
6	B	816	Total	O	0	0
			816	816		
6	C	849	Total	O	0	0
			849	849		
6	D	863	Total	O	0	0
			863	863		
6	E	853	Total	O	0	0
			853	853		
6	F	822	Total	O	0	0
			822	822		

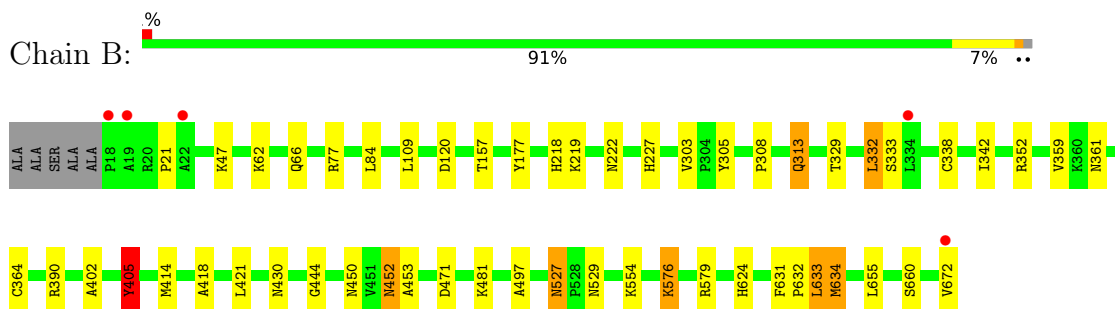
### 3 Residue-property plots [i](#)

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.

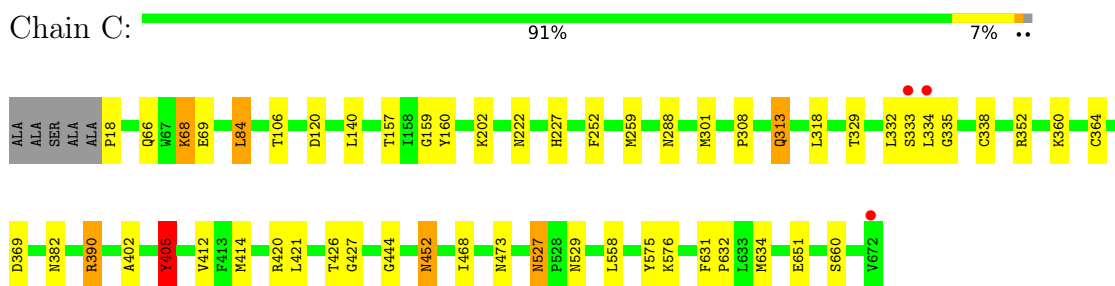
- Molecule 1: Peroxisomal copper amine oxidase



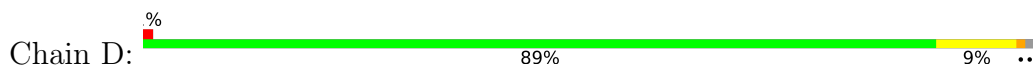
- Molecule 1: Peroxisomal copper amine oxidase



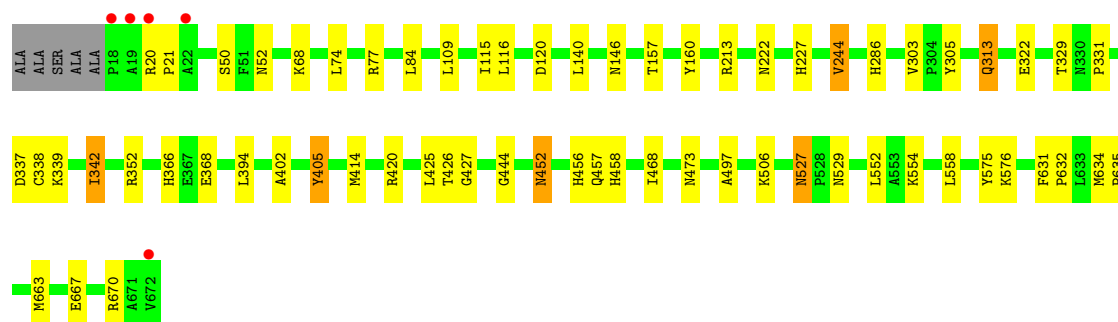
- Molecule 2: Peroxisomal copper amine oxidase



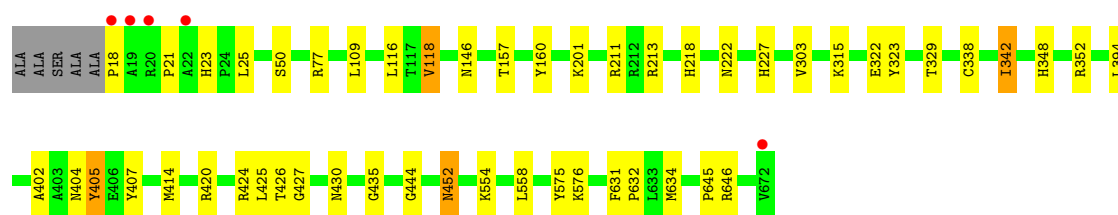
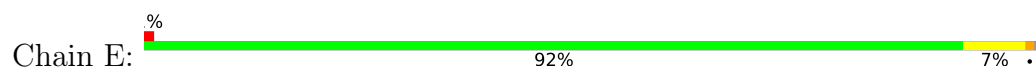
- Molecule 2: Peroxisomal copper amine oxidase



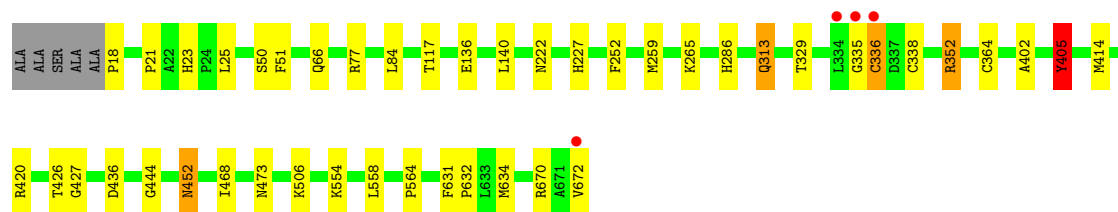
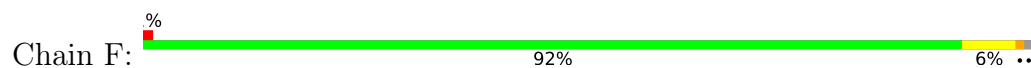




- Molecule 2: Peroxisomal copper amine oxidase



- Molecule 2: Peroxisomal copper amine oxidase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	104.15Å 223.08Å 104.25Å 90.00° 95.77° 90.00°	Depositor
Resolution (Å)	37.96 – 1.70 37.96 – 1.70	Depositor EDS
% Data completeness (in resolution range)	85.0 (37.96-1.70) 84.8 (37.96-1.70)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.66 (at 1.70Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.147 , 0.178 0.150 , 0.180	Depositor DCC
$R_{free}$ test set	21965 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	15.4	Xtrriage
Anisotropy	0.103	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 35.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.477 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	36770	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.67% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CU, GOL, PO4, TPQ, SME

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	0.53	0/5417	0.64	2/7364 (0.0%)
1	B	0.53	0/5390	0.63	0/7330
2	C	0.52	0/5451	0.63	1/7413 (0.0%)
2	D	0.53	0/5426	0.64	0/7382
2	E	0.53	0/5386	0.64	0/7328
2	F	0.53	0/5393	0.62	0/7336
All	All	0.53	0/32463	0.63	3/44153 (0.0%)

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	3
1	B	0	1
2	C	0	1
2	F	0	1
All	All	0	6

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	334	LEU	N-CA-C	-7.43	90.94	111.00
1	A	641	LEU	CA-CB-CG	6.30	129.80	115.30
2	C	84	LEU	CA-CB-CG	5.83	128.71	115.30

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	332	LEU	Peptide
1	A	333	SER	Peptide
1	A	405	TPQ	Mainchain
1	B	405	TPQ	Mainchain
2	C	405[A]	TPQ	Mainchain

## 5.2 Too-close contacts [i](#)

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	5253	0	5125	46	0
1	B	5235	0	5095	42	0
2	C	5288	0	5148	49	0
2	D	5266	0	5137	59	0
2	E	5244	0	5087	49	0
2	F	5245	0	5095	43	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
4	A	36	0	48	6	0
4	B	36	0	48	2	0
4	C	24	0	32	2	0
4	D	12	0	16	9	0
4	E	36	0	48	2	0
4	F	24	0	32	4	0
5	C	5	0	0	0	0
5	F	5	0	0	0	0
6	A	852	0	0	16	0
6	B	816	0	0	5	0
6	C	849	0	0	10	0
6	D	863	0	0	16	0
6	E	853	0	0	15	0
6	F	822	0	0	8	0
All	All	36770	0	30911	287	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 5.

The worst 5 of 287 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)
2:E:404:ASN:C	2:E:405[A]:TPQ:H2	1.08	1.53
2:E:404:ASN:C	2:E:405[B]:TPQ:H2	0.96	1.49
2:D:157[A]:THR:CG2	6:D:6597:HOH:O	1.75	1.34
1:A:157[B]:THR:CG2	6:A:6465:HOH:O	1.72	1.34
2:E:157[B]:THR:CG2	6:E:6588:HOH:O	1.74	1.25

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	664/660 (101%)	642 (97%)	21 (3%)	1 (0%)	47	30
1	B	661/660 (100%)	643 (97%)	17 (3%)	1 (0%)	47	30
2	C	668/660 (101%)	649 (97%)	19 (3%)	0	100	100
2	D	665/660 (101%)	644 (97%)	21 (3%)	0	100	100
2	E	660/660 (100%)	639 (97%)	21 (3%)	0	100	100
2	F	661/660 (100%)	640 (97%)	21 (3%)	0	100	100
All	All	3979/3960 (100%)	3857 (97%)	120 (3%)	2 (0%)	51	33

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	333	SER
1	A	333	SER

### 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	577/565 (102%)	564 (98%)	13 (2%)	50	33
1	B	574/565 (102%)	560 (98%)	14 (2%)	49	31
2	C	581/566 (103%)	570 (98%)	11 (2%)	57	41
2	D	578/566 (102%)	562 (97%)	16 (3%)	43	25
2	E	573/566 (101%)	563 (98%)	10 (2%)	60	46
2	F	574/566 (101%)	564 (98%)	10 (2%)	60	46
All	All	3457/3394 (102%)	3383 (98%)	74 (2%)	53	36

5 of 74 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	E	201	LYS
2	F	452	ASN
2	E	329	THR
2	F	140	LEU
1	B	576	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 50 such sidechains are listed below:

Mol	Chain	Res	Type
2	D	452	ASN
2	E	286	HIS
2	F	473	ASN
2	D	457	GLN
2	E	23	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

12 non-standard protein/DNA/RNA residues are modelled in this entry.

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
1	TPQ	B	405	1	13,14,15	2.23	4 (30%)	15,19,21	1.34	2 (13%)
2	TPQ	D	405[A]	-	13,14,15	2.21	4 (30%)	15,19,21	1.46	2 (13%)
1	SME	B	634	1	7,8,9	4.40	1 (14%)	4,9,11	3.11	1 (25%)
2	TPQ	E	405[B]	-	13,14,15	2.23	5 (38%)	15,19,21	1.27	2 (13%)
1	SME	A	634	1	7,8,9	4.50	1 (14%)	4,9,11	3.44	1 (25%)
2	TPQ	C	405[A]	-	13,14,15	2.18	6 (46%)	15,19,21	1.33	2 (13%)
2	TPQ	F	405[A]	-	13,14,15	2.07	5 (38%)	15,19,21	1.60	2 (13%)
2	TPQ	E	405[A]	3	13,14,15	2.31	6 (46%)	15,19,21	1.07	1 (6%)
2	TPQ	D	405[B]	3	13,14,15	2.26	5 (38%)	15,19,21	1.29	1 (6%)
2	TPQ	F	405[B]	-	13,14,15	2.32	6 (46%)	15,19,21	1.16	1 (6%)
1	TPQ	A	405	1	13,14,15	2.15	3 (23%)	15,19,21	1.38	2 (13%)
2	TPQ	C	405[B]	3	13,14,15	2.30	6 (46%)	15,19,21	1.28	1 (6%)

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
1	TPQ	B	405	1	-	0/5/22/24	0/1/1/1
2	TPQ	D	405[A]	-	-	1/5/22/24	0/1/1/1
1	SME	B	634	1	-	2/6/7/9	-
2	TPQ	E	405[B]	-	-	0/5/22/24	0/1/1/1
1	SME	A	634	1	-	2/6/7/9	-
2	TPQ	C	405[A]	-	-	0/5/22/24	0/1/1/1
2	TPQ	F	405[A]	-	-	0/5/22/24	0/1/1/1
2	TPQ	E	405[A]	3	-	4/5/22/24	0/1/1/1
2	TPQ	D	405[B]	3	-	4/5/22/24	0/1/1/1

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	TPQ	F	405[B]	-	-	4/5/22/24	0/1/1/1
1	TPQ	A	405	1	-	0/5/22/24	0/1/1/1
2	TPQ	C	405[B]	3	-	5/5/22/24	0/1/1/1

The worst 5 of 52 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	634	SME	OE-S	11.84	1.82	1.50
1	B	634	SME	OE-S	11.57	1.81	1.50
2	C	405[B]	TPQ	O5-C5	5.04	1.38	1.24
2	F	405[B]	TPQ	O5-C5	4.96	1.37	1.24
2	E	405[A]	TPQ	O5-C5	4.91	1.37	1.24

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	634	SME	OE-S-CE	6.76	119.93	106.25
1	B	634	SME	OE-S-CE	6.20	118.81	106.25
2	F	405[A]	TPQ	CB-CA-C	-3.93	104.10	111.47
2	D	405[A]	TPQ	CB-CA-C	-3.71	104.50	111.47
2	F	405[A]	TPQ	C6-C1-C2	3.26	121.14	118.64

There are no chirality outliers.

5 of 22 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	634	SME	C-CA-CB-CG
2	C	405[B]	TPQ	C-CA-CB-C1
2	C	405[B]	TPQ	O-C-CA-CB
2	C	405[B]	TPQ	C2-C1-CB-CA
2	C	405[B]	TPQ	C6-C1-CB-CA

There are no ring outliers.

12 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	405	TPQ	2	0
2	D	405[A]	TPQ	1	0
1	B	634	SME	1	0
2	E	405[B]	TPQ	3	0

*Continued on next page...*



Continued from previous page...

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	634	SME	1	0
2	C	405[A]	TPQ	1	0
2	F	405[A]	TPQ	1	0
2	E	405[A]	TPQ	4	0
2	D	405[B]	TPQ	4	0
2	F	405[B]	TPQ	1	0
1	A	405	TPQ	1	0
2	C	405[B]	TPQ	1	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 36 ligands modelled in this entry, 6 are monoatomic - leaving 30 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	$\# Z  > 2$
4	GOL	D	6030	-	5,5,5	0.29	0	5,5,5	0.66	0
4	GOL	E	6015	-	5,5,5	0.45	0	5,5,5	0.19	0
4	GOL	E	6016	-	5,5,5	0.39	0	5,5,5	0.31	0
4	GOL	E	6022	-	5,5,5	0.40	0	5,5,5	0.33	0
4	GOL	A	6013	-	5,5,5	0.35	0	5,5,5	0.43	0
4	GOL	C	6007	-	5,5,5	0.30	0	5,5,5	0.39	0
4	GOL	A	6027	-	5,5,5	0.29	0	5,5,5	0.51	0
4	GOL	D	6028	-	5,5,5	0.53	0	5,5,5	0.58	0
4	GOL	B	6009	-	5,5,5	0.30	0	5,5,5	0.46	0
4	GOL	C	6029	-	5,5,5	0.37	0	5,5,5	0.24	0
4	GOL	E	6020	-	5,5,5	0.34	0	5,5,5	0.26	0
5	PO4	C	6010	-	4,4,4	0.82	0	6,6,6	0.58	0
4	GOL	F	6003	-	5,5,5	0.39	0	5,5,5	0.59	0
4	GOL	F	6006	-	5,5,5	0.37	0	5,5,5	0.18	0
4	GOL	E	6019	-	5,5,5	0.30	0	5,5,5	0.42	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	GOL	A	6005	-	5,5,5	0.39	0	5,5,5	0.14	0
4	GOL	C	6021	-	5,5,5	0.46	0	5,5,5	0.48	0
4	GOL	B	6023	-	5,5,5	0.42	0	5,5,5	0.14	0
4	GOL	F	6001	-	5,5,5	0.40	0	5,5,5	0.24	0
4	GOL	F	6008	-	5,5,5	0.29	0	5,5,5	0.35	0
5	PO4	F	6011	-	4,4,4	0.87	0	6,6,6	0.37	0
4	GOL	B	6004	-	5,5,5	0.29	0	5,5,5	0.19	0
4	GOL	E	6014	-	5,5,5	0.35	0	5,5,5	0.18	0
4	GOL	B	6024	-	5,5,5	0.40	0	5,5,5	0.38	0
4	GOL	C	6002	-	5,5,5	0.35	0	5,5,5	0.56	0
4	GOL	A	6018	-	5,5,5	0.32	0	5,5,5	0.24	0
4	GOL	B	6025	-	5,5,5	0.34	0	5,5,5	0.44	0
4	GOL	A	6012	-	5,5,5	0.30	0	5,5,5	0.45	0
4	GOL	A	6017	-	5,5,5	0.37	0	5,5,5	0.35	0
4	GOL	B	6026	-	5,5,5	0.44	0	5,5,5	0.31	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	D	6030	-	-	3/4/4/4	-
4	GOL	E	6015	-	-	0/4/4/4	-
4	GOL	E	6016	-	-	2/4/4/4	-
4	GOL	E	6022	-	-	2/4/4/4	-
4	GOL	A	6013	-	-	4/4/4/4	-
4	GOL	C	6007	-	-	2/4/4/4	-
4	GOL	A	6027	-	-	2/4/4/4	-
4	GOL	D	6028	-	-	4/4/4/4	-
4	GOL	B	6009	-	-	2/4/4/4	-
4	GOL	C	6029	-	-	4/4/4/4	-
4	GOL	E	6020	-	-	0/4/4/4	-
4	GOL	F	6003	-	-	2/4/4/4	-
4	GOL	F	6006	-	-	1/4/4/4	-
4	GOL	E	6019	-	-	2/4/4/4	-
4	GOL	A	6005	-	-	2/4/4/4	-
4	GOL	C	6021	-	-	2/4/4/4	-
4	GOL	B	6023	-	-	1/4/4/4	-

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	F	6001	-	-	2/4/4/4	-
4	GOL	F	6008	-	-	0/4/4/4	-
4	GOL	B	6004	-	-	0/4/4/4	-
4	GOL	E	6014	-	-	2/4/4/4	-
4	GOL	B	6024	-	-	3/4/4/4	-
4	GOL	C	6002	-	-	4/4/4/4	-
4	GOL	A	6018	-	-	2/4/4/4	-
4	GOL	B	6025	-	-	4/4/4/4	-
4	GOL	A	6012	-	-	1/4/4/4	-
4	GOL	A	6017	-	-	4/4/4/4	-
4	GOL	B	6026	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 59 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	6005	GOL	O1-C1-C2-C3
4	A	6013	GOL	O1-C1-C2-C3
4	A	6013	GOL	C1-C2-C3-O3
4	A	6017	GOL	C1-C2-C3-O3
4	A	6018	GOL	O1-C1-C2-C3

There are no ring outliers.

11 monomers are involved in 25 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	6015	GOL	2	0
4	A	6013	GOL	2	0
4	D	6028	GOL	9	0
4	F	6003	GOL	2	0
4	F	6006	GOL	1	0
4	C	6021	GOL	2	0
4	B	6023	GOL	1	0
4	F	6001	GOL	1	0
4	A	6018	GOL	2	0
4	A	6017	GOL	2	0
4	B	6026	GOL	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	E	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	E	404:ASN	C	405:TPQ	N	1.74

## 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	653/660 (98%)	-0.65	7 (1%) 80 83	14, 19, 31, 55	0
1	B	653/660 (98%)	-0.65	5 (0%) 86 88	14, 19, 31, 55	0
2	C	654/660 (99%)	-0.65	3 (0%) 91 92	14, 19, 32, 48	0
2	D	654/660 (99%)	-0.69	5 (0%) 86 88	14, 19, 29, 51	0
2	E	654/660 (99%)	-0.68	5 (0%) 86 88	13, 19, 29, 50	0
2	F	654/660 (99%)	-0.66	4 (0%) 89 91	13, 19, 32, 49	0
All	All	3922/3960 (99%)	-0.66	29 (0%) 87 90	13, 19, 31, 55	0

The worst 5 of 29 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	C	334	LEU	8.0
2	E	672	VAL	5.5
2	F	672	VAL	5.5
2	D	672	VAL	5.2
2	F	334	LEU	4.9

### 6.2 Non-standard residues in protein, DNA, RNA chains [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
1	TPQ	B	405	14/15	0.88	0.15	21,28,30,31	1
1	SME	A	634	9/10	0.90	0.11	18,19,32,32	0
2	TPQ	C	405[A]	14/15	0.90	0.14	18,22,23,24	11
2	TPQ	C	405[B]	14/15	0.90	0.14	18,18,19,20	11

*Continued on next page...*

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	TPQ	E	405[A]	14/15	0.90	0.14	18,20,21,21	11
2	TPQ	E	405[B]	14/15	0.90	0.14	18,21,22,23	11
2	TPQ	F	405[A]	14/15	0.90	0.14	18,20,23,23	11
2	TPQ	F	405[B]	14/15	0.90	0.14	18,20,22,23	11
1	TPQ	A	405	14/15	0.91	0.12	22,29,30,31	1
2	TPQ	D	405[A]	14/15	0.92	0.13	17,20,22,23	11
2	TPQ	D	405[B]	14/15	0.92	0.13	17,19,20,21	11
1	SME	B	634	9/10	0.94	0.09	19,20,26,30	1

### 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( $\text{\AA}^2$ )	Q<0.9
4	GOL	E	6022	6/6	0.33	0.36	68,68,69,69	0
4	GOL	D	6028	6/6	0.75	0.32	61,61,61,61	0
4	GOL	A	6018	6/6	0.75	0.17	52,52,52,54	0
4	GOL	F	6003	6/6	0.75	0.22	45,46,47,48	0
4	GOL	E	6020	6/6	0.77	0.16	59,59,59,61	0
4	GOL	F	6006	6/6	0.78	0.13	42,43,44,45	0
4	GOL	B	6025	6/6	0.80	0.17	38,42,43,43	0
4	GOL	A	6005	6/6	0.81	0.13	49,50,50,50	0
4	GOL	E	6015	6/6	0.81	0.12	50,52,52,53	0
4	GOL	F	6008	6/6	0.81	0.13	40,41,41,41	0
4	GOL	C	6002	6/6	0.84	0.12	40,43,44,45	0
4	GOL	C	6007	6/6	0.84	0.12	37,39,39,39	0
4	GOL	C	6029	6/6	0.84	0.14	29,40,41,43	0
4	GOL	A	6013	6/6	0.84	0.11	53,55,56,56	0
4	GOL	B	6026	6/6	0.84	0.17	52,52,53,53	0
4	GOL	E	6016	6/6	0.85	0.14	57,58,58,59	0
4	GOL	B	6023	6/6	0.85	0.13	54,56,57,57	0
4	GOL	A	6027	6/6	0.85	0.10	48,50,50,52	0
4	GOL	E	6019	6/6	0.86	0.14	37,39,40,42	0
4	GOL	D	6030	6/6	0.86	0.12	34,36,37,38	0

Continued on next page...

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	GOL	E	6014	6/6	0.86	0.13	51,52,53,53	0
4	GOL	B	6004	6/6	0.87	0.11	48,49,50,52	0
4	GOL	A	6012	6/6	0.87	0.10	34,37,38,41	0
4	GOL	B	6024	6/6	0.89	0.11	56,58,59,59	0
4	GOL	A	6017	6/6	0.90	0.11	43,45,46,48	0
4	GOL	B	6009	6/6	0.91	0.09	35,37,39,41	0
4	GOL	F	6001	6/6	0.92	0.12	35,39,40,41	0
4	GOL	C	6021	6/6	0.93	0.18	35,39,39,42	0
5	PO4	C	6010	5/5	0.93	0.12	50,52,52,53	0
5	PO4	F	6011	5/5	0.95	0.10	50,51,52,52	0
3	CU	A	801	1/1	1.00	0.06	19,19,19,19	0
3	CU	B	801	1/1	1.00	0.05	19,19,19,19	0
3	CU	C	801	1/1	1.00	0.04	19,19,19,19	0
3	CU	D	801	1/1	1.00	0.04	19,19,19,19	0
3	CU	E	801	1/1	1.00	0.04	18,18,18,18	0
3	CU	F	801	1/1	1.00	0.05	18,18,18,18	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.