Full wwPDB X-ray Structure Validation Report (i)

Aug 24, 2026 – 06:14 am BST

PDB ID	:	7AQA / pdb_00007aqa
Title	:	Pseudomonas stutzeri nitrous oxide reductase mutant, H382A
Authors	:	Zhang, L.; Bill, E.; Kroneck, P.M.H.; Einsle, O.
Deposited on	:	2020-10-20
Resolution	:	1.50 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 (i) 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 (i)) were used in the production of this report:

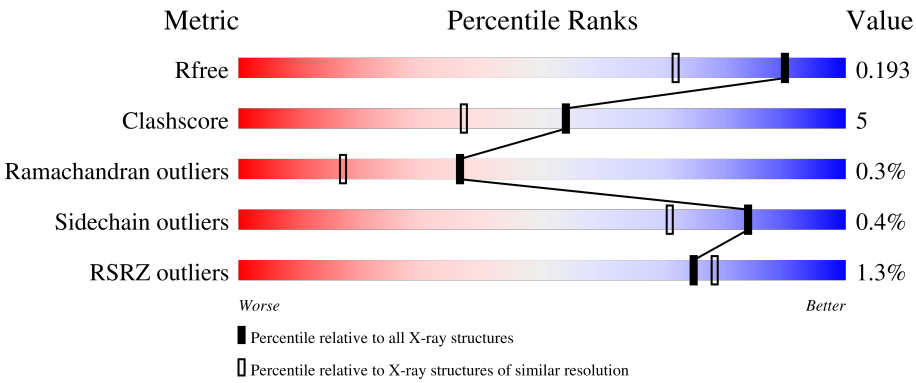
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

1 Overall quality at a glance (i)

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

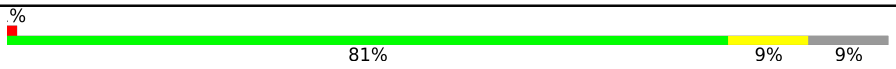
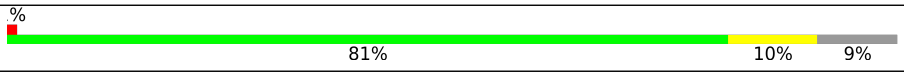
The reported resolution of this entry is 1.50 Å.

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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4037 (1.50-1.50)
Clashscore	190562	4235 (1.50-1.50)
Ramachandran outliers	187476	4153 (1.50-1.50)
Sidechain outliers	187428	4150 (1.50-1.50)
RSRZ outliers	180081	4039 (1.50-1.50)

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	646	
1	B	646	

2 Entry composition (i)

There are 12 unique types of molecules in this entry. The entry contains 10392 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.

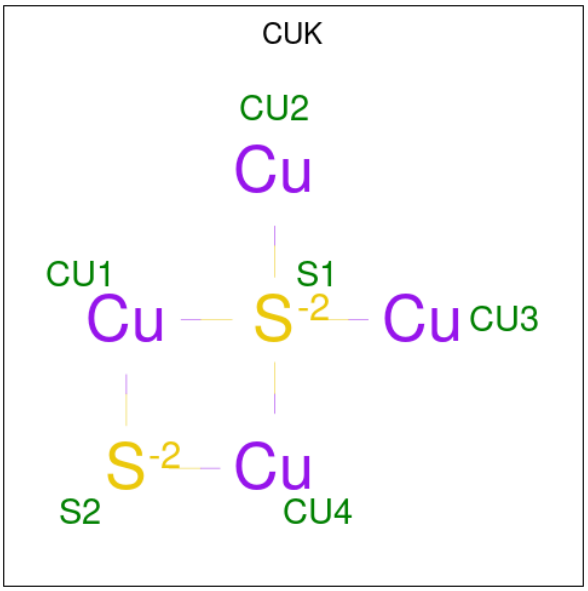
- Molecule 1 is a protein called Nitrous-oxide reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	585	4615	2919	792	872	32	0	4	0
1	B	586	4614	2919	794	869	32	0	1	0

There are 18 discrepancies between the modelled and reference sequences:

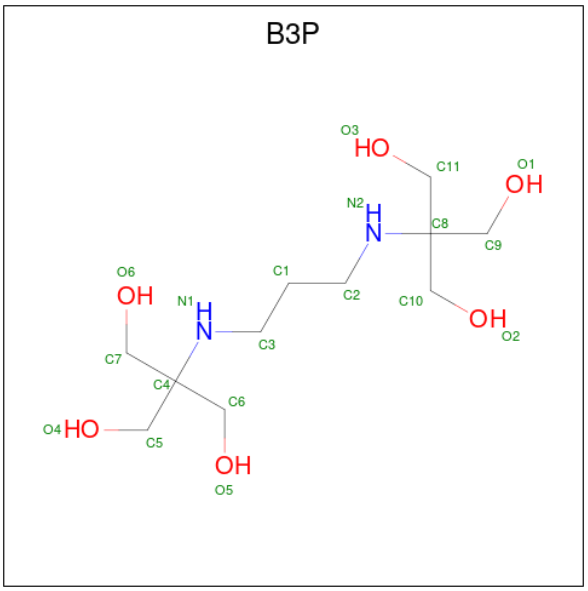
Chain	Residue	Modelled	Actual	Comment	Reference
A	382	ALA	HIS	engineered mutation	UNP P19573
A	639	TRP	-	expression tag	UNP P19573
A	640	SER	-	expression tag	UNP P19573
A	641	HIS	-	expression tag	UNP P19573
A	642	PRO	-	expression tag	UNP P19573
A	643	GLN	-	expression tag	UNP P19573
A	644	PHE	-	expression tag	UNP P19573
A	645	GLU	-	expression tag	UNP P19573
A	646	LYS	-	expression tag	UNP P19573
B	382	ALA	HIS	engineered mutation	UNP P19573
B	639	TRP	-	expression tag	UNP P19573
B	640	SER	-	expression tag	UNP P19573
B	641	HIS	-	expression tag	UNP P19573
B	642	PRO	-	expression tag	UNP P19573
B	643	GLN	-	expression tag	UNP P19573
B	644	PHE	-	expression tag	UNP P19573
B	645	GLU	-	expression tag	UNP P19573
B	646	LYS	-	expression tag	UNP P19573

- Molecule 2 is [4Cu:2S] cluster (CCD ID: CUK) (formula: Cu_4S_2) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Cu	S		
2	A	1	6	4	2	0	0

- Molecule 3 is 2-[3-(2-HYDROXY-1,1-DIHYDROXYMETHYL-ETHYLAMINO)-PROPYLAMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: B3P) (formula: $C_{11}H_{26}N_2O_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	19	11	2	6	0	0
			Total	C	N	O		
3	B	1	19	11	2	6	0	0

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

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

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
5	A	1	1	1	0	0
5	B	1	1	1	0	0

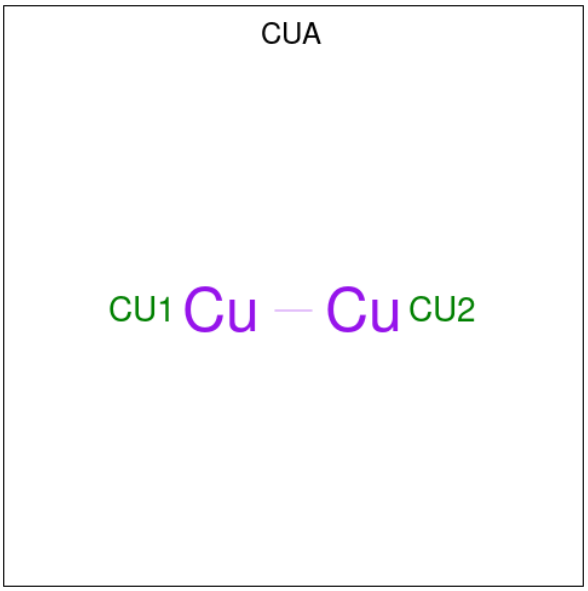
- Molecule 6 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	K		
6	A	1	1	1	0	0
6	B	1	1	1	0	0

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

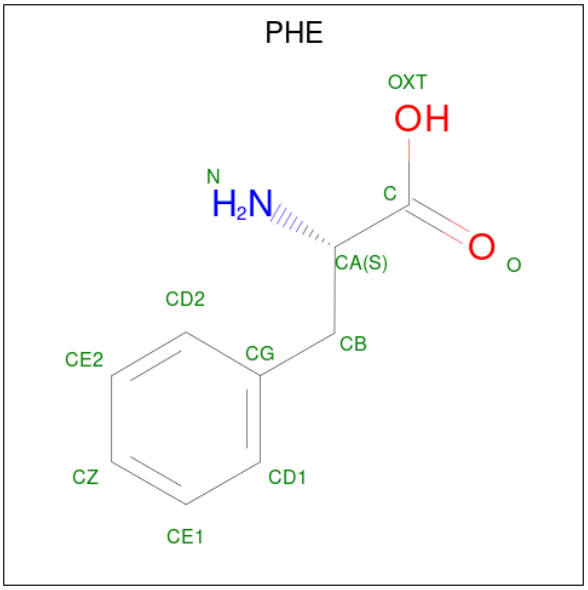
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
7	A	2	2	2	0	0
7	B	1	1	1	0	0

- Molecule 8 is DINUCLEAR COPPER ION (CCD ID: CUA) (formula: Cu_2).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total Cu 2 2	0	0
8	B	1	Total Cu 2 2	0	0

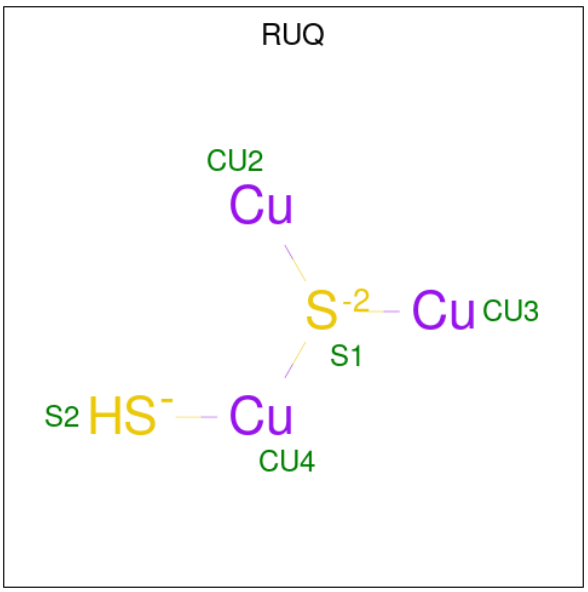
- Molecule 9 is PHENYLALANINE (CCD ID: PHE) (formula: $C_9H_{11}NO_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	B	1	Total C N O 11 9 1 1	0	0

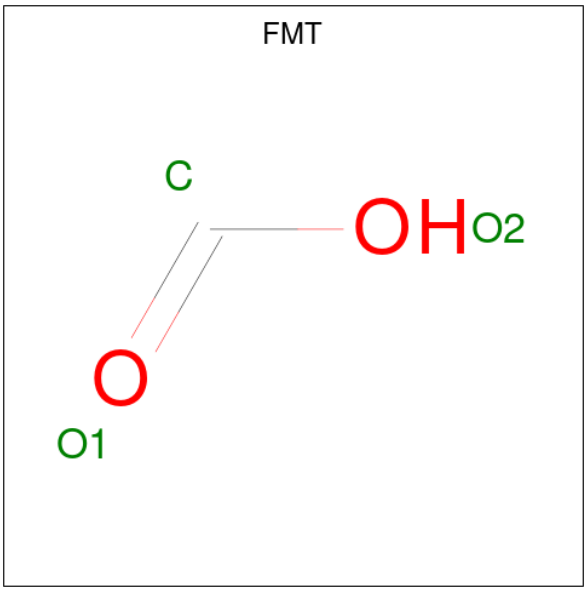
- Molecule 10 is dicupriosulfonio(sulfanyl)copper (CCD ID: RUQ) (formula: Cu_3HS_2) (labeled

as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	Cu	S		
10	B	1	5	3	2	0	0

- Molecule 11 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
11	B	1	3	1	2	0	0

- Molecule 12 is water.

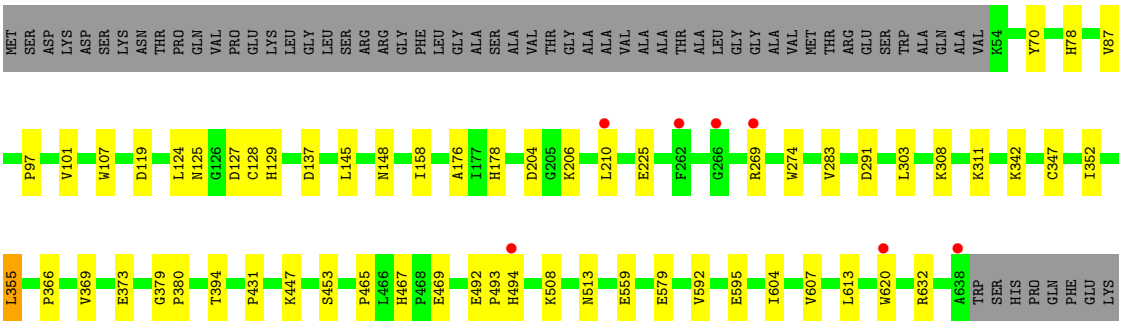
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
12	A	597	597	597	0	0
			Total	O		
12	B	491	491	491	0	0

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.

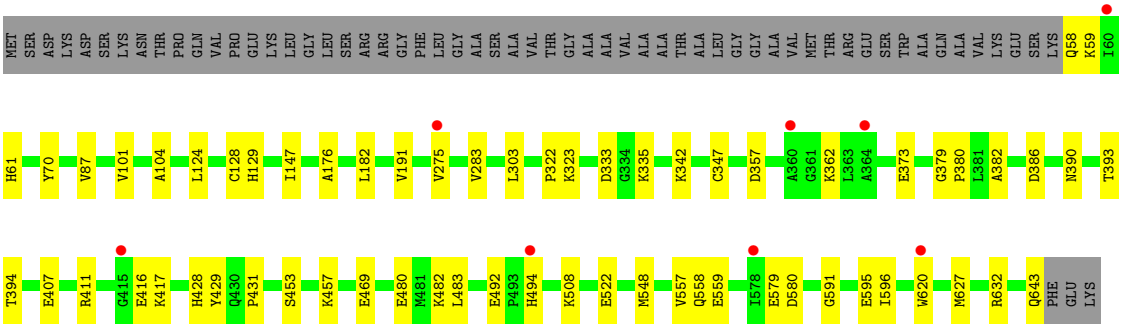
• Molecule 1: Nitrous-oxide reductase

Chain A:



• Molecule 1: Nitrous-oxide reductase

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	68.82Å 76.83Å 108.51Å 90.00° 93.47° 90.00°	Depositor
Resolution (Å)	62.67 – 1.50 62.67 – 1.50	Depositor EDS
% Data completeness (in resolution range)	63.4 (62.67-1.50) 63.6 (62.67-1.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.21 (at 1.50Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.156 , 0.194 0.157 , 0.193	Depositor DCC
R_{free} test set	5646 reflections (3.11%)	wwPDB-VP
Wilson B-factor (Å^2)	21.0	Xtriage
Anisotropy	0.066	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 45.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	10392	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.58% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: B3P, RUQ, CL, CUK, NA, CUA, CA, FMT, K

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	0.46	1/4738 (0.0%)	0.62	2/6413 (0.0%)
1	B	0.42	0/4732	0.59	0/6411
All	All	0.44	1/9470 (0.0%)	0.61	2/12824 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	274	TRP	C-O	-8.03	1.15	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	493	PRO	CA-C-N	-7.07	109.31	122.60
1	A	493	PRO	C-N-CA	-7.07	109.31	122.60

There are no chirality outliers.

There are no planarity outliers.

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	4615	0	4500	46	0
1	B	4614	0	4478	49	0
2	A	6	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	19	0	26	0	0
3	B	19	0	26	0	0
4	A	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
7	A	2	0	0	1	0
7	B	1	0	0	0	0
8	A	2	0	0	0	0
8	B	2	0	0	0	0
9	B	11	0	8	1	0
10	B	5	0	0	0	0
11	B	3	0	1	0	0
12	A	597	0	0	11	1
12	B	491	0	0	7	1
All	All	10392	0	9039	89	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (89) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:469[A]:GLU:HG3	1:A:492:GLU:HA	1.59	0.84
7:A:707:CL:CL	12:A:1245:HOH:O	2.35	0.81
1:B:469[A]:GLU:HG3	1:B:492:GLU:HA	1.64	0.79
1:A:225:GLU:OE2	12:A:801:HOH:O	2.01	0.78
1:A:206:LYS:NZ	12:A:802:HOH:O	2.18	0.76
1:B:283:VAL:HG13	1:B:303:LEU:HD13	1.68	0.76
1:B:508:LYS:HG2	1:B:579:GLU:CD	2.13	0.73
1:B:357:ASP:CG	1:B:362:LYS:HE2	2.14	0.73
1:B:558:GLN:OE1	12:B:801:HOH:O	2.10	0.68
1:A:204:ASP:OD2	1:A:206:LYS:NZ	2.26	0.66
1:A:595:GLU:HB2	1:A:620:TRP:CH2	2.31	0.65
1:B:453:SER:O	1:B:469[B]:GLU:HG3	1.96	0.65
1:A:467:HIS:HE1	1:B:508:LYS:HD2	1.62	0.64
1:A:467:HIS:CE1	1:B:508:LYS:HD2	2.34	0.62
1:A:210:LEU:HD13	12:A:1115:HOH:O	2.00	0.61
1:A:283:VAL:HG13	1:A:303:LEU:HD13	1.82	0.61
1:A:178:HIS:CE1	1:B:627:MET:HE1	2.39	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:VAL:HG21	1:A:124:LEU:HD22	1.86	0.57
1:A:129:HIS:CE1	1:A:494:HIS:CE1	2.92	0.57
1:B:59:LYS:HG2	12:B:864:HOH:O	2.05	0.56
1:B:480:GLU:OE2	1:B:482:LYS:HE3	2.06	0.56
1:B:411:ARG:NH2	1:B:416:GLU:OE2	2.37	0.55
1:A:352:ILE:HA	1:A:355:LEU:HD22	1.89	0.55
1:B:129:HIS:CE1	1:B:494:HIS:CE1	2.95	0.54
1:B:357:ASP:OD1	1:B:362:LYS:HE2	2.07	0.54
1:B:595:GLU:HB2	1:B:620:TRP:CH2	2.44	0.52
1:A:308:LYS:O	1:A:311:LYS:HE3	2.10	0.52
1:B:129:HIS:ND1	1:B:494:HIS:CE1	2.77	0.51
1:A:632:ARG:HD3	12:A:1018:HOH:O	2.10	0.51
1:B:508:LYS:HG2	1:B:579:GLU:OE1	2.11	0.51
1:B:522:GLU:OE1	12:B:802:HOH:O	2.19	0.51
1:B:70:TYR:HB2	1:B:87:VAL:HB	1.93	0.51
1:A:269:ARG:O	1:A:269:ARG:NH2	2.45	0.50
1:A:129:HIS:HD2	1:A:148:ASN:HD21	1.60	0.49
1:A:178:HIS:CE1	1:B:627:MET:CE	2.95	0.49
1:B:58:GLN:N	12:B:814:HOH:O	2.44	0.49
1:A:467:HIS:HB2	1:B:580:ASP:OD1	2.13	0.48
1:A:494:HIS:N	1:A:494:HIS:CD2	2.81	0.48
1:A:492:GLU:O	1:A:494:HIS:CD2	2.66	0.48
1:B:431:PRO:HA	1:B:453:SER:HA	1.96	0.48
1:A:70:TYR:HB2	1:A:87:VAL:HB	1.95	0.47
1:B:333:ASP:CG	1:B:335:LYS:HG3	2.38	0.47
1:A:129:HIS:CD2	1:A:148:ASN:HD21	2.32	0.47
1:A:128:CYS:HB3	1:A:148:ASN:O	2.15	0.47
1:B:379:GLY:N	1:B:380:PRO:HD3	2.30	0.47
1:A:129:HIS:ND1	1:A:494:HIS:CE1	2.82	0.46
1:A:145:LEU:HD22	1:A:158:ILE:HD12	1.98	0.46
1:A:431:PRO:HA	1:A:453:SER:HA	1.97	0.46
1:A:178:HIS:NE2	1:B:627:MET:HE1	2.31	0.46
1:B:182:LEU:HD22	1:B:191:VAL:HG22	1.98	0.46
1:A:119:ASP:HB2	12:A:1264:HOH:O	2.15	0.45
1:B:104:ALA:O	1:B:620:TRP:CH2	2.69	0.45
1:A:347:CYS:O	1:A:373:GLU:HA	2.17	0.45
1:B:380:PRO:HA	1:B:394:THR:O	2.16	0.45
1:A:137[A]:ASP:OD1	12:A:803:HOH:O	2.21	0.45
1:B:59:LYS:HD2	1:B:61:HIS:H	1.81	0.45
1:A:592:VAL:HG13	1:A:604:ILE:HD13	1.99	0.45
1:B:417:LYS:HD3	1:B:417:LYS:C	2.41	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:291:ASP:HB2	12:A:1191:HOH:O	2.17	0.45
1:B:559:GLU:HA	1:B:632:ARG:O	2.17	0.45
1:A:78:HIS:HA	1:A:127:ASP:HA	1.98	0.44
1:B:417:LYS:HA	1:B:417:LYS:HE2	2.00	0.44
1:B:128:CYS:HB2	1:B:147:ILE:HG12	2.00	0.44
1:A:613:LEU:HD11	1:A:632:ARG:HG2	1.99	0.44
1:B:322:PRO:HA	1:B:323:LYS:HA	1.84	0.44
1:B:469[A]:GLU:HG3	1:B:492:GLU:CA	2.43	0.44
1:B:428:HIS:HA	1:B:429:TYR:CG	2.53	0.44
1:A:380:PRO:HA	1:A:394:THR:O	2.18	0.43
1:B:101:VAL:HG21	1:B:124:LEU:HD22	2.01	0.43
1:A:97:PRO:HB2	1:A:107:TRP:CG	2.53	0.43
1:A:379:GLY:N	1:A:380:PRO:HD3	2.34	0.43
1:A:513:ASN:HB2	12:A:809:HOH:O	2.19	0.42
1:A:559:GLU:HA	1:A:632:ARG:O	2.19	0.42
1:B:643:GLN:C	9:B:701:PHE:HA	2.45	0.42
1:A:465:PRO:HA	12:B:840:HOH:O	2.19	0.42
1:B:58:GLN:N	12:B:830:HOH:O	2.52	0.42
1:A:125:ASN:OD1	1:B:591:GLY:HA2	2.20	0.42
1:A:366:PRO:O	1:A:369:VAL:HG22	2.20	0.42
1:B:595:GLU:HG2	1:B:596:ILE:N	2.35	0.41
1:B:429:TYR:CD2	1:B:457:LYS:HD2	2.56	0.41
1:A:447[A]:LYS:NZ	12:A:829:HOH:O	2.51	0.41
1:A:206:LYS:HB2	1:A:206:LYS:HE2	1.86	0.41
1:B:386:ASP:OD2	1:B:390:ASN:HB2	2.20	0.41
1:B:347:CYS:O	1:B:373:GLU:HA	2.21	0.40
1:B:382:ALA:O	1:B:393:THR:HA	2.21	0.40
1:A:508:LYS:HD3	1:A:579:GLU:OE2	2.21	0.40
1:B:407:GLU:HG2	12:B:870:HOH:O	2.21	0.40
12:A:1034:HOH:O	1:B:508:LYS:HE3	2.21	0.40
1:B:548:MET:HE2	1:B:557:VAL:HB	2.04	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:A:1317:HOH:O	12:B:1266:HOH:O[1_545]	2.16	0.04

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	587/646 (91%)	565 (96%)	20 (3%)	2 (0%)	36	17
1	B	585/646 (91%)	563 (96%)	20 (3%)	2 (0%)	36	17
All	All	1172/1292 (91%)	1128 (96%)	40 (3%)	4 (0%)	36	17

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	342	LYS
1	A	342	LYS
1	A	176	ALA
1	B	176	ALA

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	503/544 (92%)	501 (100%)	2 (0%)	84	71
1	B	501/544 (92%)	499 (100%)	2 (0%)	84	71
All	All	1004/1088 (92%)	1000 (100%)	4 (0%)	84	71

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	355	LEU
1	A	607	VAL

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Mol	Chain	Res	Type
1	B	275	VAL
1	B	483	LEU

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	HIS
1	A	129	HIS
1	A	467	HIS
1	A	494	HIS
1	A	599	GLN
1	B	115	HIS
1	B	214	ASN
1	B	232	GLN
1	B	281	HIS
1	B	400	GLN

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 (i)

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 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	$\#\|Z\| > 2$
3	B3P	B	703	-	18,18,18	0.98	0	21,23,23	1.41	4 (19%)
8	CUA	B	708	1	0,1,1	-	-	-		
9	PHE	B	701	-	10,11,12	0.71	0	10,13,15	0.19	0
3	B3P	A	702	-	18,18,18	0.84	1 (5%)	21,23,23	0.92	0
2	CUK	A	701	1	0,6,6	-	-	-		
8	CUA	A	708	1	0,1,1	-	-	-		
11	FMT	B	706	-	2,2,2	0.62	0	1,1,1	0.02	0
10	RUQ	B	702	1	0,4,4	-	-	-		

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
3	B3P	B	703	-	-	7/28/28/28	-
2	CUK	A	701	1	-	-	0/1/1/1
9	PHE	B	701	-	-	0/5/6/8	0/1/1/1
3	B3P	A	702	-	-	4/28/28/28	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	702	B3P	C3-N1	2.12	1.49	1.46

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	703	B3P	O3-C11-C8	-2.94	105.68	111.63
3	B	703	B3P	O2-C10-C8	-2.38	106.81	111.63
3	B	703	B3P	C2-N2-C8	-2.21	112.94	116.08
3	B	703	B3P	O1-C9-C8	2.16	116.00	111.63

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	702	B3P	C5-C4-N1-C3
3	A	702	B3P	C6-C4-N1-C3
3	B	703	B3P	C11-C8-C9-O1

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Mol	Chain	Res	Type	Atoms
3	B	703	B3P	O3-C11-C8-N2
3	B	703	B3P	O3-C11-C8-C9
3	B	703	B3P	O3-C11-C8-C10
3	A	702	B3P	C7-C4-N1-C3
3	B	703	B3P	C10-C8-C9-O1
3	B	703	B3P	N2-C8-C9-O1
3	A	702	B3P	C11-C8-N2-C2
3	B	703	B3P	C5-C4-N1-C3

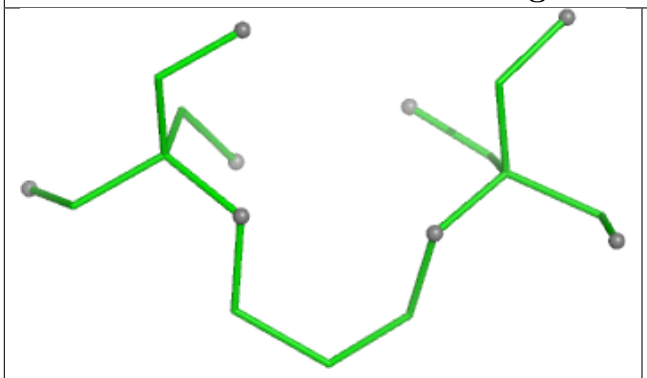
There are no ring outliers.

1 monomer is involved in 1 short contact:

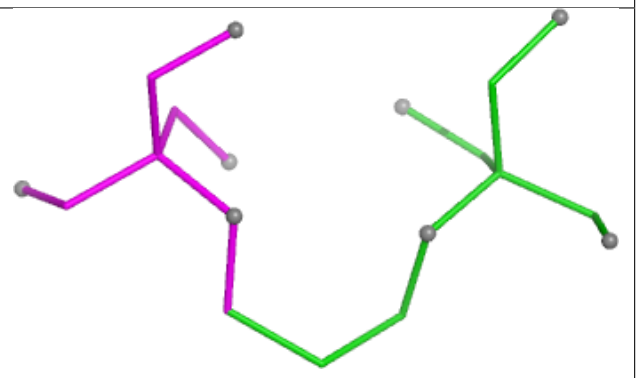
Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	B	701	PHE	1	0

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.

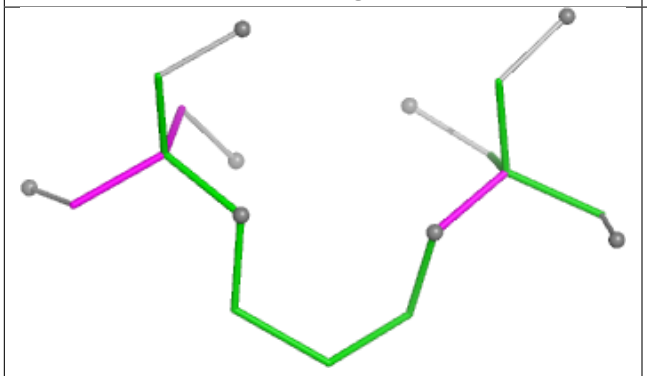
Ligand B3P B 703



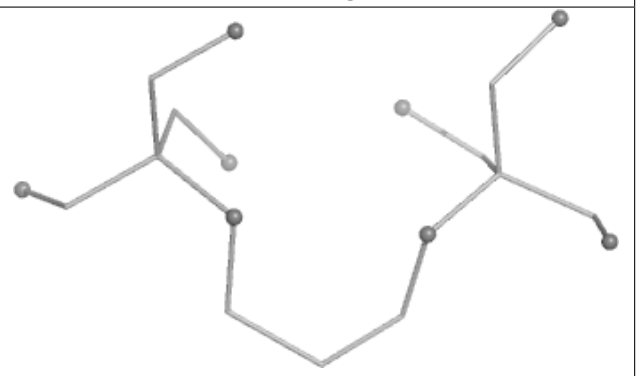
Bond lengths



Bond angles

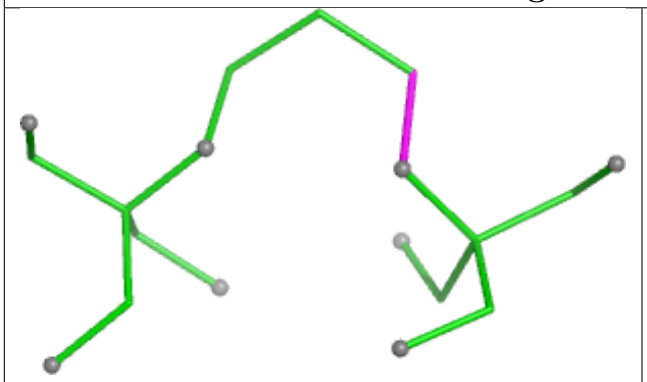


Torsions

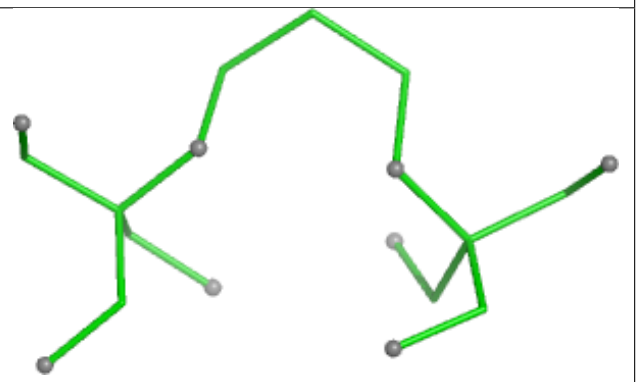


Rings

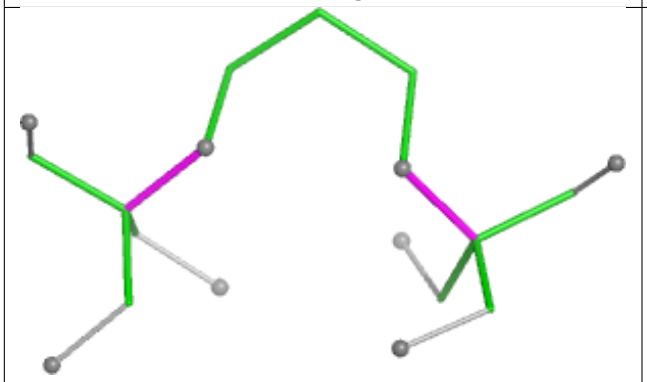
Ligand B3P A 702



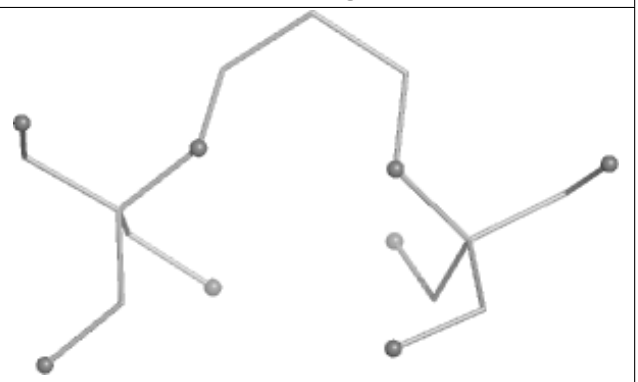
Bond lengths



Bond angles

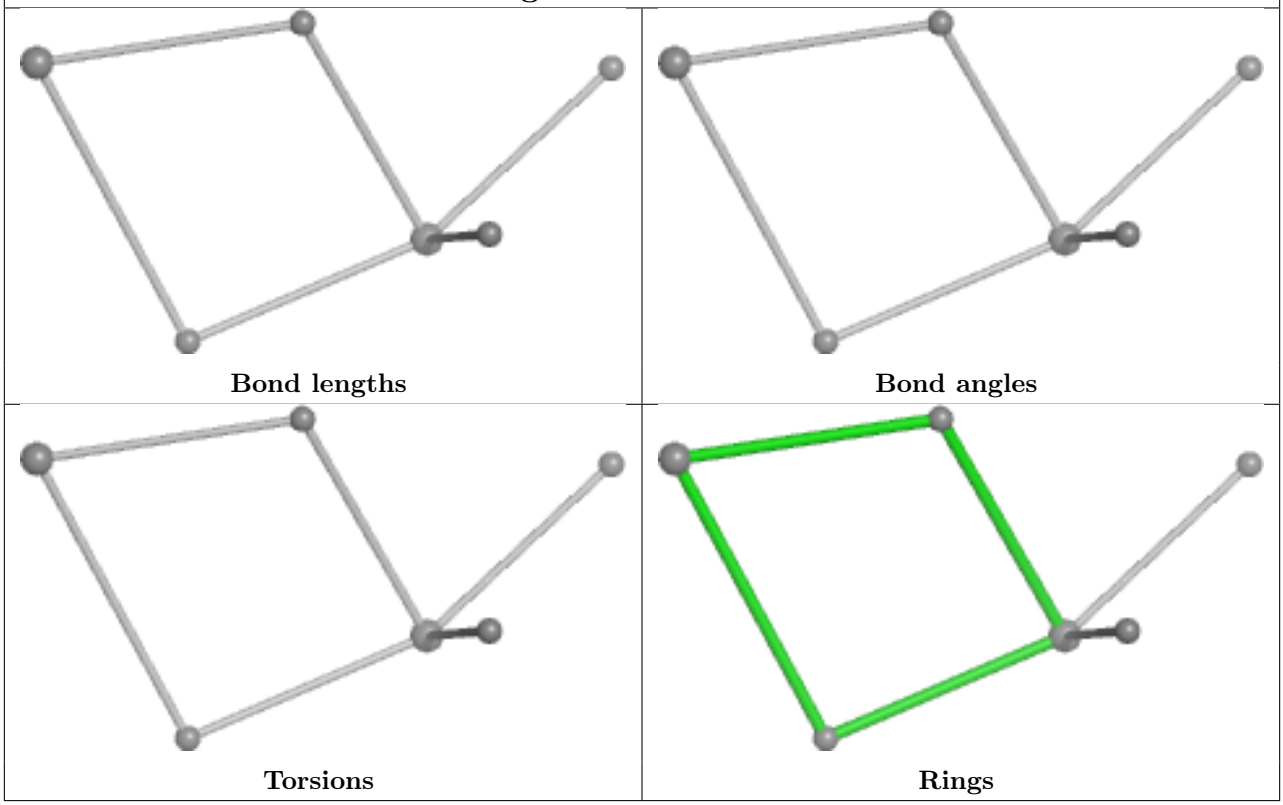


Torsions

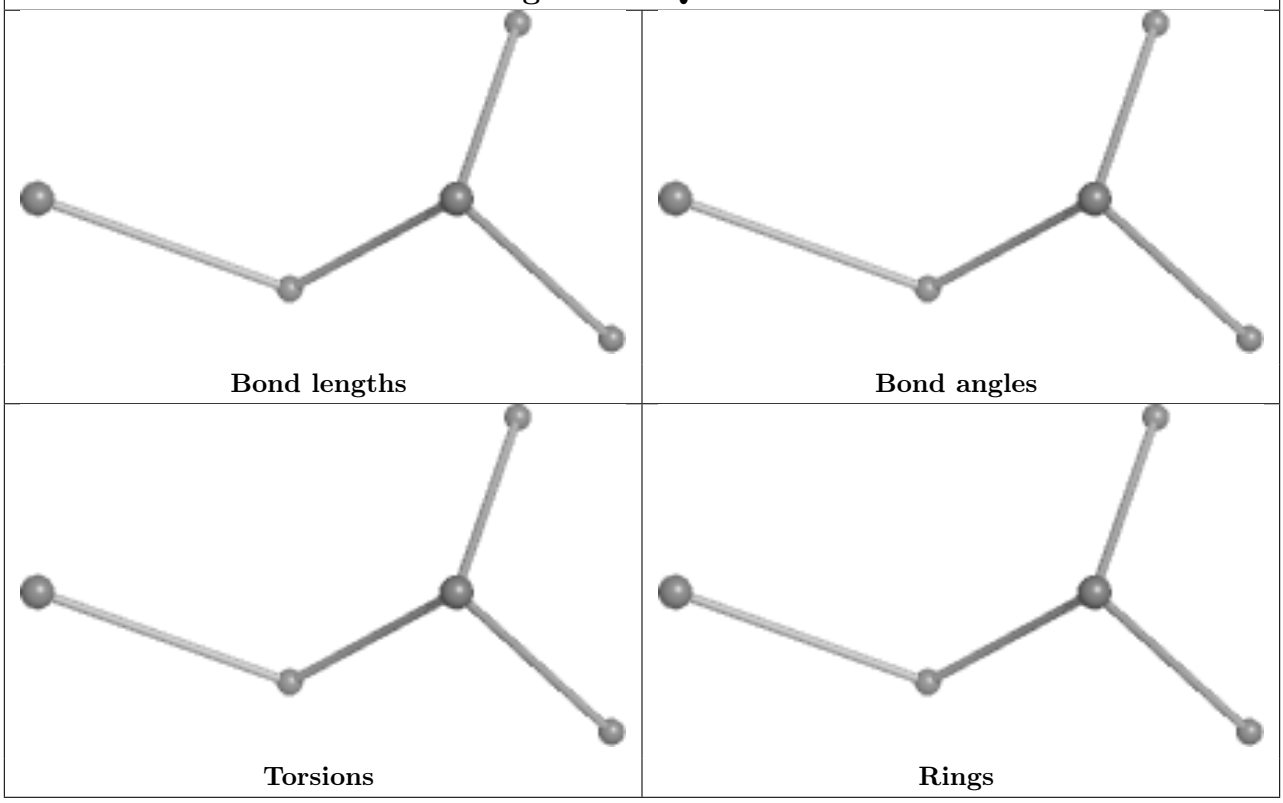


Rings

Ligand CUK A 701



Ligand RUQ B 702



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 (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, 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	585/646 (90%)	-0.23	7 (1%)	76	80	11, 23, 44, 65	4 (0%)
1	B	586/646 (90%)	-0.01	8 (1%)	73	77	14, 29, 52, 74	1 (0%)
All	All	1171/1292 (90%)	-0.12	15 (1%)	75	78	11, 26, 48, 74	5 (0%)

All (15) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	638	ALA	3.8
1	A	494	HIS	3.5
1	A	262	PHE	2.6
1	A	269	ARG	2.4
1	B	360	ALA	2.4
1	B	275	VAL	2.3
1	A	266	GLY	2.3
1	A	210	LEU	2.3
1	B	60	ILE	2.3
1	A	620	TRP	2.3
1	B	364	ALA	2.2
1	B	578	ILE	2.2
1	B	494	HIS	2.1
1	B	415	GLY	2.1
1	B	620	TRP	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)

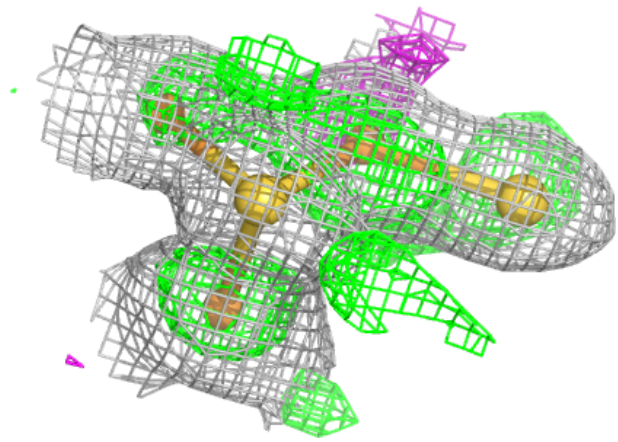
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

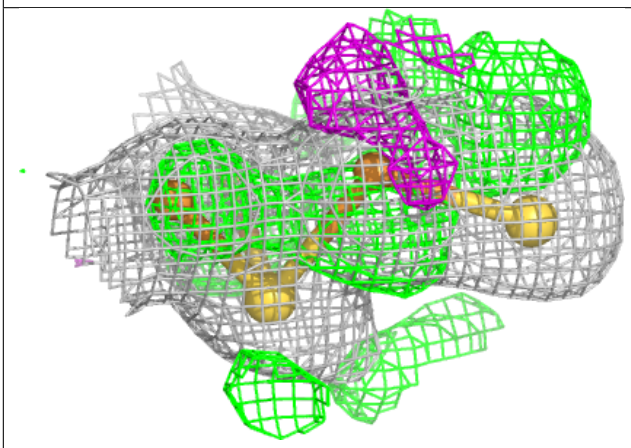
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
9	PHE	B	701	11/12	0.79	0.13	37,44,54,60	0
11	FMT	B	706	3/3	0.83	0.20	35,35,49,50	0
10	RUQ	B	702	5/5	0.90	0.12	24,26,31,39	5
6	K	A	705	1/1	0.91	0.09	21,21,21,21	1
3	B3P	B	703	19/19	0.92	0.09	22,28,34,48	0
8	CUA	B	708	2/2	0.93	0.11	32,32,32,35	1
3	B3P	A	702	19/19	0.94	0.08	24,28,32,35	0
8	CUA	A	708	2/2	0.94	0.08	31,31,31,33	0
2	CUK	A	701	6/6	0.94	0.12	17,26,29,67	6
7	CL	A	707	1/1	0.95	0.07	31,31,31,31	1
5	CA	B	704	1/1	0.97	0.04	19,19,19,19	1
4	NA	A	703	1/1	0.97	0.05	19,19,19,19	1
6	K	B	705	1/1	0.97	0.04	18,18,18,18	1
7	CL	B	707	1/1	0.98	0.04	24,24,24,24	1
7	CL	A	706	1/1	0.98	0.04	24,24,24,24	1
5	CA	A	704	1/1	0.99	0.03	18,18,18,18	1

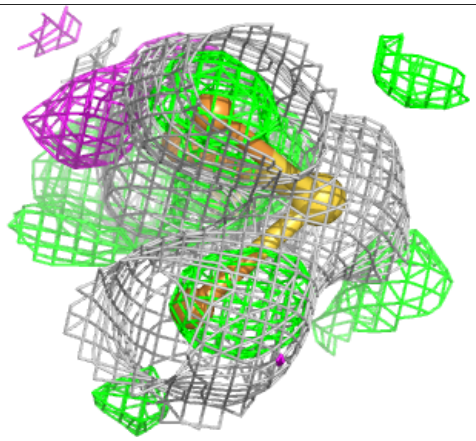
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around RUQ B 702:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

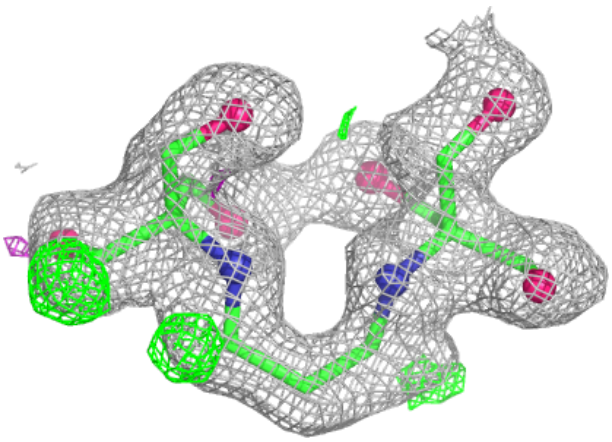


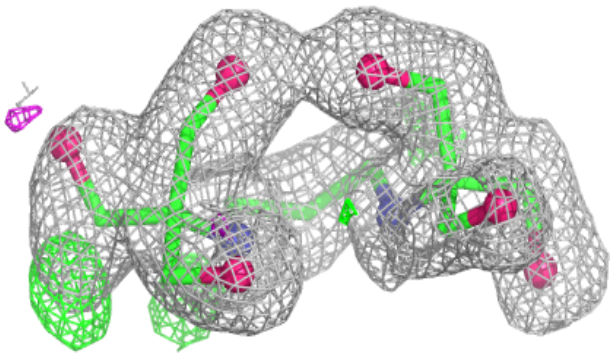


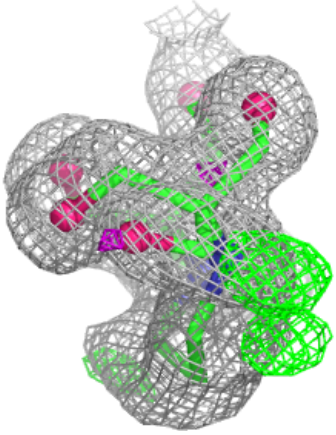


Electron density around B3P B 703:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)







Electron density around B3P A 702:

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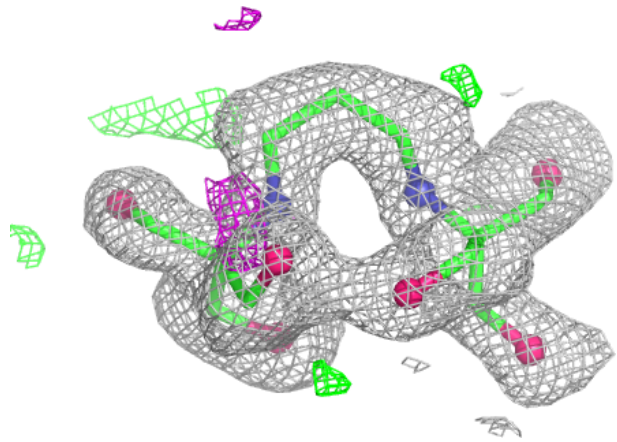
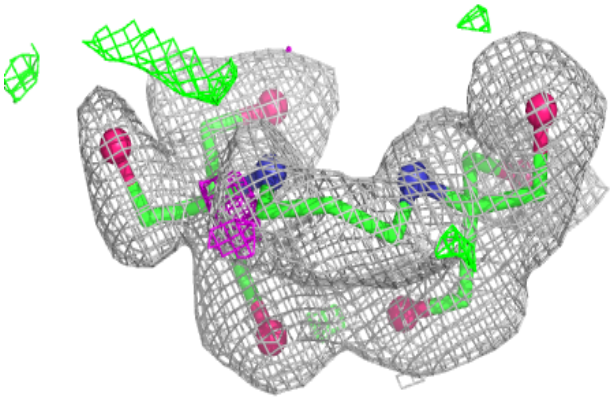
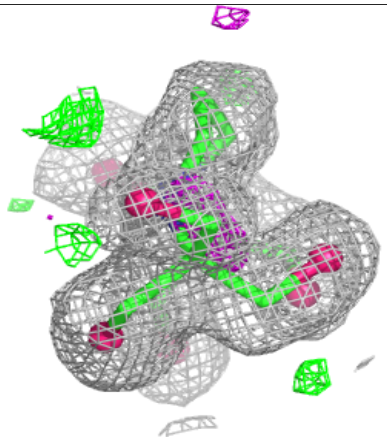
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)







Electron density around CUK A 701:

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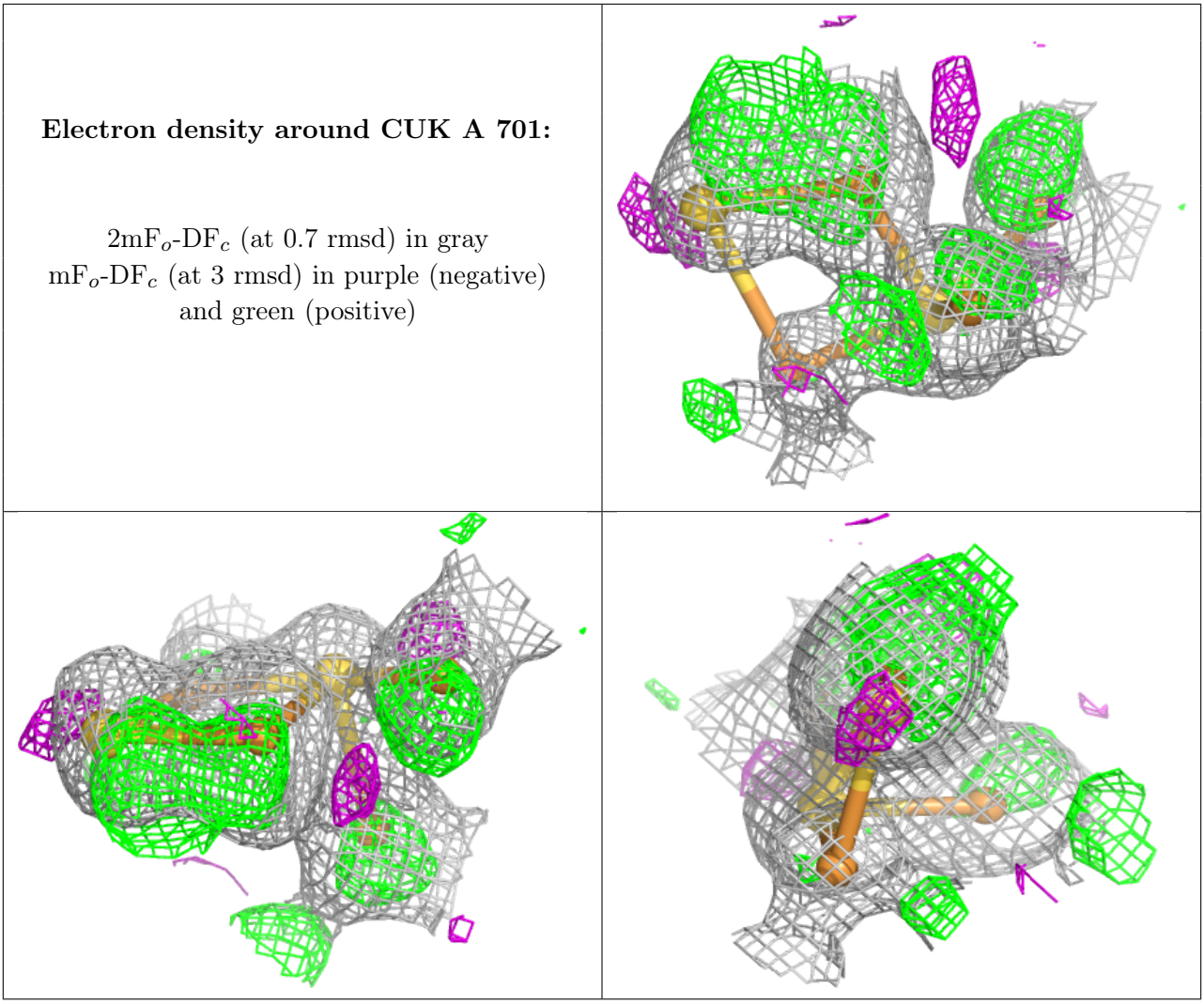
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers (i)

There are no such residues in this entry.