



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 13, 2026 – 10:51 PM UTC

PDB ID : 6VOX / pdb\_00006vox  
Title : Crystal structure of multi-copper oxidase from Pseudomonas Parafulva  
Authors : Partowmah, S.H.; Coler, E.A.; Soares, A.S.; Collins, R.E.  
Deposited on : 2020-01-31  
Resolution : 3.80 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 2.0  
EDS : 3.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
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

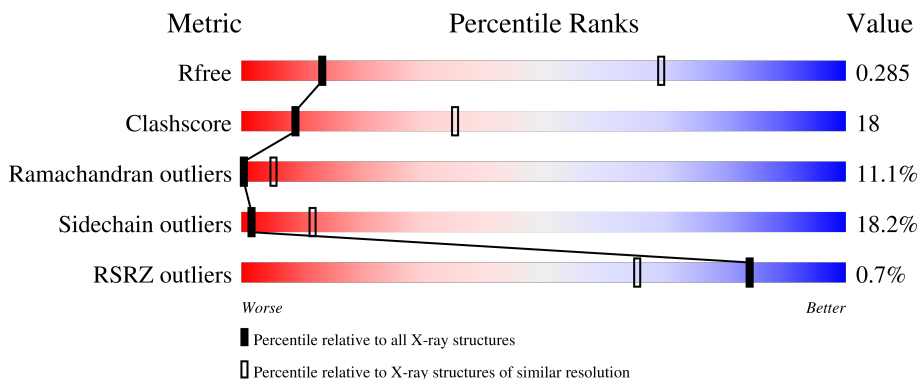
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.80 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	1065 (3.96-3.64)
Clashscore	190562	1012 (3.94-3.66)
Ramachandran outliers	187476	1048 (3.96-3.64)
Sidechain outliers	187428	1043 (3.96-3.64)
RSRZ outliers	180081	1064 (3.96-3.64)

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	420	

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
2	C2O	A	501	-	-	X	-

## 2 Entry composition [i](#)

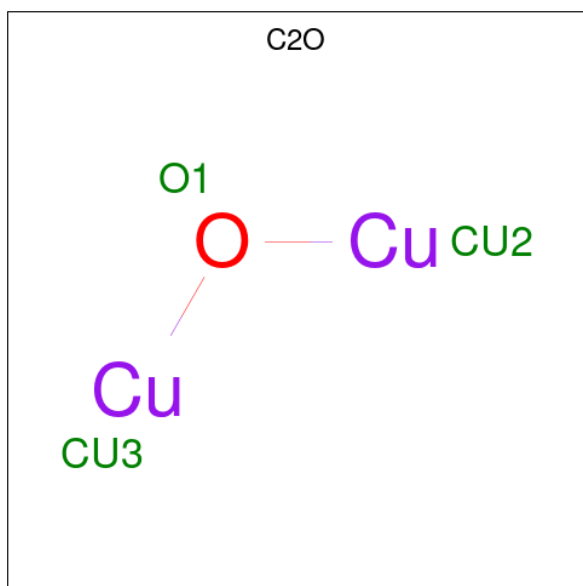
There are 3 unique types of molecules in this entry. The entry contains 3203 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Copper oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	407	3198	2047	562	577	12	0	0	0

- Molecule 2 is CU-O-CU LINKAGE (CCD ID: C2O) (formula:  $\text{Cu}_2\text{O}$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Cu	O		
2	A	1	3	2	1	0	0

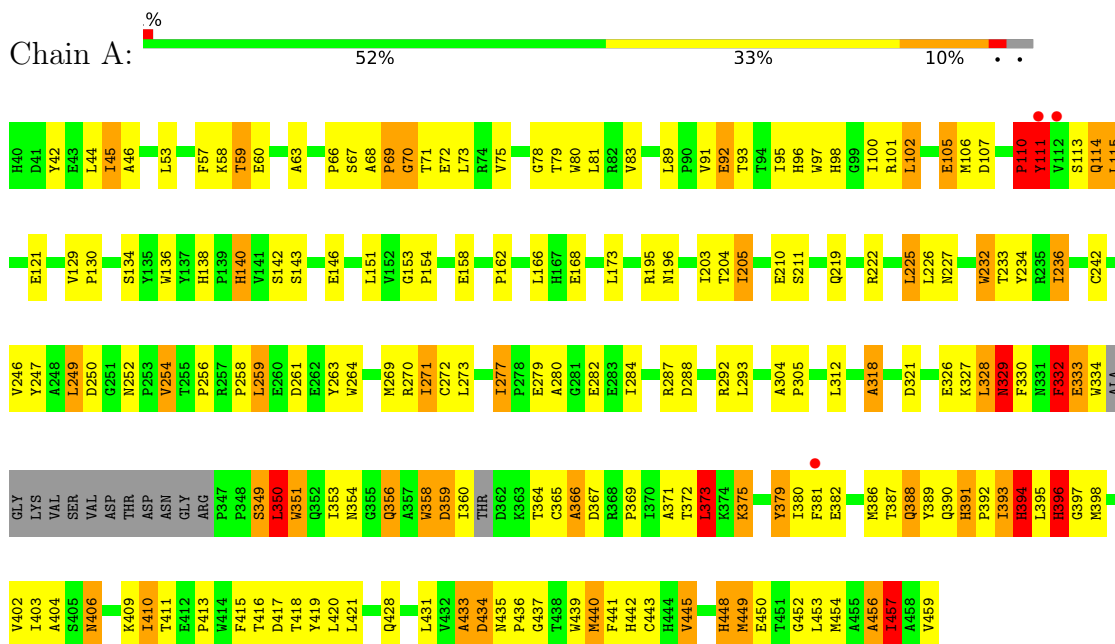
- Molecule 3 is COPPER (II) ION (CCD ID: CU) (formula: Cu).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cu		
3	A	2	2	2	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: Copper oxidase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 62 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	170.35Å 170.35Å 131.00Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.00 – 3.80 30.00 – 3.80	Depositor EDS
% Data completeness (in resolution range)	92.3 (30.00-3.80) 92.4 (30.00-3.80)	Depositor EDS
$R_{merge}$	0.29	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.42 (at 3.75Å)	Xtrriage
Refinement program	REFMAC 5.8.0135	Depositor
R, $R_{free}$	0.258 , 0.274 0.267 , 0.285	Depositor DCC
$R_{free}$ test set	215 reflections (1.86%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	152.0	Xtrriage
Anisotropy	0.040	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 258.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.39$ , $\langle L^2 \rangle = 0.22$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	3203	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	197.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.96% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CU, C2O

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	0.95	9/3287 (0.3%)	1.20	21/4475 (0.5%)

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	5

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	110	PRO	CA-C	7.24	1.61	1.52
1	A	333	GLU	N-CA	6.24	1.54	1.46
1	A	394	HIS	C-O	-6.00	1.16	1.23
1	A	329	ASN	CA-C	5.88	1.60	1.53
1	A	111	TYR	N-CA	5.70	1.53	1.46
1	A	391	HIS	CA-C	5.63	1.57	1.52
1	A	350	LEU	N-CA	5.42	1.53	1.46
1	A	328	LEU	CA-C	5.16	1.58	1.53
1	A	333	GLU	CA-C	5.01	1.59	1.52

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	329	ASN	N-CA-C	10.21	121.72	108.24
1	A	332	PHE	N-CA-C	8.73	129.39	110.80
1	A	350	LEU	N-CA-C	8.67	129.26	110.80
1	A	410	ILE	N-CA-C	8.00	119.04	106.88

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	456	ALA	N-CA-C	6.82	118.56	108.60
1	A	204	THR	N-CA-C	6.75	119.42	108.34
1	A	396	HIS	N-CA-C	-6.68	100.32	110.14
1	A	236	ILE	N-CA-C	6.46	118.33	108.71
1	A	457	ILE	CB-CA-C	-6.13	103.28	111.80
1	A	111	TYR	N-CA-C	5.90	123.36	110.80
1	A	42	TYR	N-CA-C	5.88	118.63	109.52
1	A	196	ASN	N-CA-C	5.83	120.01	113.01
1	A	380	ILE	N-CA-C	5.82	117.06	108.45
1	A	92	GLU	N-CA-C	5.61	117.54	110.24
1	A	327	LYS	N-CA-C	5.42	116.64	108.46
1	A	277	ILE	N-CA-C	-5.39	104.01	109.02
1	A	45	ILE	CB-CA-C	-5.29	103.79	111.68
1	A	421	LEU	N-CA-C	5.21	117.21	109.25
1	A	373	LEU	N-CA-C	5.11	118.08	109.95
1	A	242	CYS	N-CA-C	5.05	116.20	108.42
1	A	379	TYR	N-CA-C	5.02	116.70	109.07

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	110	PRO	Peptide
1	A	279	GLU	Peptide
1	A	321	ASP	Peptide
1	A	349	SER	Peptide
1	A	409	LYS	Peptide

## 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	3198	0	3123	117	0
2	A	3	0	0	2	0
3	A	2	0	0	0	0
All	All	3203	0	3123	117	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 18.

All (117) 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:442:HIS:CE1	1:A:449:MET:SD	2.12	1.43
1:A:442:HIS:HE1	1:A:449:MET:CE	1.53	1.21
1:A:394:HIS:CE1	1:A:395:LEU:C	2.20	1.20
1:A:332:PHE:CB	1:A:386:MET:HB2	1.81	1.10
1:A:442:HIS:CE1	1:A:449:MET:CE	2.35	1.05
1:A:442:HIS:HE1	1:A:449:MET:SD	1.66	1.00
1:A:395:LEU:C	1:A:396:HIS:N	2.23	0.97
1:A:332:PHE:CB	1:A:386:MET:CB	2.45	0.94
1:A:441:PHE:C	1:A:442:HIS:N	2.25	0.94
1:A:396:HIS:N	1:A:396:HIS:CD2	2.32	0.93
1:A:442:HIS:ND1	1:A:449:MET:SD	2.45	0.88
1:A:332:PHE:CB	1:A:386:MET:HG2	2.04	0.86
1:A:332:PHE:CB	1:A:386:MET:CG	2.54	0.85
1:A:394:HIS:ND1	1:A:395:LEU:N	2.28	0.82
1:A:394:HIS:HE1	1:A:395:LEU:C	1.85	0.80
1:A:396:HIS:N	1:A:396:HIS:HD2	1.79	0.79
1:A:442:HIS:HE1	1:A:449:MET:HE1	1.48	0.79
1:A:441:PHE:C	1:A:442:HIS:CA	2.59	0.76
1:A:98:HIS:CD2	1:A:136:TRP:HE1	2.02	0.76
1:A:68:ALA:HA	1:A:69:PRO:C	2.13	0.73
1:A:442:HIS:N	1:A:442:HIS:CD2	2.59	0.70
1:A:205:ILE:HD13	1:A:211:SER:HB2	1.76	0.66
1:A:46:ALA:HB1	1:A:89:LEU:HD11	1.77	0.66
1:A:365:CYS:SG	1:A:366:ALA:N	2.67	0.66
1:A:448:HIS:O	1:A:453:LEU:HB3	1.95	0.65
1:A:68:ALA:HA	1:A:70:GLY:N	2.12	0.65
1:A:396:HIS:CD2	1:A:440:MET:O	2.50	0.64
1:A:396:HIS:CE1	1:A:440:MET:HB3	2.33	0.63
1:A:396:HIS:CE1	1:A:440:MET:CB	2.83	0.61
1:A:442:HIS:CE1	1:A:449:MET:HE2	2.29	0.61
1:A:140:HIS:CE1	1:A:449:MET:SD	2.94	0.60
1:A:110:PRO:HA	1:A:114:GLN:O	2.03	0.59
1:A:98:HIS:CD2	1:A:136:TRP:NE1	2.72	0.58
1:A:392:PRO:CD	1:A:445:VAL:HG23	2.34	0.58
1:A:436:PRO:O	1:A:439:TRP:NE1	2.37	0.57
1:A:394:HIS:CD2	2:A:501:C2O:O1	2.58	0.57
1:A:394:HIS:HD2	2:A:501:C2O:O1	1.88	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:358:TRP:O	1:A:359:ASP:HB2	2.06	0.55
1:A:394:HIS:ND1	1:A:395:LEU:C	2.62	0.55
1:A:101:ARG:HD2	1:A:398:MET:HA	1.89	0.55
1:A:396:HIS:NE2	1:A:440:MET:HB3	2.22	0.55
1:A:396:HIS:CE1	1:A:440:MET:HB2	2.43	0.54
1:A:225:LEU:HB3	1:A:271:ILE:HG23	1.89	0.53
1:A:304:ALA:HB1	1:A:305:PRO:HD2	1.90	0.53
1:A:97:TRP:CD1	1:A:102:LEU:HD21	2.43	0.53
1:A:394:HIS:CG	1:A:395:LEU:N	2.77	0.53
1:A:270:ARG:NH2	1:A:417:ASP:OD2	2.31	0.52
1:A:146:GLU:HB3	1:A:151:LEU:HD12	1.91	0.52
1:A:63:ALA:HB1	1:A:68:ALA:HB2	1.92	0.52
1:A:225:LEU:HD13	1:A:271:ILE:CG2	2.41	0.50
1:A:234:TYR:HB3	1:A:236:ILE:HD11	1.94	0.50
1:A:232:TRP:CZ3	1:A:234:TYR:HA	2.47	0.50
1:A:403:ILE:HD12	1:A:428:GLN:HB3	1.93	0.50
1:A:304:ALA:HB1	1:A:305:PRO:CD	2.43	0.49
1:A:102:LEU:HD22	1:A:106:MET:CB	2.43	0.49
1:A:234:TYR:CB	1:A:236:ILE:HD11	2.43	0.49
1:A:373:LEU:HD21	1:A:379:TYR:CD1	2.48	0.49
1:A:269:MET:C	1:A:270:ARG:HG3	2.38	0.48
1:A:277:ILE:HD12	1:A:284:ILE:HD13	1.96	0.47
1:A:136:TRP:HB2	1:A:153:GLY:O	2.14	0.47
1:A:402:VAL:O	1:A:413:PRO:HB3	2.15	0.47
1:A:406:ASN:HD22	1:A:406:ASN:N	2.13	0.47
1:A:102:LEU:HD22	1:A:106:MET:HB3	1.96	0.47
1:A:168:GLU:CB	1:A:222:ARG:HB3	2.44	0.47
1:A:101:ARG:CD	1:A:398:MET:HA	2.45	0.47
1:A:107:ASP:OD2	1:A:396:HIS:ND1	2.44	0.46
1:A:334:TRP:HA	1:A:351:TRP:O	2.14	0.46
1:A:440:MET:HE2	1:A:456:ALA:HB2	1.97	0.46
1:A:252:ASN:HB3	1:A:415:PHE:HB3	1.97	0.46
1:A:391:HIS:HB3	1:A:443:CYS:SG	2.56	0.46
1:A:396:HIS:C	1:A:397:GLY:HA3	2.40	0.46
1:A:395:LEU:C	1:A:396:HIS:CA	2.89	0.46
1:A:264:TRP:HB2	1:A:420:LEU:HD21	1.97	0.46
1:A:140:HIS:HE1	1:A:449:MET:SD	2.39	0.45
1:A:249:LEU:HD11	1:A:263:TYR:CZ	2.51	0.45
1:A:195:ARG:HG3	1:A:389:TYR:CE1	2.52	0.45
1:A:433:ALA:HB1	1:A:459:VAL:HG13	1.98	0.45
1:A:58:LYS:O	1:A:59:THR:OG1	2.22	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:79:THR:O	1:A:81:LEU:N	2.51	0.44
1:A:373:LEU:HD12	1:A:433:ALA:HB2	1.99	0.44
1:A:396:HIS:HB2	1:A:439:TRP:CE3	2.52	0.44
1:A:371:ALA:HB3	1:A:457:ILE:HG23	2.00	0.43
1:A:391:HIS:CE1	1:A:448:HIS:CE1	3.06	0.43
1:A:98:HIS:CG	1:A:136:TRP:NE1	2.87	0.43
1:A:441:PHE:C	1:A:442:HIS:CB	2.91	0.43
1:A:373:LEU:CD1	1:A:433:ALA:HB2	2.49	0.43
1:A:111:TYR:HA	1:A:115:LEU:HD22	2.00	0.42
1:A:232:TRP:HZ3	1:A:234:TYR:HA	1.84	0.42
1:A:250:ASP:OD2	1:A:416:THR:OG1	2.36	0.42
1:A:75:VAL:CG2	1:A:81:LEU:HD13	2.49	0.42
1:A:318:ALA:HB2	1:A:434:ASP:HB2	2.01	0.42
1:A:72:GLU:HA	1:A:154:PRO:HG2	2.00	0.42
1:A:95:ILE:O	1:A:97:TRP:NE1	2.52	0.42
1:A:98:HIS:CE1	1:A:394:HIS:CD2	3.08	0.42
1:A:329:ASN:HB3	1:A:382:GLU:HB3	2.01	0.42
1:A:140:HIS:CE1	1:A:442:HIS:CE1	3.08	0.41
1:A:371:ALA:C	1:A:457:ILE:HG23	2.45	0.41
1:A:441:PHE:C	1:A:442:HIS:HB3	2.44	0.41
1:A:195:ARG:HG3	1:A:389:TYR:CZ	2.55	0.41
1:A:350:LEU:O	1:A:351:TRP:C	2.63	0.41
1:A:375:LYS:HA	1:A:459:VAL:CG1	2.50	0.41
1:A:404:ALA:HA	1:A:410:ILE:CG1	2.50	0.41
1:A:96:HIS:HB3	1:A:138:HIS:O	2.20	0.41
1:A:227:ASN:OD1	1:A:227:ASN:C	2.63	0.41
1:A:393:ILE:N	1:A:419:TYR:O	2.52	0.41
1:A:392:PRO:HD2	1:A:443:CYS:SG	2.61	0.41
1:A:98:HIS:NE2	1:A:417:ASP:OD1	2.54	0.41
1:A:406:ASN:N	1:A:406:ASN:ND2	2.69	0.41
1:A:205:ILE:HD13	1:A:211:SER:CB	2.47	0.40
1:A:360:ILE:HG23	1:A:364:THR:HG23	2.03	0.40
1:A:353:ILE:HG22	1:A:356:GLN:HA	2.03	0.40
1:A:394:HIS:HA	1:A:418:THR:HA	2.03	0.40
1:A:457:ILE:N	1:A:457:ILE:HD12	2.37	0.40
1:A:110:PRO:C	1:A:111:TYR:CG	2.99	0.40
1:A:246:VAL:HG12	1:A:247:TYR:N	2.37	0.40
1:A:288:ASP:HB2	1:A:293:LEU:HD11	2.04	0.40
1:A:441:PHE:C	1:A:442:HIS:HA	2.44	0.40

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	396/420 (94%)	281 (71%)	71 (18%)	44 (11%)	<b>0</b> <b>5</b>

All (44) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	44	LEU
1	A	59	THR
1	A	100	ILE
1	A	113	SER
1	A	259	LEU
1	A	280	ALA
1	A	318	ALA
1	A	330	PHE
1	A	350	LEU
1	A	358	TRP
1	A	359	ASP
1	A	450	GLU
1	A	70	GLY
1	A	80	TRP
1	A	111	TYR
1	A	142	SER
1	A	254	VAL
1	A	271	ILE
1	A	292	ARG
1	A	333	GLU
1	A	356	GLN
1	A	449	MET
1	A	105	GLU
1	A	351	TRP
1	A	366	ALA
1	A	388	GLN
1	A	452	GLY
1	A	67	SER

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Mol	Chain	Res	Type
1	A	158	GLU
1	A	210	GLU
1	A	349	SER
1	A	411	THR
1	A	433	ALA
1	A	258	PRO
1	A	332	PHE
1	A	369	PRO
1	A	437	GLY
1	A	130	PRO
1	A	445	VAL
1	A	256	PRO
1	A	66	PRO
1	A	78	GLY
1	A	162	PRO
1	A	69	PRO

### 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	336/355 (95%)	275 (82%)	61 (18%)	<b>2</b> <b>12</b>

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	ILE
1	A	53	LEU
1	A	57	PHE
1	A	60	GLU
1	A	71	THR
1	A	73	LEU
1	A	83	VAL
1	A	91	VAL
1	A	92	GLU
1	A	93	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	102	LEU
1	A	105	GLU
1	A	114	GLN
1	A	115	LEU
1	A	121	GLU
1	A	129	VAL
1	A	134	SER
1	A	140	HIS
1	A	143	SER
1	A	166	LEU
1	A	173	LEU
1	A	203	ILE
1	A	205	ILE
1	A	219	GLN
1	A	225	LEU
1	A	226	LEU
1	A	232	TRP
1	A	233	THR
1	A	249	LEU
1	A	254	VAL
1	A	259	LEU
1	A	261	ASP
1	A	272	CYS
1	A	273	LEU
1	A	282	GLU
1	A	287	ARG
1	A	312	LEU
1	A	326	GLU
1	A	328	LEU
1	A	329	ASN
1	A	350	LEU
1	A	354	ASN
1	A	367	ASP
1	A	372	THR
1	A	373	LEU
1	A	375	LYS
1	A	381	PHE
1	A	387	THR
1	A	388	GLN
1	A	390	GLN
1	A	393	ILE
1	A	394	HIS

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Mol	Chain	Res	Type
1	A	396	HIS
1	A	406	ASN
1	A	431	LEU
1	A	434	ASP
1	A	435	ASN
1	A	440	MET
1	A	448	HIS
1	A	454	MET
1	A	457	ILE

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	98	HIS
1	A	140	HIS
1	A	206	ASN
1	A	219	GLN
1	A	252	ASN
1	A	354	ASN
1	A	390	GLN
1	A	394	HIS
1	A	406	ASN
1	A	442	HIS
1	A	444	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry

Of 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 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	C2O	A	501	1	0,2,2	-	-	-		

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

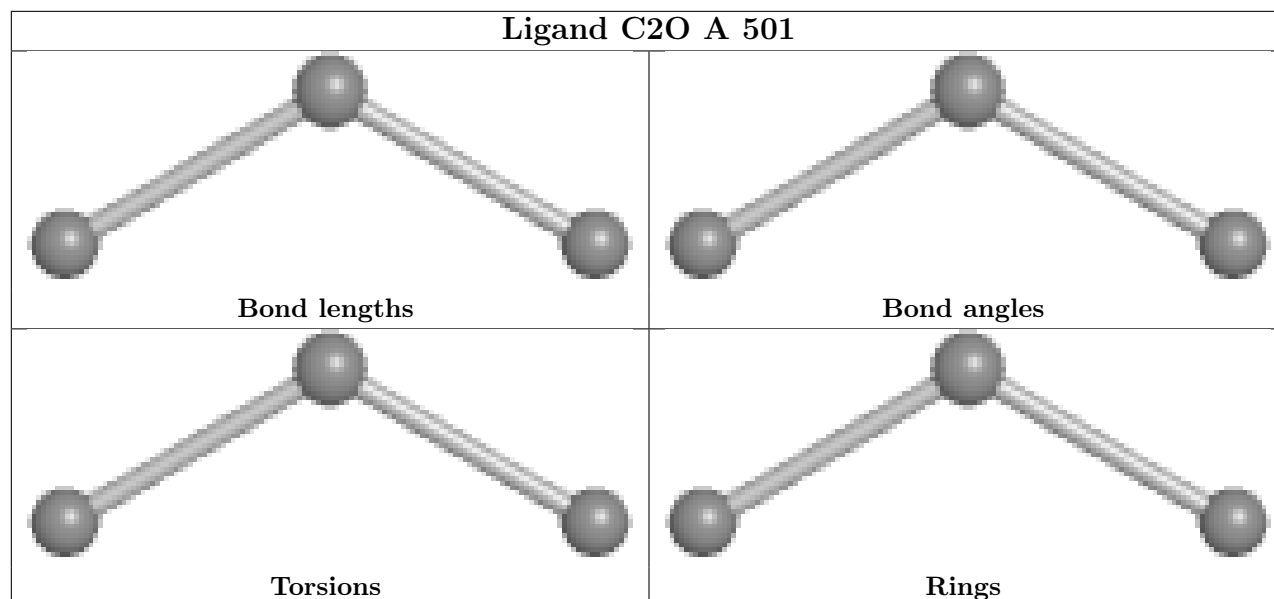
There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	C2O	2	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 than 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.



## 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
1	A	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	396:HIS	C	397:GLY	N	2.83
1	A	441:PHE	C	442:HIS	N	2.25
1	A	395:LEU	C	396:HIS	N	2.23

## 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	407/420 (96%)	-0.50	3 (0%) 84 65	117, 196, 262, 312	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	381	PHE	2.8
1	A	112	VAL	2.5
1	A	111	TYR	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.

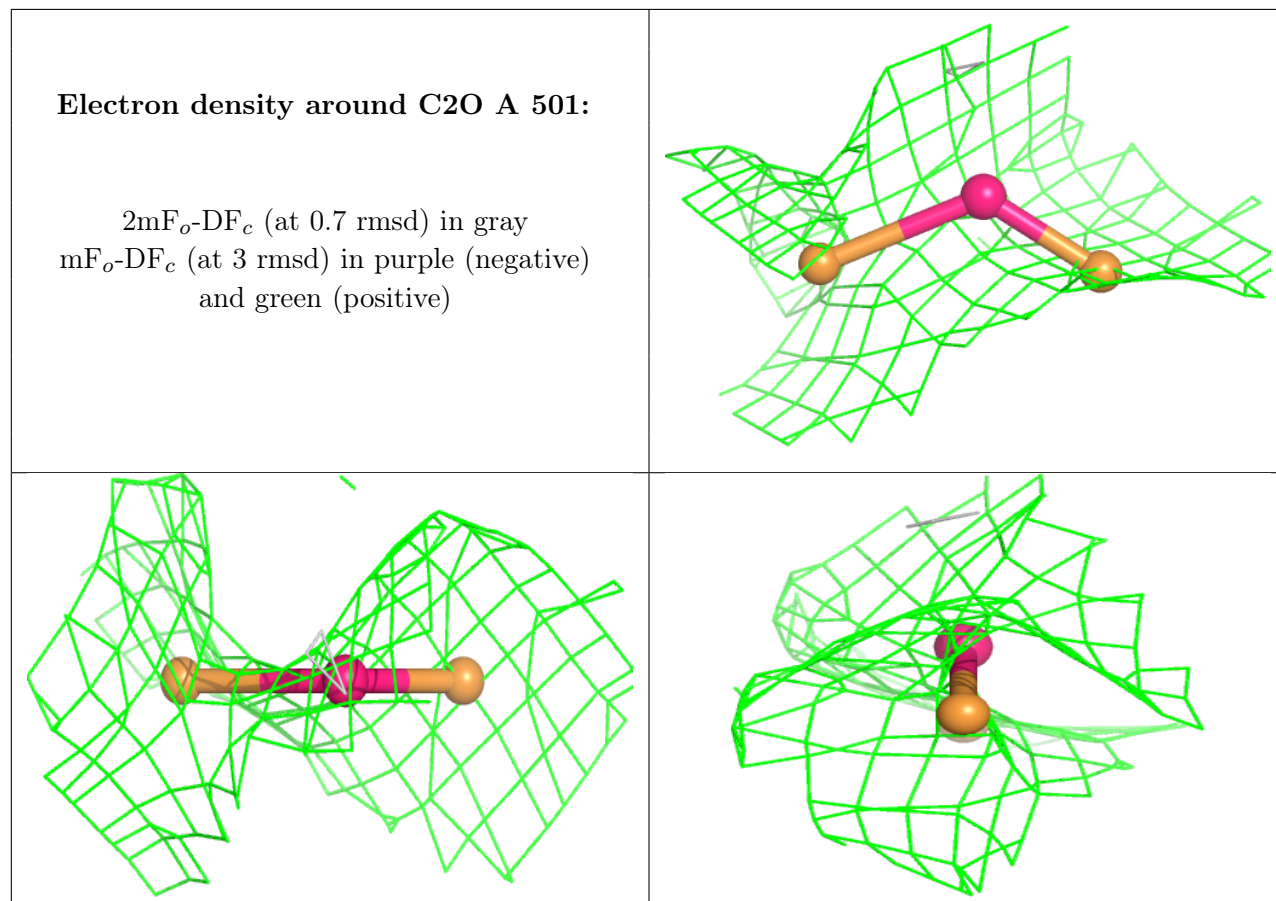
### 6.4 Ligands [i](#)

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, 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
2	C2O	A	501	3/3	0.99	0.09	82,82,85,93	3
3	CU	A	502	1/1	0.99	0.07	109,109,109,109	1
3	CU	A	503	1/1	1.00	0.02	113,113,113,113	1

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.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.