



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 08:55 PM UTC

PDB ID : 4HGD / pdb_00004hgd
Title : Structural insights into yeast Nit2: C169S mutant of yeast Nit2 in complex with an endogenous peptide-like ligand
Authors : Liu, H.; Qiu, X.; Zhang, M.; Gao, Y.; Niu, L.; Teng, M.
Deposited on : 2012-10-08
Resolution : 2.04 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
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

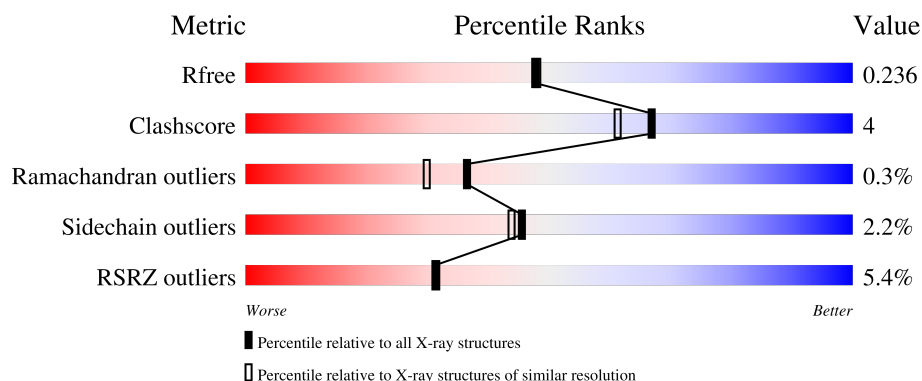
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

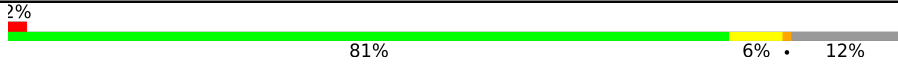
The reported resolution of this entry is 2.04 Å.

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	2260 (2.04-2.04)
Clashscore	190562	2333 (2.04-2.04)
Ramachandran outliers	187476	2318 (2.04-2.04)
Sidechain outliers	187428	2318 (2.04-2.04)
RSRZ outliers	180081	2260 (2.04-2.04)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	341	
1	B	341	
1	C	341	
1	D	341	

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
3	CAC	D	404	-	X	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 9730 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 Probable hydrolase NIT2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	299	Total	C	N	O	S	0	0	0
			2324	1478	404	433	9			
1	B	300	Total	C	N	O	S	0	0	0
			2347	1492	405	441	9			
1	C	302	Total	C	N	O	S	0	2	0
			2338	1490	407	431	10			
1	D	292	Total	C	N	O	S	0	0	0
			2213	1413	382	411	7			

There are 140 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-33	MET	-	expression tag	UNP P47016
A	-32	GLY	-	expression tag	UNP P47016
A	-31	SER	-	expression tag	UNP P47016
A	-30	SER	-	expression tag	UNP P47016
A	-29	HIS	-	expression tag	UNP P47016
A	-28	HIS	-	expression tag	UNP P47016
A	-27	HIS	-	expression tag	UNP P47016
A	-26	HIS	-	expression tag	UNP P47016
A	-25	HIS	-	expression tag	UNP P47016
A	-24	HIS	-	expression tag	UNP P47016
A	-23	SER	-	expression tag	UNP P47016
A	-22	SER	-	expression tag	UNP P47016
A	-21	GLY	-	expression tag	UNP P47016
A	-20	LEU	-	expression tag	UNP P47016
A	-19	VAL	-	expression tag	UNP P47016
A	-18	PRO	-	expression tag	UNP P47016
A	-17	ARG	-	expression tag	UNP P47016
A	-16	GLY	-	expression tag	UNP P47016
A	-15	SER	-	expression tag	UNP P47016
A	-14	HIS	-	expression tag	UNP P47016
A	-13	MET	-	expression tag	UNP P47016

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-12	ALA	-	expression tag	UNP P47016
A	-11	SER	-	expression tag	UNP P47016
A	-10	MET	-	expression tag	UNP P47016
A	-9	THR	-	expression tag	UNP P47016
A	-8	GLY	-	expression tag	UNP P47016
A	-7	GLY	-	expression tag	UNP P47016
A	-6	GLN	-	expression tag	UNP P47016
A	-5	GLN	-	expression tag	UNP P47016
A	-4	MET	-	expression tag	UNP P47016
A	-3	GLY	-	expression tag	UNP P47016
A	-2	ARG	-	expression tag	UNP P47016
A	-1	GLY	-	expression tag	UNP P47016
A	0	SER	-	expression tag	UNP P47016
A	169	SER	CYS	engineered mutation	UNP P47016
B	-33	MET	-	expression tag	UNP P47016
B	-32	GLY	-	expression tag	UNP P47016
B	-31	SER	-	expression tag	UNP P47016
B	-30	SER	-	expression tag	UNP P47016
B	-29	HIS	-	expression tag	UNP P47016
B	-28	HIS	-	expression tag	UNP P47016
B	-27	HIS	-	expression tag	UNP P47016
B	-26	HIS	-	expression tag	UNP P47016
B	-25	HIS	-	expression tag	UNP P47016
B	-24	HIS	-	expression tag	UNP P47016
B	-23	SER	-	expression tag	UNP P47016
B	-22	SER	-	expression tag	UNP P47016
B	-21	GLY	-	expression tag	UNP P47016
B	-20	LEU	-	expression tag	UNP P47016
B	-19	VAL	-	expression tag	UNP P47016
B	-18	PRO	-	expression tag	UNP P47016
B	-17	ARG	-	expression tag	UNP P47016
B	-16	GLY	-	expression tag	UNP P47016
B	-15	SER	-	expression tag	UNP P47016
B	-14	HIS	-	expression tag	UNP P47016
B	-13	MET	-	expression tag	UNP P47016
B	-12	ALA	-	expression tag	UNP P47016
B	-11	SER	-	expression tag	UNP P47016
B	-10	MET	-	expression tag	UNP P47016
B	-9	THR	-	expression tag	UNP P47016
B	-8	GLY	-	expression tag	UNP P47016
B	-7	GLY	-	expression tag	UNP P47016
B	-6	GLN	-	expression tag	UNP P47016

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-5	GLN	-	expression tag	UNP P47016
B	-4	MET	-	expression tag	UNP P47016
B	-3	GLY	-	expression tag	UNP P47016
B	-2	ARG	-	expression tag	UNP P47016
B	-1	GLY	-	expression tag	UNP P47016
B	0	SER	-	expression tag	UNP P47016
B	169	SER	CYS	engineered mutation	UNP P47016
C	-33	MET	-	expression tag	UNP P47016
C	-32	GLY	-	expression tag	UNP P47016
C	-31	SER	-	expression tag	UNP P47016
C	-30	SER	-	expression tag	UNP P47016
C	-29	HIS	-	expression tag	UNP P47016
C	-28	HIS	-	expression tag	UNP P47016
C	-27	HIS	-	expression tag	UNP P47016
C	-26	HIS	-	expression tag	UNP P47016
C	-25	HIS	-	expression tag	UNP P47016
C	-24	HIS	-	expression tag	UNP P47016
C	-23	SER	-	expression tag	UNP P47016
C	-22	SER	-	expression tag	UNP P47016
C	-21	GLY	-	expression tag	UNP P47016
C	-20	LEU	-	expression tag	UNP P47016
C	-19	VAL	-	expression tag	UNP P47016
C	-18	PRO	-	expression tag	UNP P47016
C	-17	ARG	-	expression tag	UNP P47016
C	-16	GLY	-	expression tag	UNP P47016
C	-15	SER	-	expression tag	UNP P47016
C	-14	HIS	-	expression tag	UNP P47016
C	-13	MET	-	expression tag	UNP P47016
C	-12	ALA	-	expression tag	UNP P47016
C	-11	SER	-	expression tag	UNP P47016
C	-10	MET	-	expression tag	UNP P47016
C	-9	THR	-	expression tag	UNP P47016
C	-8	GLY	-	expression tag	UNP P47016
C	-7	GLY	-	expression tag	UNP P47016
C	-6	GLN	-	expression tag	UNP P47016
C	-5	GLN	-	expression tag	UNP P47016
C	-4	MET	-	expression tag	UNP P47016
C	-3	GLY	-	expression tag	UNP P47016
C	-2	ARG	-	expression tag	UNP P47016
C	-1	GLY	-	expression tag	UNP P47016
C	0	SER	-	expression tag	UNP P47016
C	169	SER	CYS	engineered mutation	UNP P47016

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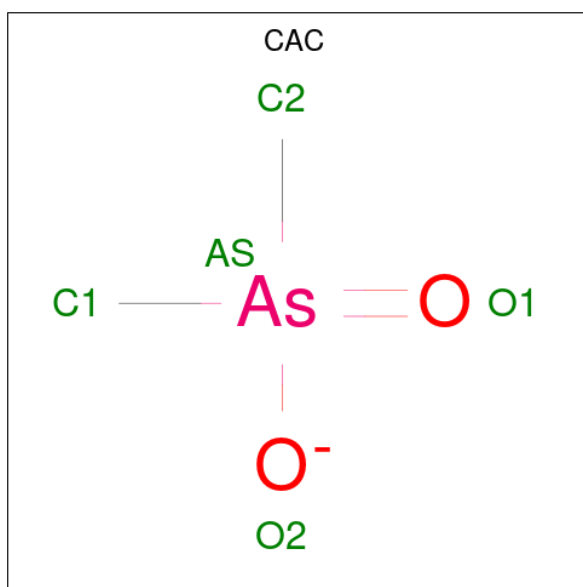
Chain	Residue	Modelled	Actual	Comment	Reference
D	-33	MET	-	expression tag	UNP P47016
D	-32	GLY	-	expression tag	UNP P47016
D	-31	SER	-	expression tag	UNP P47016
D	-30	SER	-	expression tag	UNP P47016
D	-29	HIS	-	expression tag	UNP P47016
D	-28	HIS	-	expression tag	UNP P47016
D	-27	HIS	-	expression tag	UNP P47016
D	-26	HIS	-	expression tag	UNP P47016
D	-25	HIS	-	expression tag	UNP P47016
D	-24	HIS	-	expression tag	UNP P47016
D	-23	SER	-	expression tag	UNP P47016
D	-22	SER	-	expression tag	UNP P47016
D	-21	GLY	-	expression tag	UNP P47016
D	-20	LEU	-	expression tag	UNP P47016
D	-19	VAL	-	expression tag	UNP P47016
D	-18	PRO	-	expression tag	UNP P47016
D	-17	ARG	-	expression tag	UNP P47016
D	-16	GLY	-	expression tag	UNP P47016
D	-15	SER	-	expression tag	UNP P47016
D	-14	HIS	-	expression tag	UNP P47016
D	-13	MET	-	expression tag	UNP P47016
D	-12	ALA	-	expression tag	UNP P47016
D	-11	SER	-	expression tag	UNP P47016
D	-10	MET	-	expression tag	UNP P47016
D	-9	THR	-	expression tag	UNP P47016
D	-8	GLY	-	expression tag	UNP P47016
D	-7	GLY	-	expression tag	UNP P47016
D	-6	GLN	-	expression tag	UNP P47016
D	-5	GLN	-	expression tag	UNP P47016
D	-4	MET	-	expression tag	UNP P47016
D	-3	GLY	-	expression tag	UNP P47016
D	-2	ARG	-	expression tag	UNP P47016
D	-1	GLY	-	expression tag	UNP P47016
D	0	SER	-	expression tag	UNP P47016
D	169	SER	CYS	engineered mutation	UNP P47016

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



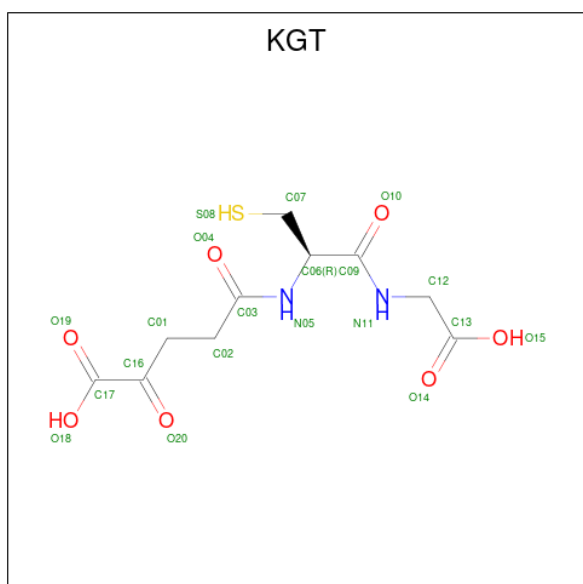
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total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

- Molecule 3 is CACODYLATE ION (CCD ID: CAC') (formula: $C_2H_6AsO_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	As	C	O	0	0
			5	1	2	2		
3	B	1	Total	As	C	O	0	0
			5	1	2	2		
3	C	1	Total	As	C	O	0	0
			5	1	2	2		
3	D	1	Total	As	C	O	0	0
			5	1	2	2		

- Molecule 4 is N-(4-carboxy-4-oxobutanoyl)-L-cysteinylglycine (CCD ID: KGT) (formula: $C_{10}H_{14}N_2O_7S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			20	10	2	7	1		
4	B	1	Total	C	N	O	S	0	0
			20	10	2	7	1		
4	C	1	Total	C	N	O	S	0	0
			20	10	2	7	1		
4	D	1	Total	C	N	O	S	0	0
			20	10	2	7	1		

- Molecule 5 is water.

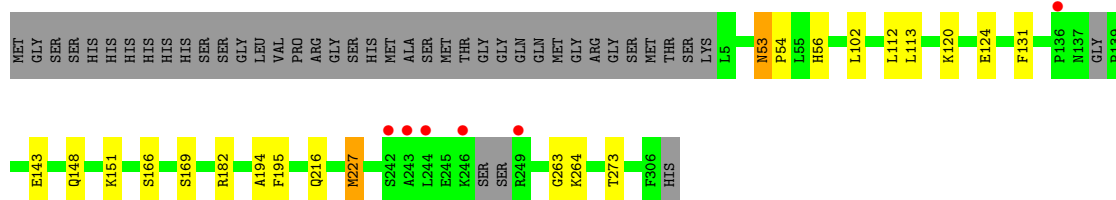
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	92	Total	O	0	0
			92	92		
5	B	111	Total	O	0	0
			111	111		
5	C	77	Total	O	0	0
			77	77		
5	D	50	Total	O	0	0
			50	50		

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.

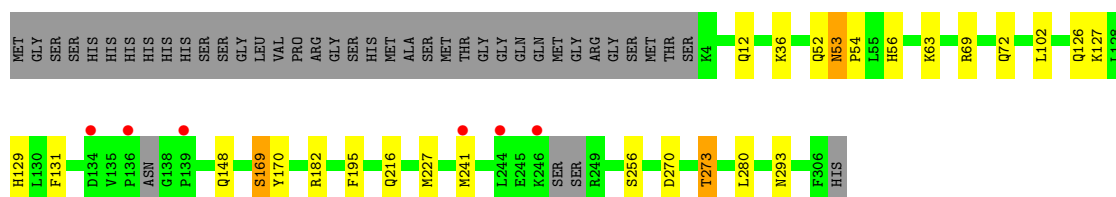
• Molecule 1: Probable hydrolase NIT2

Chain A: 



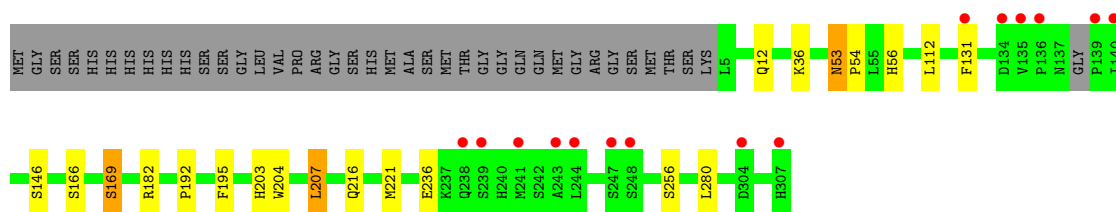
• Molecule 1: Probable hydrolase NIT2

Chain B: 



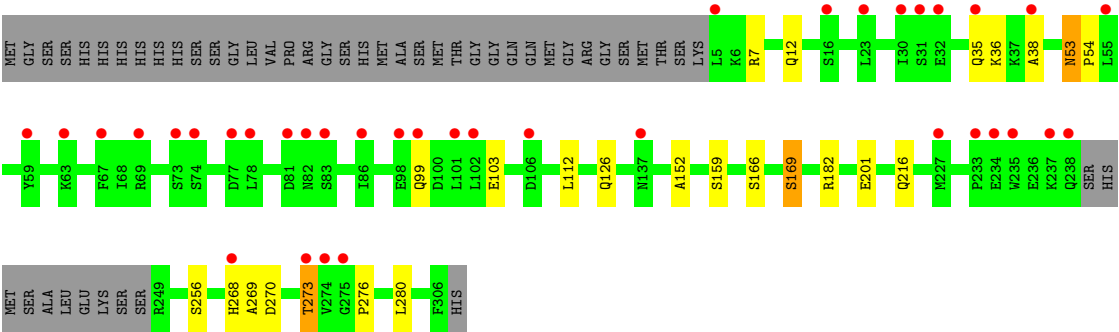
• Molecule 1: Probable hydrolase NIT2

Chain C: 



• Molecule 1: Probable hydrolase NIT2

Chain D: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	65.63Å 126.92Å 77.62Å 90.00° 95.61° 90.00°	Depositor
Resolution (Å)	35.51 – 2.04 35.51 – 2.04	Depositor EDS
% Data completeness (in resolution range)	94.4 (35.51-2.04) 94.6 (35.51-2.04)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.11 (at 2.03Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.189 , 0.228 0.201 , 0.236	Depositor DCC
R_{free} test set	4048 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	25.7	Xtriage
Anisotropy	0.130	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 41.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9730	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.65% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, KGT, CAC

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	0.50	0/2372	0.78	0/3215
1	B	0.54	0/2395	0.77	0/3245
1	C	0.51	0/2395	0.80	0/3252
1	D	0.48	0/2261	0.83	0/3080
All	All	0.51	0/9423	0.80	0/12792

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [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	2324	0	2283	16	0
1	B	2347	0	2308	17	0
1	C	2338	0	2259	18	0
1	D	2213	0	2110	18	0
2	A	30	0	40	0	0
2	B	12	0	16	3	0
2	C	18	0	24	0	0
2	D	18	0	24	6	0
3	A	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	5	0	0	0	0
3	C	5	0	0	0	0
3	D	5	0	0	0	0
4	A	20	0	12	3	0
4	B	20	0	12	1	0
4	C	20	0	12	4	0
4	D	20	0	12	1	0
5	A	92	0	0	0	0
5	B	111	0	0	0	0
5	C	77	0	0	0	0
5	D	50	0	0	1	0
All	All	9730	0	9112	69	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 4.

All (69) 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:169:SER:HB2	4:C:405:KGT:H3	1.52	0.92
1:D:182:ARG:HH12	1:D:216:GLN:HE21	1.31	0.79
1:B:126:GLN:HE22	1:B:148:GLN:HE21	1.37	0.72
1:C:182:ARG:HH12	1:C:216:GLN:HE21	1.36	0.71
1:A:264:LYS:HA	2:D:401:GOL:H12	1.74	0.68
1:A:151:LYS:O	2:B:401:GOL:H12	1.94	0.67
1:A:182:ARG:HH12	1:A:216:GLN:HE21	1.42	0.66
1:B:182:ARG:HH12	1:B:216:GLN:HE21	1.42	0.66
1:C:169:SER:CB	4:C:405:KGT:H3	2.25	0.65
1:A:194:ALA:HB3	4:A:407:KGT:O10	1.99	0.63
1:B:169:SER:HB2	4:B:404:KGT:H3	1.80	0.63
1:D:53:ASN:HB2	1:D:54:PRO:HD2	1.78	0.63
1:C:53:ASN:ND2	1:C:56:HIS:H	1.96	0.62
1:A:143:GLU:CD	4:A:407:KGT:H8	2.25	0.62
1:A:151:LYS:O	2:B:401:GOL:C1	2.48	0.62
1:C:53:ASN:C	1:C:53:ASN:HD22	2.07	0.62
1:C:36:LYS:HD3	1:C:280:LEU:HD11	1.84	0.58
1:B:53:ASN:ND2	1:B:56:HIS:H	2.02	0.56
1:C:112:LEU:HD23	1:C:166:SER:HB3	1.87	0.56
1:A:263:GLY:C	2:D:401:GOL:H32	2.32	0.55
1:B:12:GLN:NE2	1:B:256:SER:H	2.06	0.54
1:B:12:GLN:HE22	1:B:256:SER:H	1.56	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:12:GLN:NE2	1:C:256:SER:H	2.05	0.54
1:D:12:GLN:HE22	1:D:256:SER:H	1.56	0.54
1:D:36:LYS:HD2	1:D:280:LEU:HD11	1.90	0.54
1:D:169:SER:HB2	4:D:405:KGT:H3	1.91	0.51
1:A:53:ASN:ND2	1:A:56:HIS:H	2.09	0.51
1:A:53:ASN:HB2	1:A:54:PRO:HD2	1.94	0.50
1:C:53:ASN:HB2	1:C:54:PRO:HD2	1.94	0.50
1:D:12:GLN:NE2	1:D:256:SER:H	2.10	0.50
1:D:112:LEU:HD23	1:D:166:SER:HB2	1.93	0.50
1:B:53:ASN:HB2	1:B:54:PRO:CD	2.42	0.50
1:B:53:ASN:C	1:B:53:ASN:HD22	2.21	0.49
1:A:112:LEU:HD23	1:A:166:SER:HB3	1.93	0.48
1:A:264:LYS:CA	2:D:401:GOL:H12	2.43	0.48
1:B:69:ARG:HA	1:B:72:GLN:HE21	1.78	0.48
1:C:12:GLN:HE22	1:C:256:SER:H	1.61	0.47
1:B:127:LYS:HE2	1:B:129:HIS:O	2.15	0.47
1:C:131:PHE:CD1	4:C:405:KGT:H2	2.49	0.47
1:B:52:GLN:NE2	1:B:241:MET:HE1	2.30	0.46
1:B:270:ASP:HB3	1:B:273:THR:CG2	2.46	0.46
1:D:126:GLN:H	2:D:402:GOL:H2	1.80	0.46
1:D:126:GLN:H	2:D:402:GOL:C2	2.29	0.46
1:A:53:ASN:HB2	1:A:54:PRO:CD	2.46	0.46
1:B:52:GLN:HE22	1:B:241:MET:HE1	1.81	0.45
1:B:63:LYS:HE3	2:B:401:GOL:H32	1.97	0.45
1:A:131:PHE:HB3	4:A:407:KGT:H7	1.97	0.45
1:A:227:MET:HE2	1:A:227:MET:HB3	1.92	0.45
1:B:36:LYS:HD2	1:B:280:LEU:HD11	1.98	0.45
1:A:113:LEU:CD2	1:A:124:GLU:HG2	2.46	0.45
1:B:131:PHE:HD1	1:B:170:TYR:CD1	2.36	0.44
1:C:54:PRO:HA	1:C:146:SER:HB3	2.00	0.44
1:C:131:PHE:HB2	4:C:405:KGT:O04	2.17	0.44
1:C:203:HIS:HB3	1:C:207:LEU:HD22	1.98	0.43
1:D:35:GLN:NE2	5:D:533:HOH:O	2.50	0.43
1:D:36:LYS:HB3	1:D:280:LEU:HD11	2.01	0.43
1:C:53:ASN:HD22	1:C:56:HIS:H	1.66	0.43
1:C:53:ASN:HB2	1:C:54:PRO:CD	2.49	0.42
1:D:12:GLN:O	1:D:276:PRO:HA	2.20	0.42
1:D:99:GLN:O	1:D:103:GLU:HB2	2.20	0.42
1:C:112:LEU:HD13	1:C:192:PRO:HG3	2.02	0.42
1:D:152:ALA:H	2:D:402:GOL:H31	1.86	0.41
1:D:53:ASN:HB2	1:D:54:PRO:CD	2.46	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:53:ASN:HD22	1:A:53:ASN:C	2.29	0.41
1:C:204:TRP:CZ2	1:C:221[A]:MET:HB3	2.56	0.40
1:D:270:ASP:HB3	1:D:273:THR:CG2	2.51	0.40
1:D:7:ARG:HB3	1:D:38:ALA:HA	2.03	0.40
1:B:126:GLN:HE22	1:B:148:GLN:NE2	2.11	0.40
1:D:268:HIS:HD2	1:D:269:ALA:O	2.05	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	293/341 (86%)	290 (99%)	2 (1%)	1 (0%)	36	30
1	B	294/341 (86%)	291 (99%)	2 (1%)	1 (0%)	36	30
1	C	300/341 (88%)	290 (97%)	9 (3%)	1 (0%)	36	30
1	D	288/341 (84%)	279 (97%)	8 (3%)	1 (0%)	36	30
All	All	1175/1364 (86%)	1150 (98%)	21 (2%)	4 (0%)	36	30

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	169	SER
1	C	169	SER
1	A	169	SER
1	D	169	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	249/300 (83%)	242 (97%)	7 (3%)	38	34
1	B	251/300 (84%)	245 (98%)	6 (2%)	43	40
1	C	241/300 (80%)	237 (98%)	4 (2%)	53	53
1	D	223/300 (74%)	219 (98%)	4 (2%)	51	51
All	All	964/1200 (80%)	943 (98%)	21 (2%)	45	44

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	53	ASN
1	A	102	LEU
1	A	120	LYS
1	A	148	GLN
1	A	195	PHE
1	A	227	MET
1	A	273	THR
1	B	53	ASN
1	B	102	LEU
1	B	195	PHE
1	B	227	MET
1	B	273	THR
1	B	293	ASN
1	C	53	ASN
1	C	195	PHE
1	C	207	LEU
1	C	236	GLU
1	D	53	ASN
1	D	159	SER
1	D	201	GLU
1	D	273	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (34) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	52	GLN
1	A	53	ASN

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Mol	Chain	Res	Type
1	A	85	ASN
1	A	117	HIS
1	A	148	GLN
1	A	216	GLN
1	A	268	HIS
1	A	293	ASN
1	B	12	GLN
1	B	52	GLN
1	B	53	ASN
1	B	62	GLN
1	B	72	GLN
1	B	123	GLN
1	B	148	GLN
1	B	216	GLN
1	B	293	ASN
1	C	12	GLN
1	C	52	GLN
1	C	53	ASN
1	C	72	GLN
1	C	148	GLN
1	C	216	GLN
1	C	293	ASN
1	D	12	GLN
1	D	35	GLN
1	D	52	GLN
1	D	72	GLN
1	D	117	HIS
1	D	123	GLN
1	D	148	GLN
1	D	216	GLN
1	D	268	HIS
1	D	293	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

21 ligands 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
2	GOL	A	402	-	5,5,5	0.35	0	5,5,5	0.53	0
4	KGT	D	405	-	19,19,19	2.01	3 (15%)	24,24,24	1.87	6 (25%)
3	CAC	C	404	-	2,4,4	2.69	2 (100%)	4,6,6	1.21	0
4	KGT	A	407	-	19,19,19	1.93	2 (10%)	24,24,24	2.44	10 (41%)
4	KGT	B	404	-	19,19,19	1.99	2 (10%)	24,24,24	1.81	5 (20%)
2	GOL	B	401	-	5,5,5	0.38	0	5,5,5	0.49	0
3	CAC	B	403	-	2,4,4	2.61	2 (100%)	4,6,6	1.71	1 (25%)
2	GOL	A	404	-	5,5,5	0.37	0	5,5,5	0.53	0
3	CAC	A	406	-	2,4,4	2.64	2 (100%)	4,6,6	1.76	1 (25%)
2	GOL	C	401	-	5,5,5	0.39	0	5,5,5	0.25	0
3	CAC	D	404	-	2,4,4	2.67	2 (100%)	4,6,6	1.87	2 (50%)
2	GOL	D	401	-	5,5,5	0.43	0	5,5,5	0.45	0
2	GOL	C	403	-	5,5,5	0.35	0	5,5,5	0.45	0
2	GOL	B	402	-	5,5,5	0.40	0	5,5,5	0.37	0
2	GOL	A	405	-	5,5,5	0.50	0	5,5,5	0.31	0
2	GOL	D	403	-	5,5,5	0.37	0	5,5,5	0.27	0
2	GOL	C	402	-	5,5,5	0.42	0	5,5,5	0.33	0
2	GOL	D	402	-	5,5,5	0.41	0	5,5,5	0.35	0
2	GOL	A	403	-	5,5,5	0.39	0	5,5,5	0.27	0
2	GOL	A	401	-	5,5,5	0.39	0	5,5,5	0.37	0
4	KGT	C	405	-	19,19,19	1.97	2 (10%)	24,24,24	1.41	5 (20%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	C	403	-	-	0/4/4/4	-
2	GOL	B	402	-	-	1/4/4/4	-
2	GOL	A	405	-	-	2/4/4/4	-
2	GOL	A	402	-	-	0/4/4/4	-
4	KGT	A	407	-	-	12/24/24/24	-
2	GOL	D	403	-	-	0/4/4/4	-
4	KGT	B	404	-	-	7/24/24/24	-
2	GOL	C	401	-	-	2/4/4/4	-
2	GOL	C	402	-	-	2/4/4/4	-
2	GOL	B	401	-	-	0/4/4/4	-
4	KGT	D	405	-	-	2/24/24/24	-
2	GOL	A	404	-	-	4/4/4/4	-
2	GOL	D	402	-	-	3/4/4/4	-
2	GOL	A	403	-	-	2/4/4/4	-
2	GOL	A	401	-	-	0/4/4/4	-
2	GOL	D	401	-	-	4/4/4/4	-
4	KGT	C	405	-	-	3/24/24/24	-

All (17) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	404	KGT	C03-N05	5.61	1.45	1.34
4	D	405	KGT	C03-N05	5.54	1.45	1.34
4	C	405	KGT	C03-N05	5.52	1.45	1.34
4	B	404	KGT	C09-N11	5.39	1.46	1.33
4	A	407	KGT	C03-N05	5.38	1.45	1.34
4	C	405	KGT	C09-N11	5.34	1.46	1.33
4	D	405	KGT	C09-N11	5.28	1.46	1.33
4	A	407	KGT	C09-N11	5.05	1.45	1.33
3	C	404	CAC	AS-C1	2.73	1.96	1.90
3	A	406	CAC	AS-C1	2.70	1.96	1.90
3	B	403	CAC	AS-C2	2.70	1.96	1.90
3	D	404	CAC	AS-C1	2.69	1.96	1.90
3	D	404	CAC	AS-C2	2.66	1.96	1.90
3	C	404	CAC	AS-C2	2.64	1.96	1.90
3	A	406	CAC	AS-C2	2.58	1.96	1.90
3	B	403	CAC	AS-C1	2.53	1.96	1.90
4	D	405	KGT	C07-S08	-2.03	1.77	1.81

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	404	KGT	C02-C01-C16	5.49	123.21	112.91
4	D	405	KGT	C06-C07-S08	5.42	120.27	114.16
4	A	407	KGT	C06-C09-N11	5.21	127.73	116.54
4	A	407	KGT	C06-C07-S08	4.92	119.71	114.16
4	A	407	KGT	O10-C09-N11	-3.94	114.64	122.98
4	A	407	KGT	C01-C02-C03	3.77	120.42	112.67
4	D	405	KGT	C02-C01-C16	3.71	119.87	112.91
4	C	405	KGT	C02-C01-C16	3.45	119.39	112.91
4	B	404	KGT	C06-C07-S08	3.43	118.03	114.16
4	A	407	KGT	C02-C01-C16	3.40	119.30	112.91
4	A	407	KGT	C06-N05-C03	3.08	129.40	121.68
4	A	407	KGT	C07-C06-C09	2.98	115.98	109.50
4	B	404	KGT	C09-C06-N05	2.96	119.12	111.11
4	D	405	KGT	C07-C06-N05	-2.93	107.11	111.28
4	A	407	KGT	C12-N11-C09	2.84	128.54	121.38
4	C	405	KGT	C01-C02-C03	2.56	117.94	112.67
4	D	405	KGT	O18-C17-C16	2.47	120.45	113.59
4	D	405	KGT	O19-C17-C16	-2.30	118.95	121.81
4	C	405	KGT	C06-C07-S08	2.28	116.73	114.16
4	A	407	KGT	O18-C17-C16	2.17	119.60	113.59
3	D	404	CAC	O1-AS-C1	-2.15	108.83	111.50
3	D	404	CAC	O1-AS-C2	-2.13	108.85	111.50
3	A	406	CAC	O1-AS-C2	-2.12	108.86	111.50
4	D	405	KGT	C01-C02-C03	2.12	117.03	112.67
3	B	403	CAC	O1-AS-C1	-2.07	108.92	111.50
4	C	405	KGT	O18-C17-C16	2.07	119.33	113.59
4	B	404	KGT	O15-C13-C12	2.05	120.62	112.81
4	A	407	KGT	O18-C17-O19	-2.05	119.02	123.90
4	B	404	KGT	O18-C17-C16	2.03	119.23	113.59
4	C	405	KGT	C09-C06-N05	2.02	116.59	111.11

There are no chirality outliers.

All (44) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	403	GOL	O1-C1-C2-O2
2	A	403	GOL	O1-C1-C2-C3
2	D	401	GOL	O1-C1-C2-C3
2	D	401	GOL	C1-C2-C3-O3
2	D	402	GOL	C1-C2-C3-O3
2	D	402	GOL	O2-C2-C3-O3

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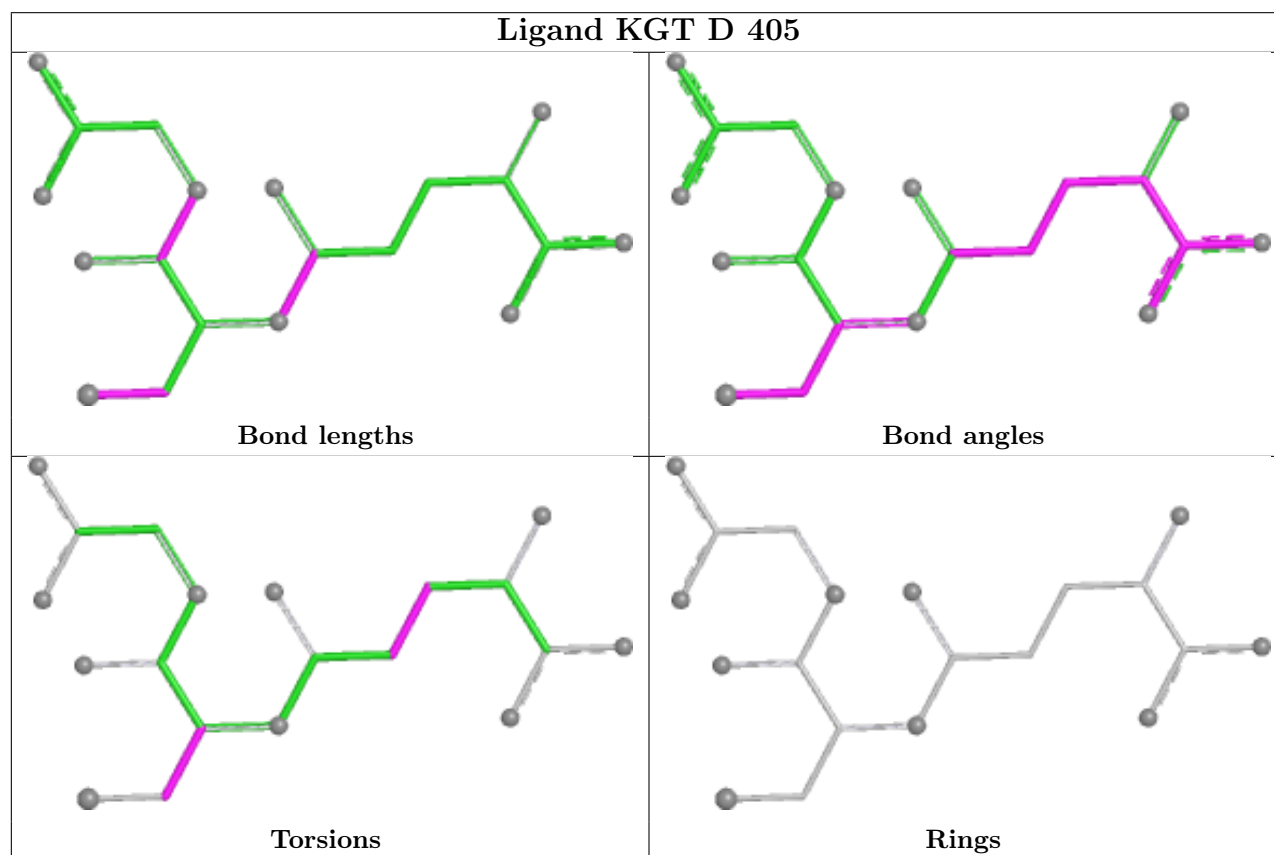
Mol	Chain	Res	Type	Atoms
4	A	407	KGT	C16-C01-C02-C03
4	A	407	KGT	N05-C06-C07-S08
4	A	407	KGT	C09-C06-C07-S08
4	B	404	KGT	C02-C01-C16-C17
4	B	404	KGT	C01-C16-C17-O18
4	B	404	KGT	C01-C16-C17-O19
4	B	404	KGT	O20-C16-C17-O18
4	B	404	KGT	O20-C16-C17-O19
4	C	405	KGT	C16-C01-C02-C03
4	C	405	KGT	N05-C06-C07-S08
4	A	407	KGT	O10-C09-N11-C12
4	A	407	KGT	C06-C09-N11-C12
2	C	401	GOL	O1-C1-C2-O2
2	D	401	GOL	O2-C2-C3-O3
4	D	405	KGT	C16-C01-C02-C03
2	A	404	GOL	O1-C1-C2-C3
2	A	404	GOL	C1-C2-C3-O3
2	A	405	GOL	C1-C2-C3-O3
2	C	401	GOL	O1-C1-C2-C3
2	C	402	GOL	C1-C2-C3-O3
2	D	401	GOL	O1-C1-C2-O2
4	A	407	KGT	N11-C12-C13-O14
4	A	407	KGT	N11-C12-C13-O15
2	C	402	GOL	O2-C2-C3-O3
2	A	404	GOL	O1-C1-C2-O2
2	A	404	GOL	O2-C2-C3-O3
4	A	407	KGT	N05-C06-C09-O10
4	A	407	KGT	N05-C06-C09-N11
4	B	404	KGT	N05-C06-C07-S08
4	D	405	KGT	N05-C06-C07-S08
4	A	407	KGT	O20-C16-C17-O18
4	C	405	KGT	O20-C16-C17-O18
4	B	404	KGT	C02-C01-C16-O20
4	A	407	KGT	C09-C06-N05-C03
2	A	405	GOL	O2-C2-C3-O3
2	D	402	GOL	O1-C1-C2-O2
4	A	407	KGT	C13-C12-N11-C09
2	B	402	GOL	O1-C1-C2-C3

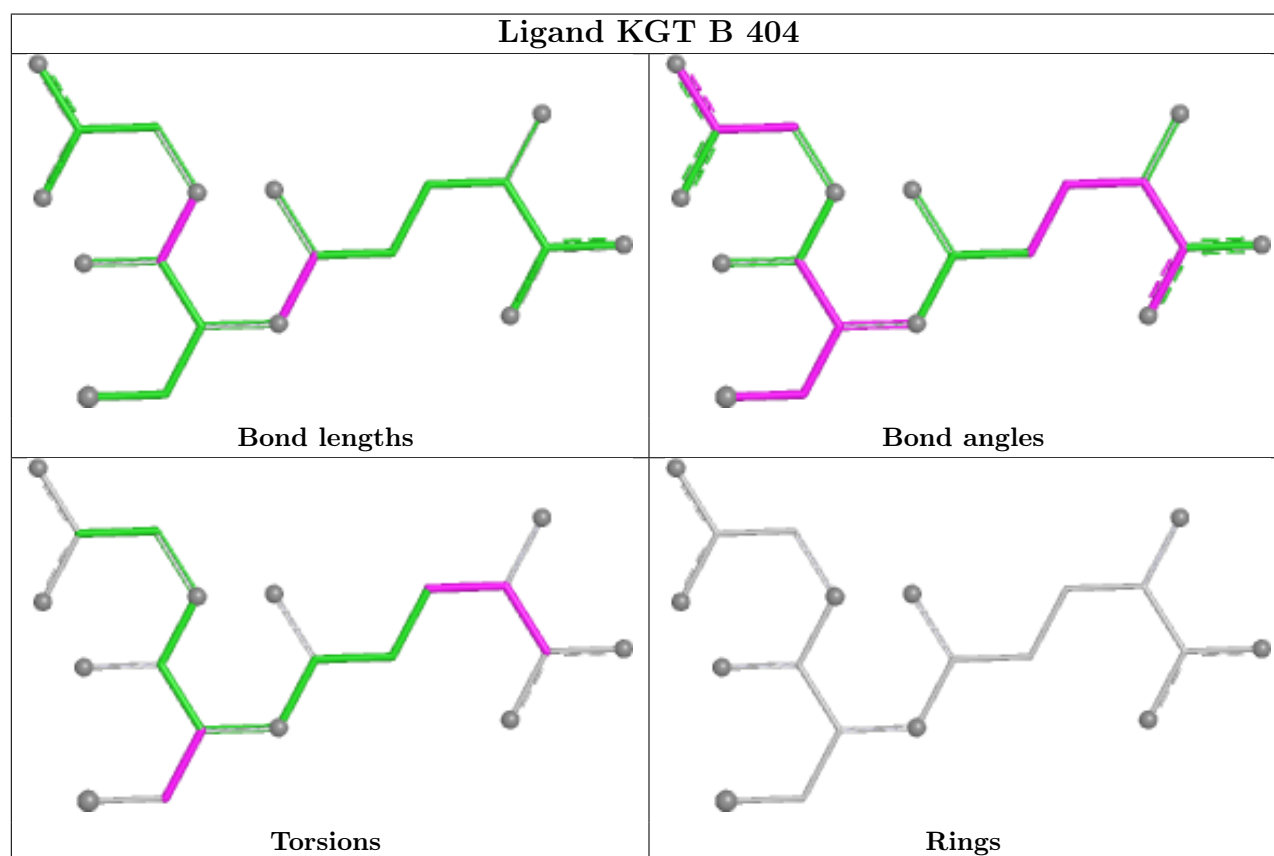
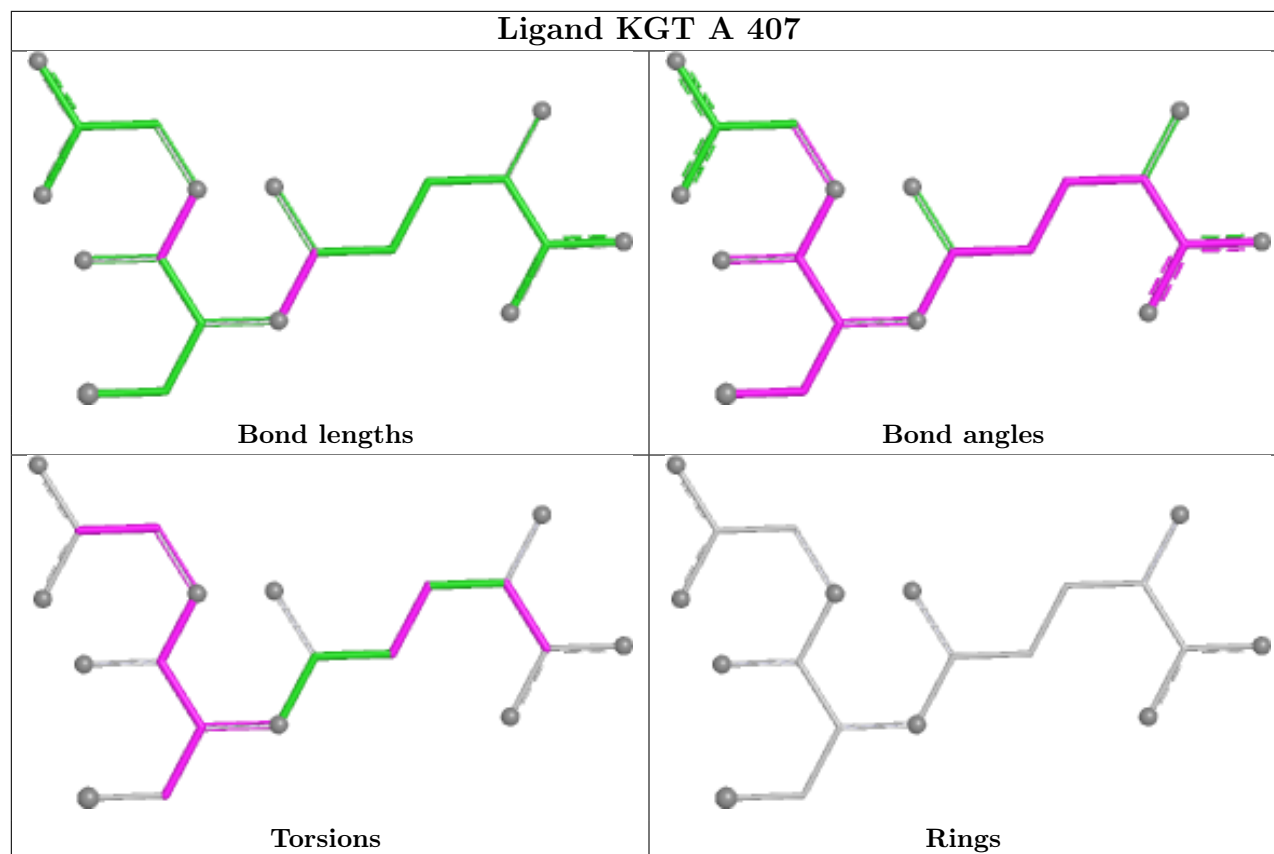
There are no ring outliers.

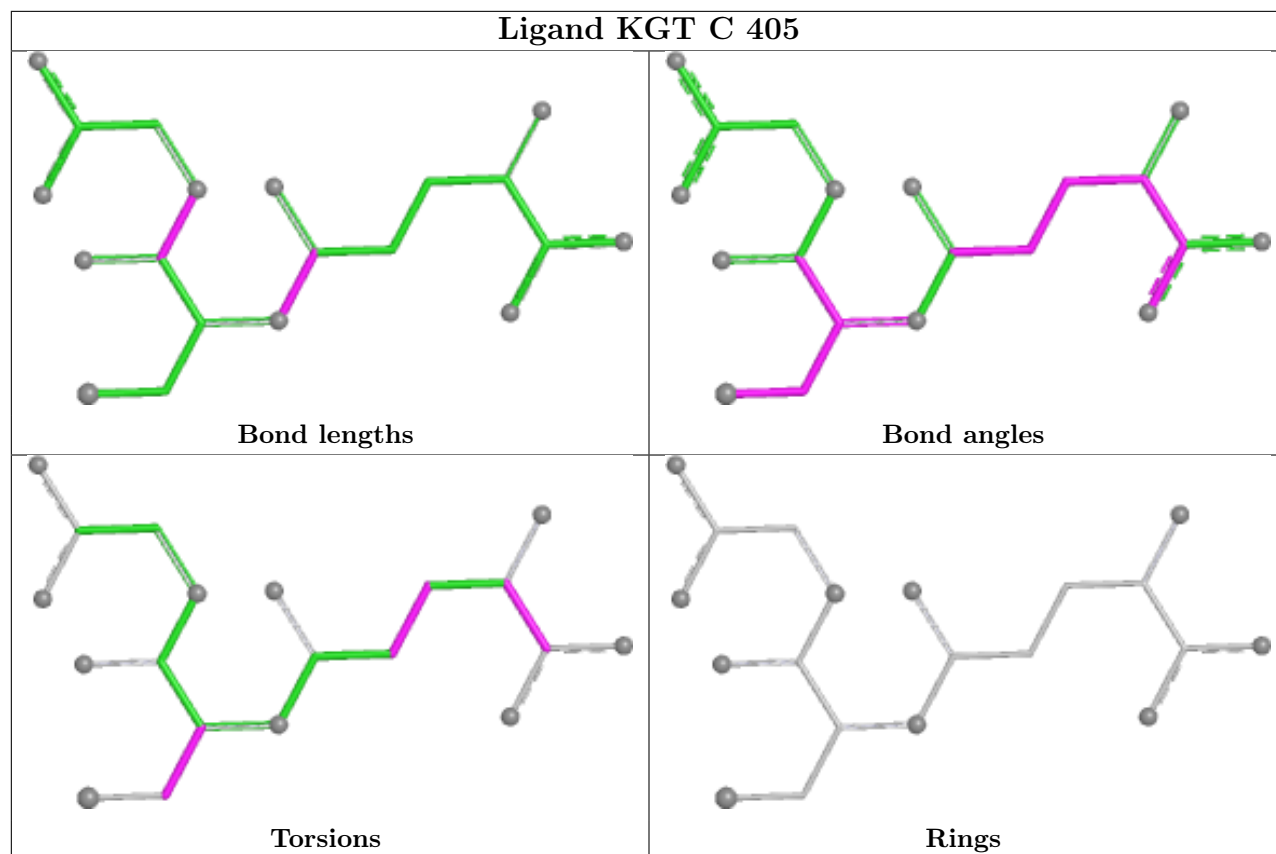
7 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	405	KGT	1	0
4	A	407	KGT	3	0
4	B	404	KGT	1	0
2	B	401	GOL	3	0
2	D	401	GOL	3	0
2	D	402	GOL	3	0
4	C	405	KGT	4	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](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	299/341 (87%)	-0.05	6 (2%) 65 67	18, 25, 42, 56	0
1	B	300/341 (87%)	-0.08	6 (2%) 65 67	15, 23, 38, 55	0
1	C	302/341 (88%)	0.15	15 (4%) 34 34	13, 27, 48, 60	2 (0%)
1	D	292/341 (85%)	0.93	37 (12%) 8 7	23, 40, 60, 83	0
All	All	1193/1364 (87%)	0.23	64 (5%) 31 31	13, 28, 52, 83	2 (0%)

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	233	PRO	4.8
1	A	243	ALA	4.1
1	D	102	LEU	4.1
1	C	136	PRO	4.1
1	D	235	TRP	3.8
1	A	244	LEU	3.7
1	C	247	SER	3.5
1	D	227	MET	3.5
1	D	81	ASP	3.4
1	A	246	LYS	3.4
1	C	307	HIS	3.2
1	D	59	TYR	3.2
1	B	244	LEU	3.2
1	D	83	SER	3.2
1	D	73	SER	3.1
1	C	139	PRO	3.0
1	C	304	ASP	2.8
1	D	238	GLN	2.8
1	B	246	LYS	2.8
1	D	32	GLU	2.7
1	D	98	GLU	2.7

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Mol	Chain	Res	Type	RSRZ
1	C	140	ILE	2.7
1	C	243	ALA	2.6
1	A	242	SER	2.6
1	D	5	LEU	2.6
1	D	31	SER	2.5
1	B	241	MET	2.5
1	D	274	VAL	2.5
1	D	77	ASP	2.5
1	D	99	GLN	2.5
1	B	136	PRO	2.5
1	A	249	ARG	2.5
1	B	139	PRO	2.4
1	D	55	LEU	2.4
1	D	101	LEU	2.4
1	D	67	PHE	2.4
1	D	74	SER	2.4
1	D	38	ALA	2.3
1	D	275	GLY	2.3
1	D	30	ILE	2.3
1	D	69	ARG	2.3
1	D	78	LEU	2.3
1	C	131	PHE	2.3
1	A	136	PRO	2.3
1	B	134	ASP	2.2
1	D	106	ASP	2.2
1	D	234	GLU	2.2
1	D	63	LYS	2.2
1	D	237	LYS	2.2
1	D	273	THR	2.2
1	C	135	VAL	2.2
1	D	16	SER	2.2
1	D	137	ASN	2.2
1	D	35	GLN	2.1
1	C	241	MET	2.1
1	D	82	ASN	2.1
1	D	268	HIS	2.1
1	C	244	LEU	2.1
1	D	86	ILE	2.1
1	C	239	SER	2.1
1	C	134	ASP	2.0
1	C	248	SER	2.0
1	C	238	GLN	2.0

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Mol	Chain	Res	Type	RSRZ
1	D	23	LEU	2.0

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](#)

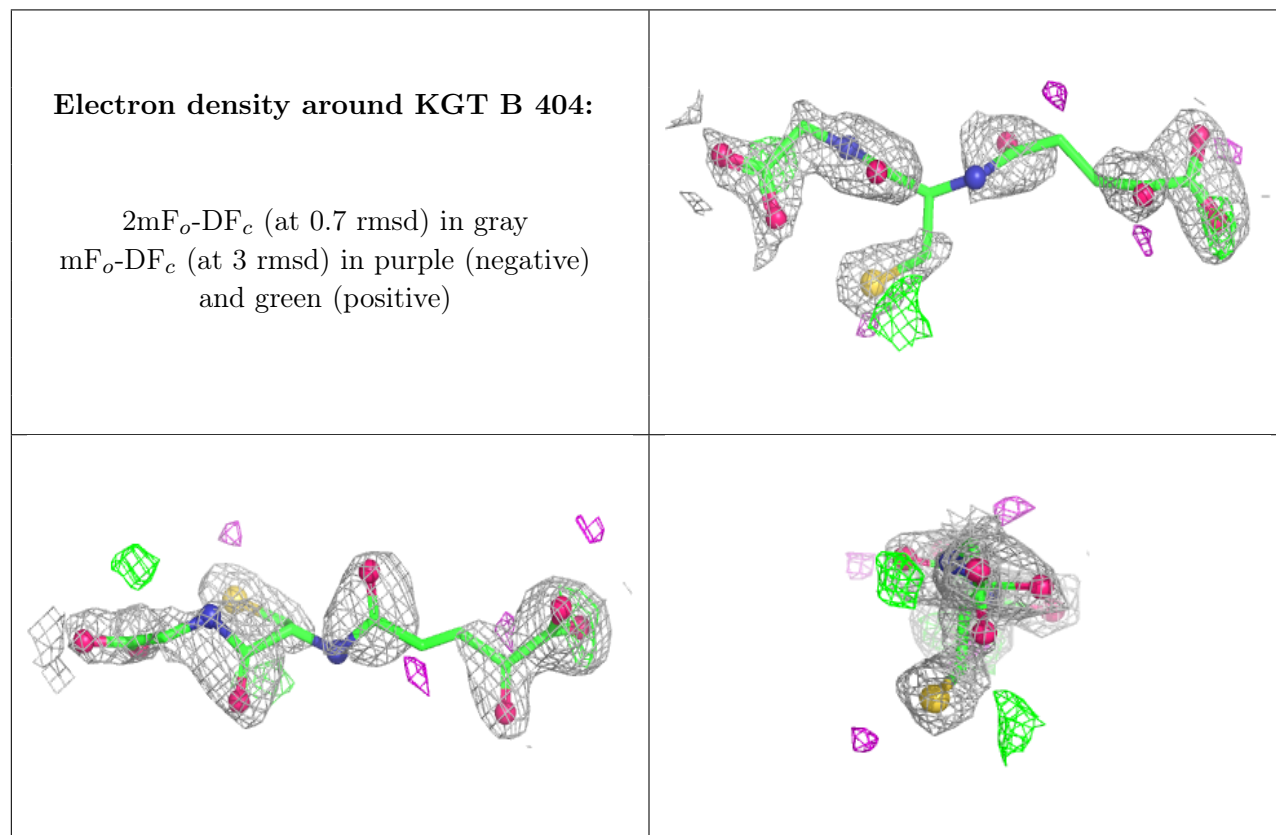
There are no oligosaccharides in this entry.

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.

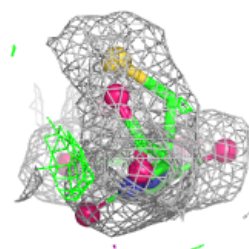
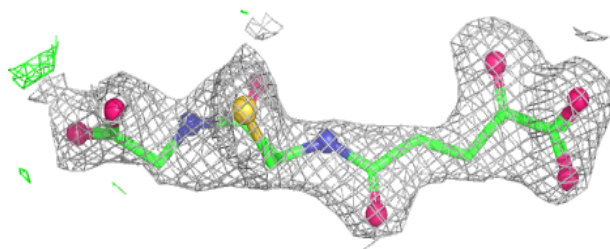
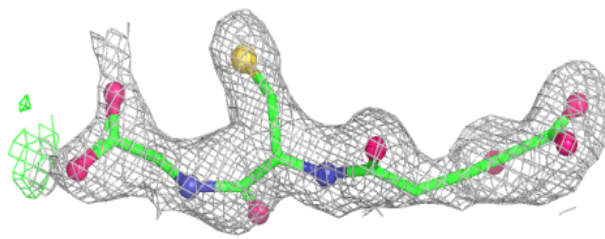
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	CAC	D	404	5/5	0.69	0.36	206,206,215,220	0
2	GOL	A	404	6/6	0.76	0.18	49,50,51,51	0
2	GOL	D	403	6/6	0.77	0.18	75,76,76,76	0
2	GOL	D	402	6/6	0.78	0.18	37,38,39,40	0
4	KGT	B	404	20/20	0.79	0.18	28,35,37,39	20
2	GOL	B	402	6/6	0.80	0.17	57,58,58,58	0
3	CAC	C	404	5/5	0.83	0.26	195,201,206,210	0
2	GOL	A	405	6/6	0.83	0.17	37,38,39,39	0
2	GOL	D	401	6/6	0.83	0.17	42,45,46,47	0
2	GOL	A	403	6/6	0.84	0.14	51,52,53,53	0
2	GOL	C	403	6/6	0.84	0.15	45,46,47,47	0
2	GOL	C	402	6/6	0.85	0.12	39,40,40,41	0
4	KGT	A	407	20/20	0.85	0.12	36,42,48,48	0
2	GOL	B	401	6/6	0.85	0.13	37,40,40,43	0
4	KGT	D	405	20/20	0.85	0.12	35,38,40,41	0
4	KGT	C	405	20/20	0.86	0.13	39,45,48,49	0
3	CAC	A	406	5/5	0.87	0.28	93,95,96,101	5
3	CAC	B	403	5/5	0.88	0.28	94,97,98,103	5
2	GOL	C	401	6/6	0.89	0.09	37,38,38,38	0
2	GOL	A	402	6/6	0.92	0.09	28,29,30,30	0
2	GOL	A	401	6/6	0.96	0.06	28,28,28,28	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.

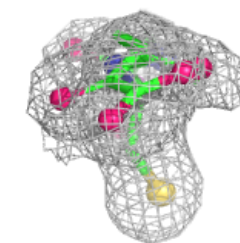
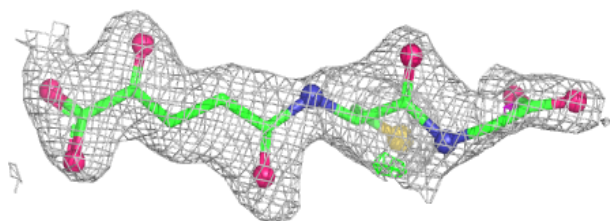
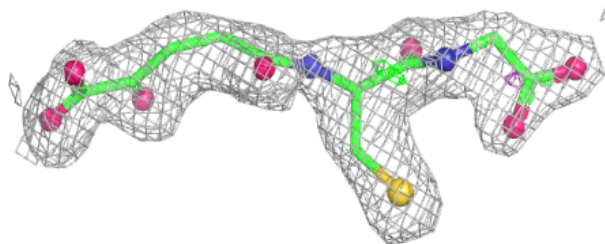


Electron density around KGT A 407:

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

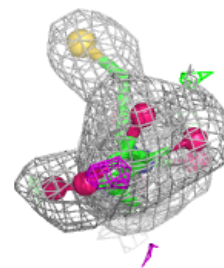
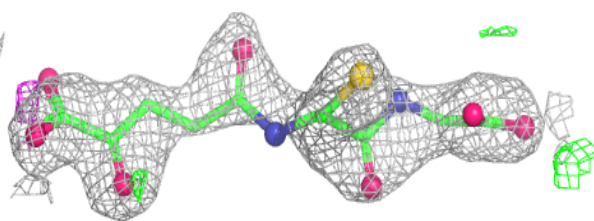
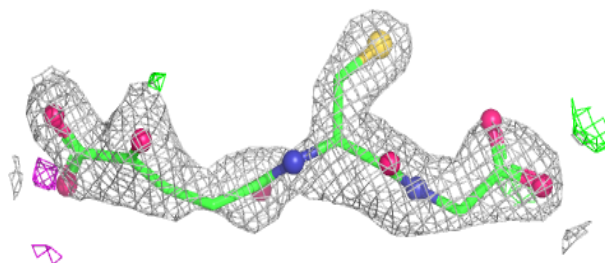
**Electron density around KGT D 405:**

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



Electron density around KGT C 405:

$2mF_o - DF_c$ (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.