



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 22, 2025 – 01:35 PM EDT

PDB ID : 6MEV  
Title : Structure of JMJD6 bound to Mono-Methyl Arginine.  
Authors : Lee, S.; Zhang, G.  
Deposited on : 2018-09-07  
Resolution : 2.60 Å(reported)

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

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

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<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 : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.21  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.004 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.41.4

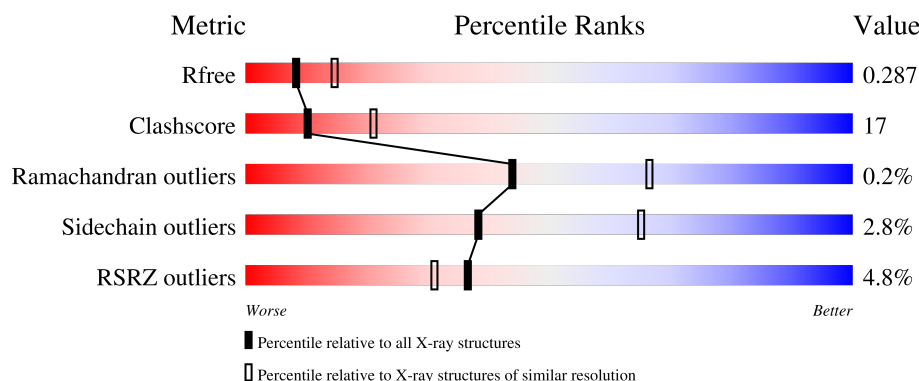
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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))
$R_{free}$	164625	3775 (2.60-2.60)
Clashscore	180529	4181 (2.60-2.60)
Ramachandran outliers	177936	4129 (2.60-2.60)
Sidechain outliers	177891	4129 (2.60-2.60)
RSRZ outliers	164620	3775 (2.60-2.60)

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	341	<div> <div>9%</div> <div>78%</div> <div>21%</div> <div>.</div> </div>
1	B	341	<div> <div>9%</div> <div>62%</div> <div>31%</div> <div>...</div> </div>
1	C	341	<div> <div>3%</div> <div>74%</div> <div>22%</div> <div>..</div> </div>
1	D	341	<div> <div>7%</div> <div>62%</div> <div>34%</div> <div>.</div> </div>
1	E	341	<div> <div>5%</div> <div>74%</div> <div>23%</div> <div>.</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	341	
1	G	341	
1	H	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
2	AKG	A	401	-	X	-	-
4	NMM	A	403	-	X	-	-
4	NMM	H	403	-	X	-	-

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 23285 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 Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	341	Total	C	N	O	S	7	0	0
			2832	1813	499	513	7			
1	B	333	Total	C	N	O	S	5	0	0
			2779	1783	491	498	7			
1	C	335	Total	C	N	O	S	4	0	0
			2794	1791	493	503	7			
1	D	341	Total	C	N	O	S	2	0	0
			2832	1813	499	513	7			
1	E	341	Total	C	N	O	S	4	0	0
			2832	1813	499	513	7			
1	F	334	Total	C	N	O	S	5	0	0
			2788	1788	492	501	7			
1	G	335	Total	C	N	O	S	8	0	0
			2794	1791	493	503	7			
1	H	340	Total	C	N	O	S	4	0	0
			2824	1809	498	510	7			

- Molecule 2 is 2-OXOGLUTARIC ACID (three-letter code: AKG) (formula: C<sub>5</sub>H<sub>6</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	10	0
			10	5	5		
2	B	1	Total	C	O	10	0
			10	5	5		
2	C	1	Total	C	O	10	0
			10	5	5		
2	D	1	Total	C	O	10	0
			10	5	5		
2	E	1	Total	C	O	10	0
			10	5	5		
2	F	1	Total	C	O	10	0
			10	5	5		
2	G	1	Total	C	O	10	0
			10	5	5		
2	H	1	Total	C	O	10	0
			10	5	5		

- Molecule 3 is FE (III) ION (three-letter code: FE) (formula: Fe).

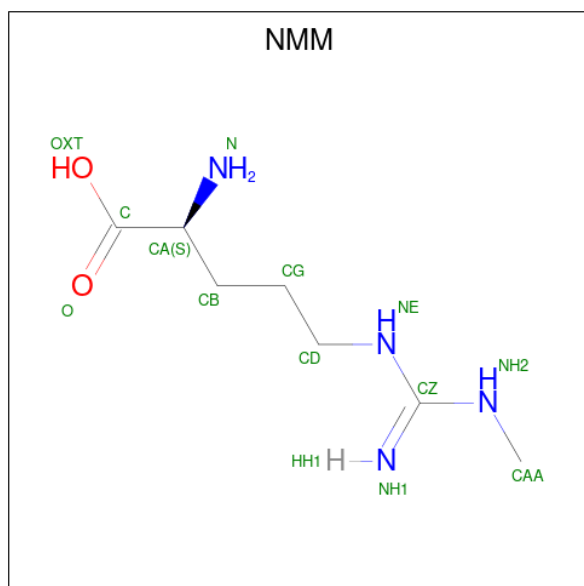
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Fe	1	0
			1	1		
3	B	1	Total	Fe	1	0
			1	1		
3	C	1	Total	Fe	1	0
			1	1		
3	D	1	Total	Fe	1	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	1	Total	Fe	1	0
			1	1		
3	F	1	Total	Fe	1	0
			1	1		
3	G	1	Total	Fe	1	0
			1	1		
3	H	1	Total	Fe	1	0
			1	1		

- Molecule 4 is (2S)-2-amino-5-[(N-methylcarbamimidoyl)amino]pentanoic acid (three-letter code: NMM) (formula: C<sub>7</sub>H<sub>16</sub>N<sub>4</sub>O<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			13	7	4	2		
4	E	1	Total	C	N	O	0	0
			13	7	4	2		
4	G	1	Total	C	N	O	0	0
			13	7	4	2		
4	H	1	Total	C	N	O	0	0
			13	7	4	2		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	115	Total	O	0	0
			115	115		

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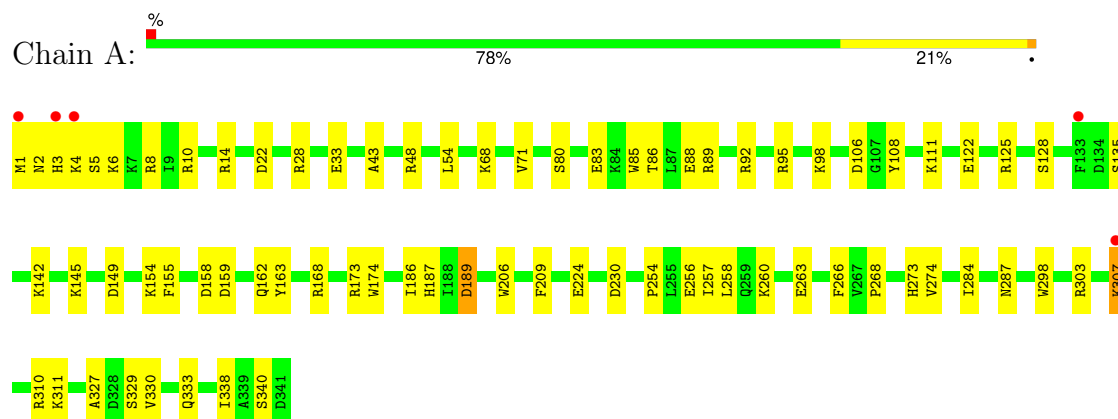
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	56	Total 56	O 56	0	0
5	C	83	Total 83	O 83	0	0
5	D	59	Total 59	O 59	0	0
5	E	111	Total 111	O 111	0	0
5	F	67	Total 67	O 67	0	0
5	G	109	Total 109	O 109	0	0
5	H	70	Total 70	O 70	0	0

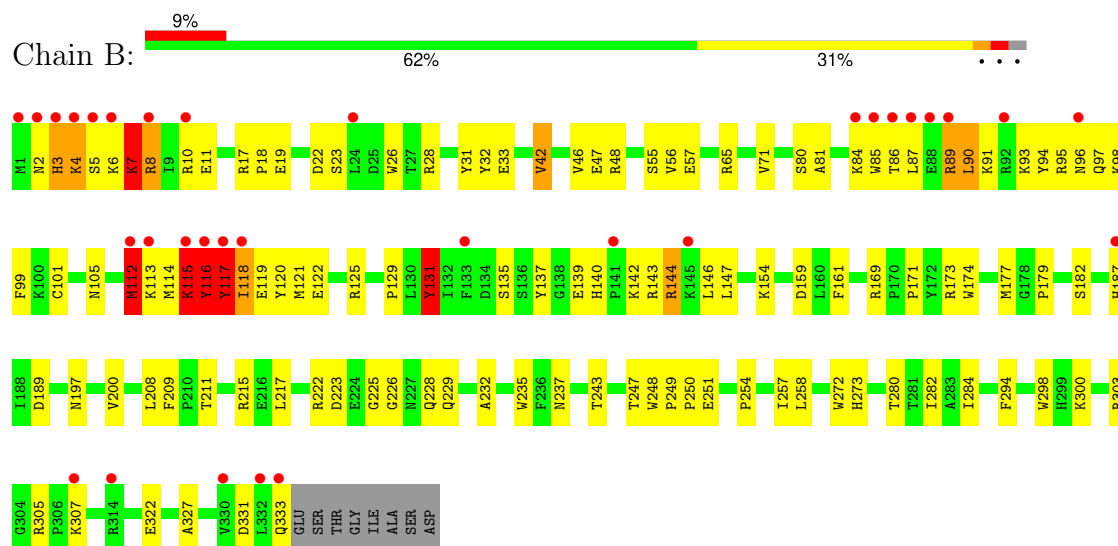
### 3 Residue-property plots [i](#)

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.

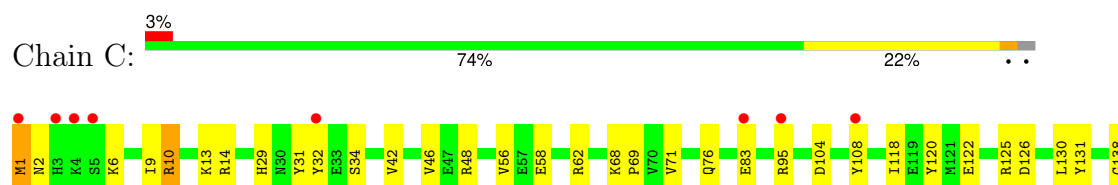
- Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6



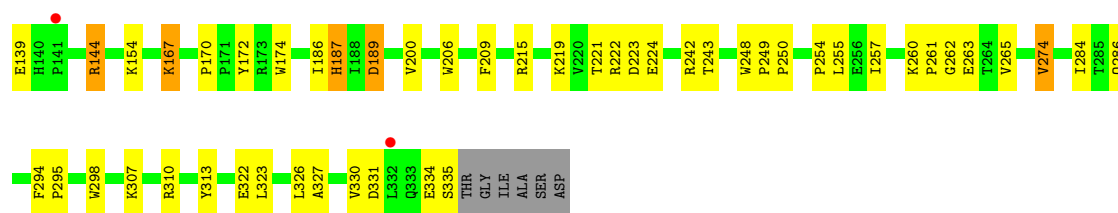
- Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6



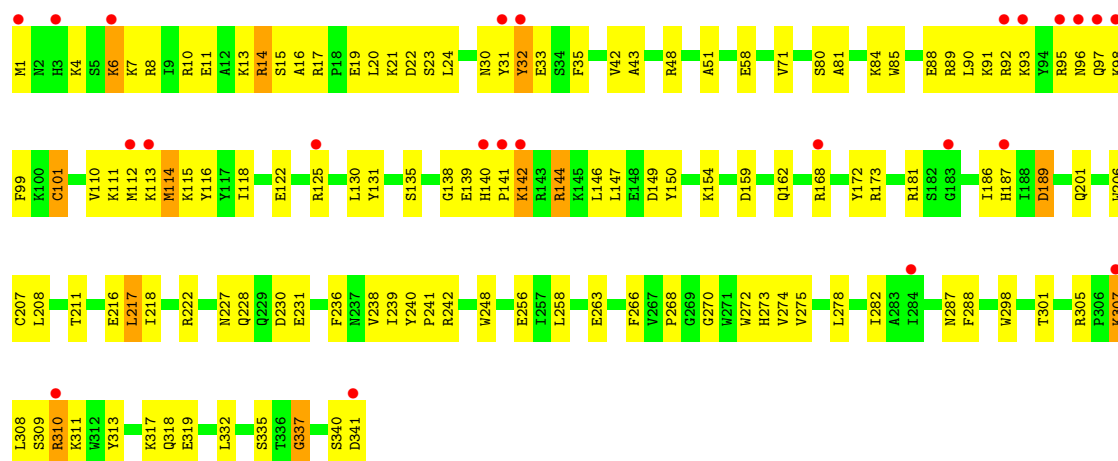
- Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6



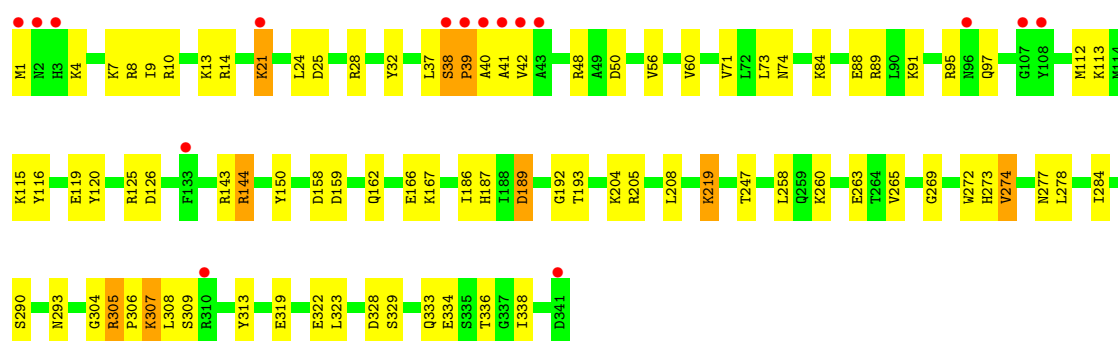
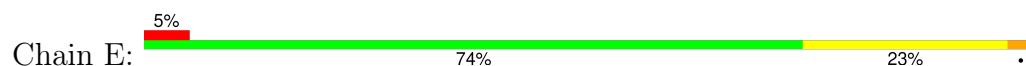




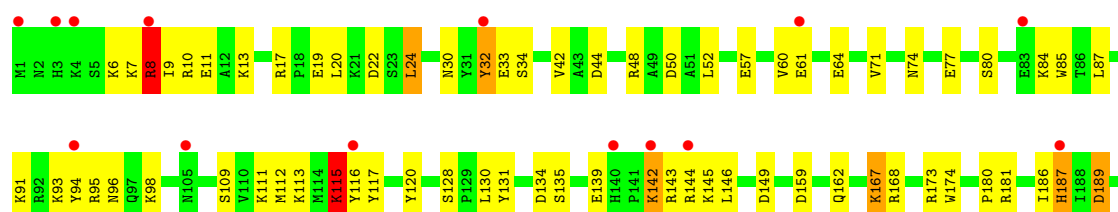
• Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6

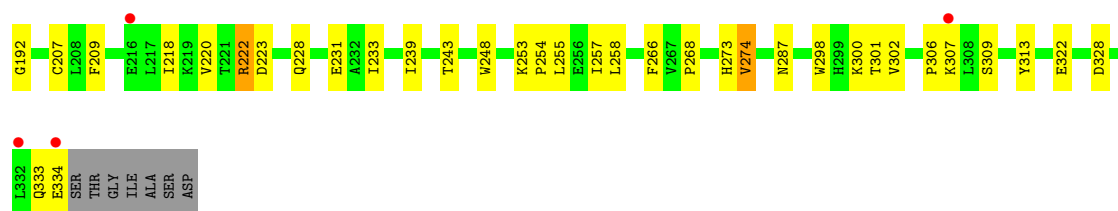


• Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6

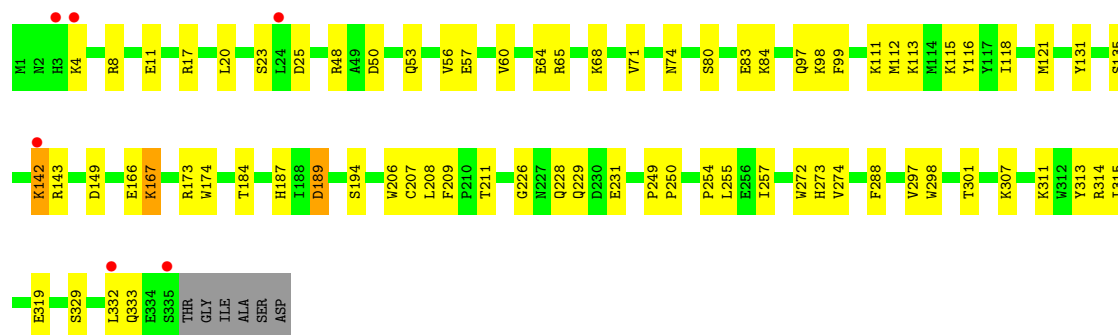
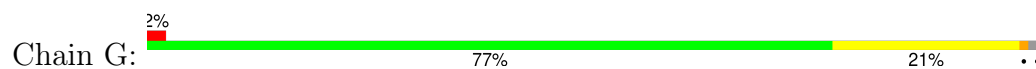


• Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6

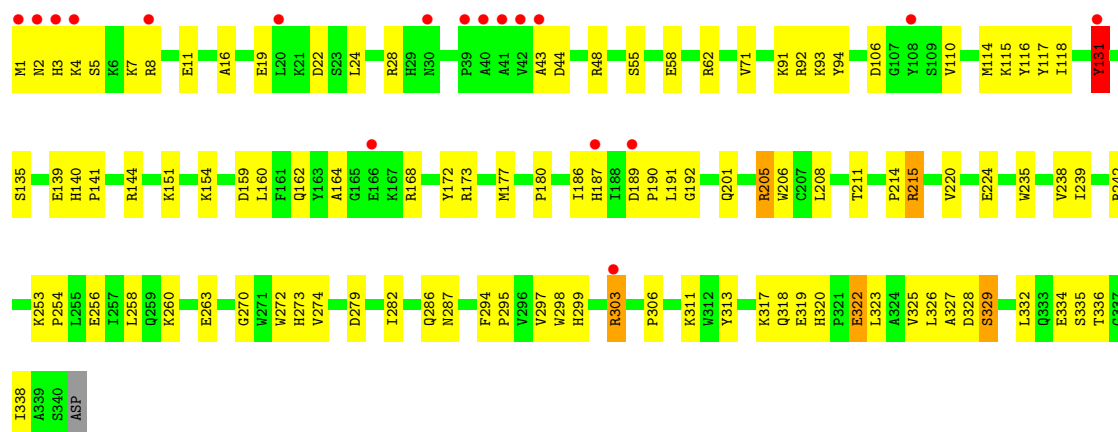




- Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6



- Molecule 1: Bifunctional arginine demethylase and lysyl-hydroxylase JMJD6



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	100.55Å 141.91Å 149.26Å 90.00° 96.80° 90.00°	Depositor
Resolution (Å)	64.00 – 2.60 64.00 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.0 (64.00-2.60) 99.1 (64.00-2.60)	Depositor EDS
$R_{merge}$	0.22	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.38 (at 2.61Å)	Xtriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.229 , 0.287 0.230 , 0.287	Depositor DCC
$R_{free}$ test set	125739 reflections (1.58%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	40.2	Xtriage
Anisotropy	0.525	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 45.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	23285	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.00% 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: AKG, FE, NMM

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.53	0/2917	0.73	2/3956 (0.1%)
1	B	0.69	8/2864 (0.3%)	0.95	21/3884 (0.5%)
1	C	0.49	0/2879	0.70	2/3904 (0.1%)
1	D	0.65	7/2917 (0.2%)	0.80	9/3956 (0.2%)
1	E	0.50	0/2917	0.73	2/3956 (0.1%)
1	F	0.56	3/2873 (0.1%)	0.74	6/3896 (0.2%)
1	G	0.53	0/2879	0.74	2/3904 (0.1%)
1	H	0.49	0/2909	0.71	2/3945 (0.1%)
All	All	0.56	18/23155 (0.1%)	0.77	46/31401 (0.1%)

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	B	0	3
1	C	0	1
1	D	0	1
1	E	0	1
All	All	0	6

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	116	TYR	CD1-CE1	-12.42	1.20	1.39
1	B	116	TYR	CE1-CZ	-11.72	1.23	1.38
1	D	32	TYR	CB-CG	-10.82	1.35	1.51
1	D	32	TYR	CD2-CE2	-9.84	1.24	1.39
1	F	115	LYS	CD-CE	-8.96	1.28	1.51

The worst 5 of 46 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	189	ASP	CB-CG-OD1	12.71	129.74	118.30
1	B	116	TYR	CB-CG-CD2	12.67	128.60	121.00
1	C	189	ASP	CB-CG-OD1	12.30	129.37	118.30
1	G	189	ASP	CB-CG-OD1	12.25	129.33	118.30
1	D	144	ARG	NE-CZ-NH2	-10.49	115.06	120.30

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	117	TYR	Peptide
1	B	3	HIS	Peptide
1	B	4	LYS	Mainchain
1	C	187	HIS	Peptide
1	D	337	GLY	Peptide

## 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	2832	0	2781	63	0
1	B	2779	0	2734	187	0
1	C	2794	0	2746	61	1
1	D	2832	0	2781	133	0
1	E	2832	0	2781	70	1
1	F	2788	0	2741	97	0
1	G	2794	0	2746	59	0
1	H	2824	0	2777	96	0
2	A	10	0	4	0	0
2	B	10	0	4	0	0
2	C	10	0	4	0	0
2	D	10	0	4	0	0
2	E	10	0	4	0	0
2	F	10	0	4	0	0
2	G	10	0	4	0	0
2	H	10	0	4	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
4	A	13	0	15	2	0
4	E	13	0	15	0	0
4	G	13	0	15	1	0
4	H	13	0	15	2	0
5	A	115	0	0	14	0
5	B	56	0	0	7	0
5	C	83	0	0	11	2
5	D	59	0	0	23	0
5	E	111	0	0	13	2
5	F	67	0	0	7	1
5	G	109	0	0	15	0
5	H	70	0	0	13	1
All	All	23285	0	22179	754	4

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 17.

The worst 5 of 754 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:E:187:HIS:NE2	1:E:273:HIS:NE2	1.74	1.35
1:B:112:MET:SD	1:B:116:TYR:OH	1.92	1.27
1:B:112:MET:SD	1:B:116:TYR:CZ	2.31	1.23
1:B:112:MET:CE	1:B:116:TYR:CE2	2.30	1.15
1:G:315:ILE:HG23	1:G:319:GLU:OE1	1.51	1.10

All (4) 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)
5:F:757:HOH:O	5:H:562:HOH:O[2_955]	1.85	0.35
5:C:783:HOH:O	5:E:611:HOH:O[2_946]	1.97	0.23

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:95:ARG:NH1	1:E:319:GLU:OE2[1_655]	2.14	0.06
5:C:754:HOH:O	5:E:544:HOH:O[1_655]	2.18	0.02

## 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	339/341 (99%)	333 (98%)	6 (2%)	0	100	100
1	B	331/341 (97%)	314 (95%)	14 (4%)	3 (1%)	14	31
1	C	333/341 (98%)	326 (98%)	6 (2%)	1 (0%)	37	59
1	D	339/341 (99%)	324 (96%)	15 (4%)	0	100	100
1	E	339/341 (99%)	321 (95%)	17 (5%)	1 (0%)	37	59
1	F	332/341 (97%)	319 (96%)	12 (4%)	1 (0%)	37	59
1	G	333/341 (98%)	330 (99%)	3 (1%)	0	100	100
1	H	338/341 (99%)	325 (96%)	13 (4%)	0	100	100
All	All	2684/2728 (98%)	2592 (97%)	86 (3%)	6 (0%)	44	66

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	7	LYS
1	B	115	LYS
1	C	167	LYS
1	B	118	ILE
1	F	167	LYS

### 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	306/306 (100%)	300 (98%)	6 (2%)	50	74
1	B	300/306 (98%)	288 (96%)	12 (4%)	27	52
1	C	302/306 (99%)	295 (98%)	7 (2%)	45	71
1	D	306/306 (100%)	295 (96%)	11 (4%)	30	56
1	E	306/306 (100%)	299 (98%)	7 (2%)	45	71
1	F	301/306 (98%)	290 (96%)	11 (4%)	29	55
1	G	302/306 (99%)	294 (97%)	8 (3%)	41	67
1	H	305/306 (100%)	299 (98%)	6 (2%)	50	74
All	All	2428/2448 (99%)	2360 (97%)	68 (3%)	38	65

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	167	LYS
1	G	211	THR
1	H	274	VAL
1	C	274	VAL
1	C	167	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	97	GLN
1	D	237	ASN
1	F	30	ASN
1	F	201	GLN
1	H	201	GLN

### 5.3.3 RNA ⓘ

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 20 ligands modelled in this entry, 8 are monoatomic - leaving 12 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	AKG	C	600	3	9,9,9	1.41	1 (11%)	11,11,11	1.57	2 (18%)
4	NMM	E	403	-	9,12,12	2.41	1 (11%)	11,14,14	4.48	8 (72%)
4	NMM	H	403	3	9,12,12	2.37	2 (22%)	11,14,14	3.83	6 (54%)
2	AKG	D	600	3	9,9,9	1.34	1 (11%)	11,11,11	1.83	3 (27%)
2	AKG	F	600	3	9,9,9	1.38	1 (11%)	11,11,11	1.77	3 (27%)
2	AKG	E	401	3	9,9,9	1.31	1 (11%)	11,11,11	1.72	2 (18%)
4	NMM	A	403	3	9,12,12	2.67	3 (33%)	11,14,14	3.89	9 (81%)
2	AKG	A	401	3	9,9,9	1.49	1 (11%)	11,11,11	2.54	6 (54%)
2	AKG	G	401	3	9,9,9	1.23	0	11,11,11	1.98	3 (27%)
2	AKG	B	600	3	9,9,9	1.39	1 (11%)	11,11,11	1.74	3 (27%)
2	AKG	H	401	3	9,9,9	1.85	1 (11%)	11,11,11	1.51	2 (18%)
4	NMM	G	403	3	9,12,12	2.32	1 (11%)	11,14,14	4.40	7 (63%)

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	AKG	C	600	3	-	3/9/9/9	-
4	NMM	E	403	-	-	6/12/13/13	-
4	NMM	H	403	3	-	9/12/13/13	-
2	AKG	D	600	3	-	3/9/9/9	-
2	AKG	F	600	3	-	3/9/9/9	-
2	AKG	E	401	3	-	6/9/9/9	-
4	NMM	A	403	3	-	4/12/13/13	-
2	AKG	A	401	3	-	7/9/9/9	-
2	AKG	G	401	3	-	5/9/9/9	-
2	AKG	B	600	3	-	2/9/9/9	-
2	AKG	H	401	3	-	4/9/9/9	-
4	NMM	G	403	3	-	6/12/13/13	-

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	403	NMM	CZ-NH2	6.56	1.49	1.34
4	E	403	NMM	CZ-NH2	6.53	1.49	1.34
4	H	403	NMM	CZ-NH2	6.24	1.48	1.34
4	G	403	NMM	CZ-NH2	6.22	1.48	1.34
2	H	401	AKG	C2-C1	-4.68	1.46	1.53

The worst 5 of 54 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	G	403	NMM	NE-CZ-NH2	-9.32	110.94	119.48
4	E	403	NMM	CD-NE-CZ	-7.44	109.81	123.46
4	A	403	NMM	NE-CZ-NH2	-6.88	113.17	119.48
4	H	403	NMM	CAA-NH2-CZ	-6.52	109.65	123.65
4	G	403	NMM	CAA-NH2-CZ	-6.49	109.71	123.65

There are no chirality outliers.

5 of 58 torsion outliers are listed below:

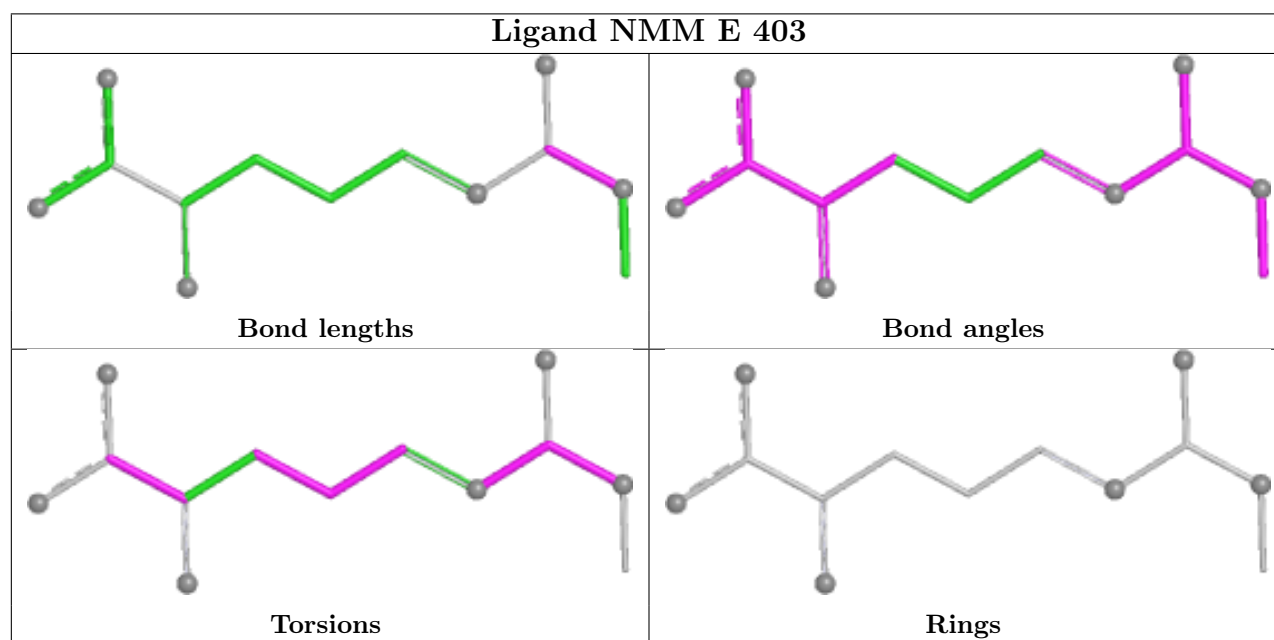
Mol	Chain	Res	Type	Atoms
2	A	401	AKG	O1-C1-C2-O5
2	A	401	AKG	O1-C1-C2-C3
2	A	401	AKG	O2-C1-C2-O5
2	A	401	AKG	O2-C1-C2-C3
2	D	600	AKG	C2-C3-C4-C5

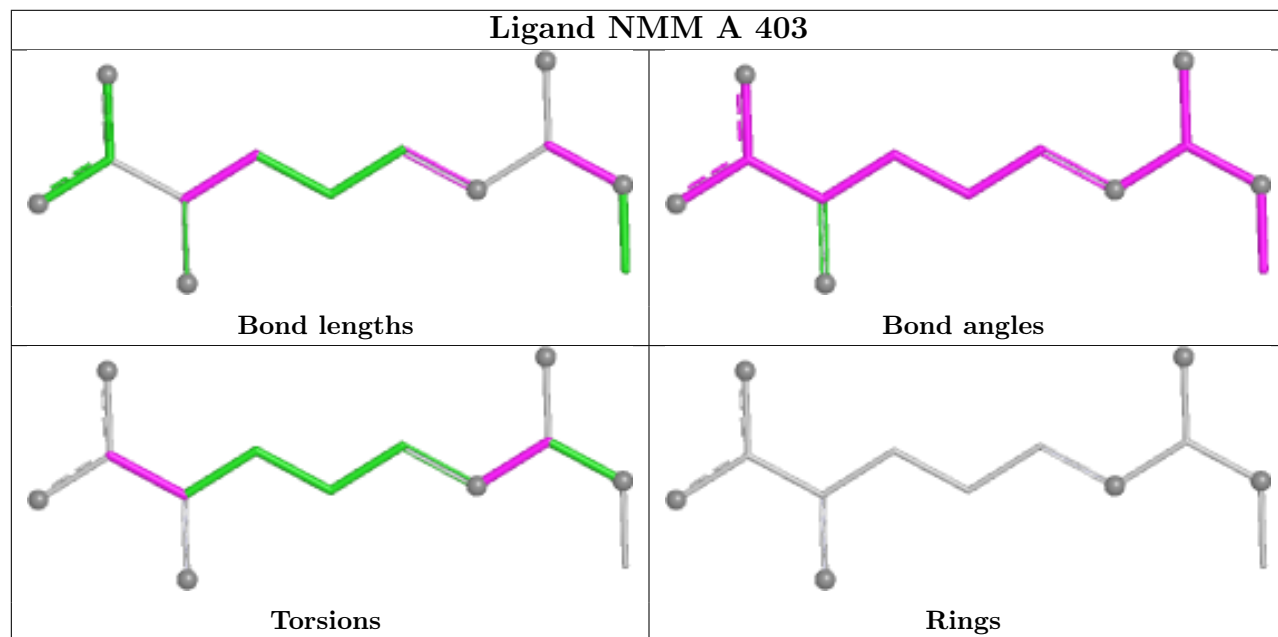
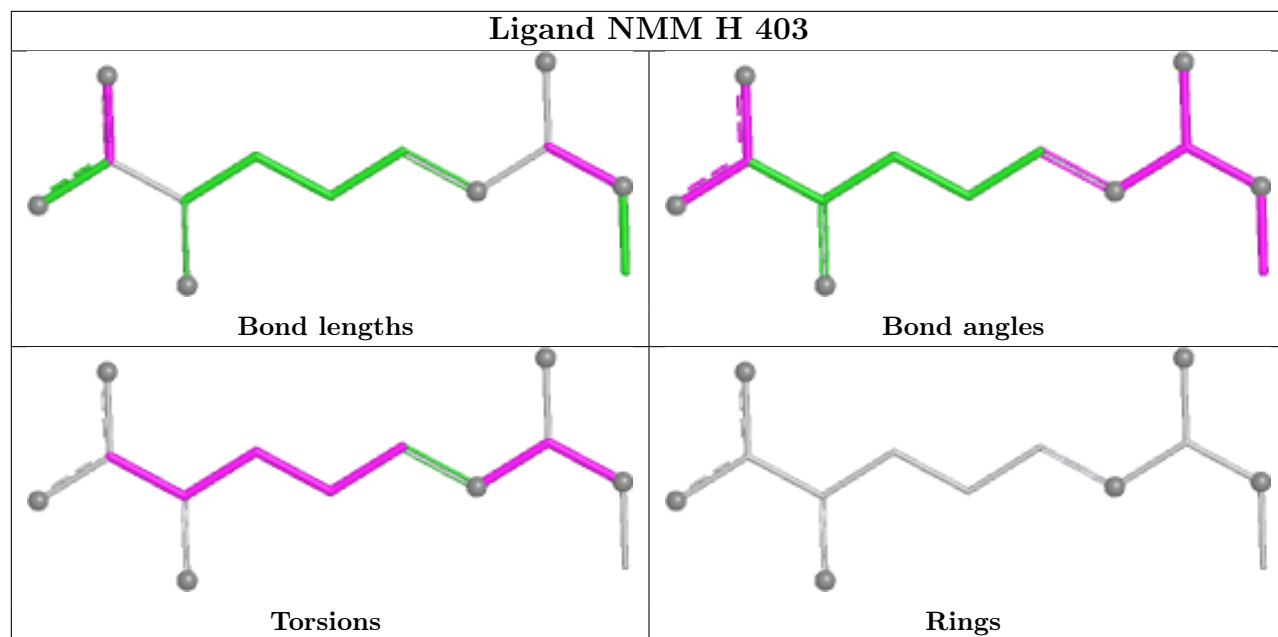
There are no ring outliers.

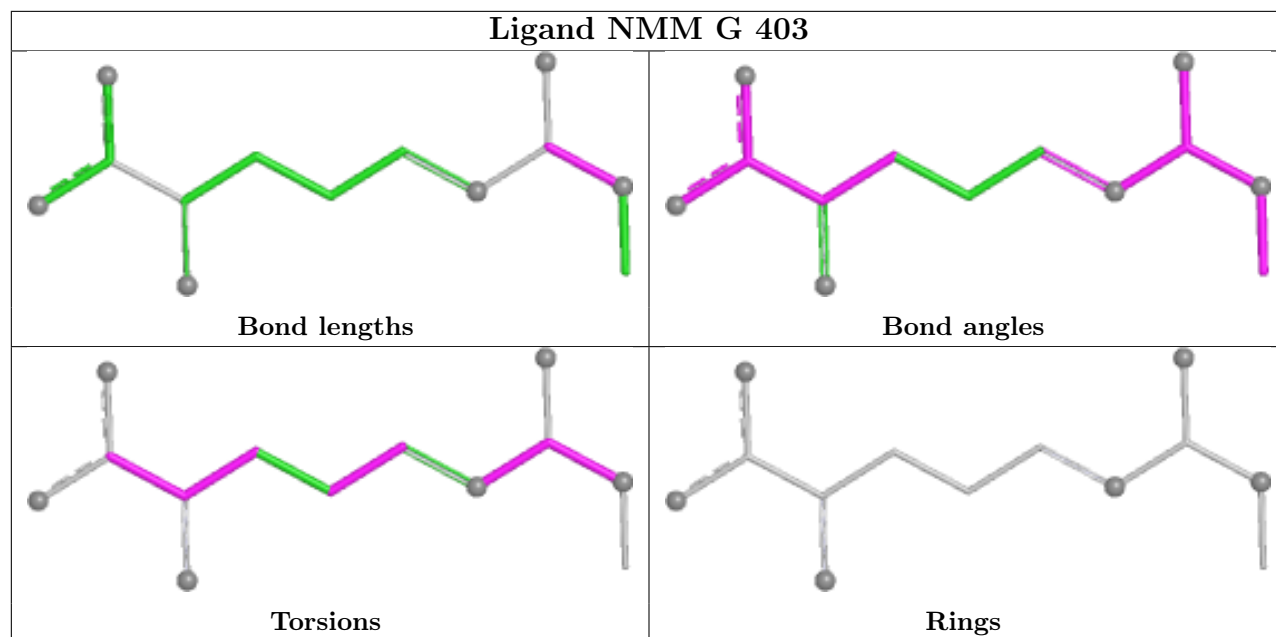
3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	H	403	NMM	2	0
4	A	403	NMM	2	0
4	G	403	NMM	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 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 [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	341/341 (100%)	-0.22	5 (1%) 71 67	15, 33, 55, 82	2 (0%)
1	B	333/341 (97%)	0.64	32 (9%) 15 12	24, 50, 77, 105	1 (0%)
1	C	335/341 (98%)	0.05	10 (2%) 52 46	22, 40, 64, 81	2 (0%)
1	D	341/341 (100%)	0.60	24 (7%) 24 19	32, 50, 72, 102	1 (0%)
1	E	341/341 (100%)	0.01	16 (4%) 37 32	22, 36, 64, 89	2 (0%)
1	F	334/341 (97%)	0.43	18 (5%) 32 27	30, 47, 73, 92	2 (0%)
1	G	335/341 (98%)	-0.23	6 (1%) 67 62	16, 32, 52, 78	3 (0%)
1	H	340/341 (99%)	0.33	18 (5%) 33 28	24, 44, 70, 95	2 (0%)
All	All	2700/2728 (98%)	0.20	129 (4%) 36 31	15, 42, 69, 105	15 (0%)

The worst 5 of 129 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	96	ASN	6.6
1	B	113	LYS	5.8
1	B	3	HIS	5.8
1	H	42	VAL	5.5
1	H	43	ALA	5.4

### 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 monosaccharides in this entry.

## 6.4 Ligands [i](#)

LIGAND-RSR INFOmissingINFO

## 6.5 Other polymers [i](#)

There are no such residues in this entry.