Full wwPDB EM Validation Report ⓘ

Oct 7, 2024 – 02:33 PM JST

PDB ID	:	8JXP
EMDB ID	:	EMD-36708
Title	:	Cryo-EM structure of BlCHR2 class one
Authors	:	Zhang, M.F.
Deposited on	:	2023-07-01
Resolution	:	2.70 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
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:

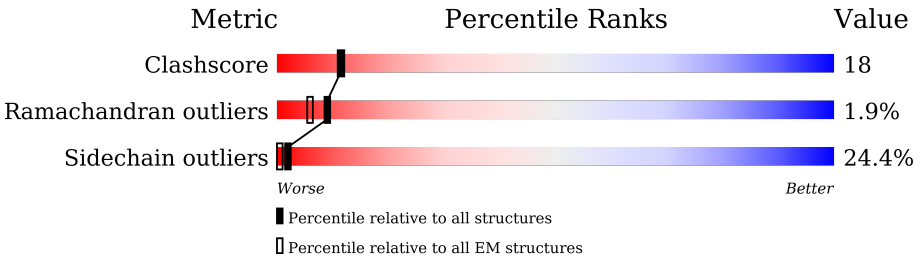
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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%

Mol	Chain	Length	Quality of chain
1	A	391	42% 19% 5% • 33%
1	B	391	42% 19% 5% • 33%
1	C	391	42% 19% 5% • 33%

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	RET	A	407	-	-	X	-
3	RET	B	407	-	-	X	-
3	RET	C	407	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6294 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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.

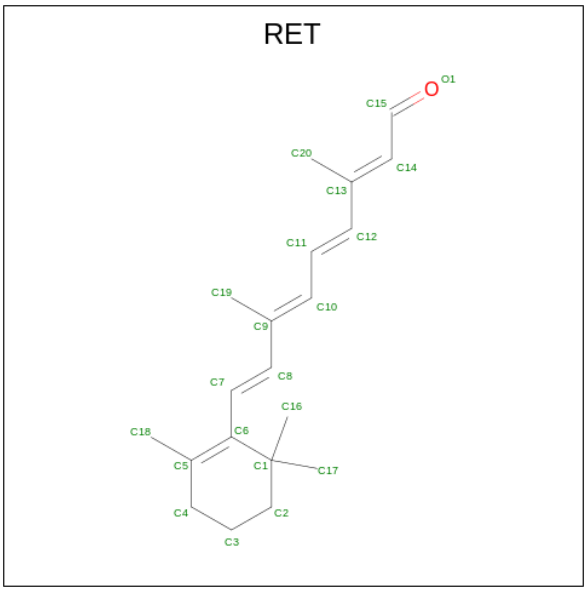
- Molecule 1 is a protein called BlCHR2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	262	Total	C	N	O	S	0	0
			2069	1372	318	365	14		
1	B	262	Total	C	N	O	S	0	0
			2069	1372	318	365	14		
1	C	262	Total	C	N	O	S	0	0
			2069	1372	318	365	14		

- Molecule 2 is POTASSIUM ION (three-letter code: K) (formula: K) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
2	A	6	Total	K	0
			6	6	
2	B	6	Total	K	0
			6	6	
2	C	6	Total	K	0
			6	6	

- Molecule 3 is RETINAL (three-letter code: RET) (formula: $C_{20}H_{28}O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
3	A	1	Total C 20 20	0
3	B	1	Total C 20 20	0
3	C	1	Total C 20 20	0

- Molecule 4 is water.

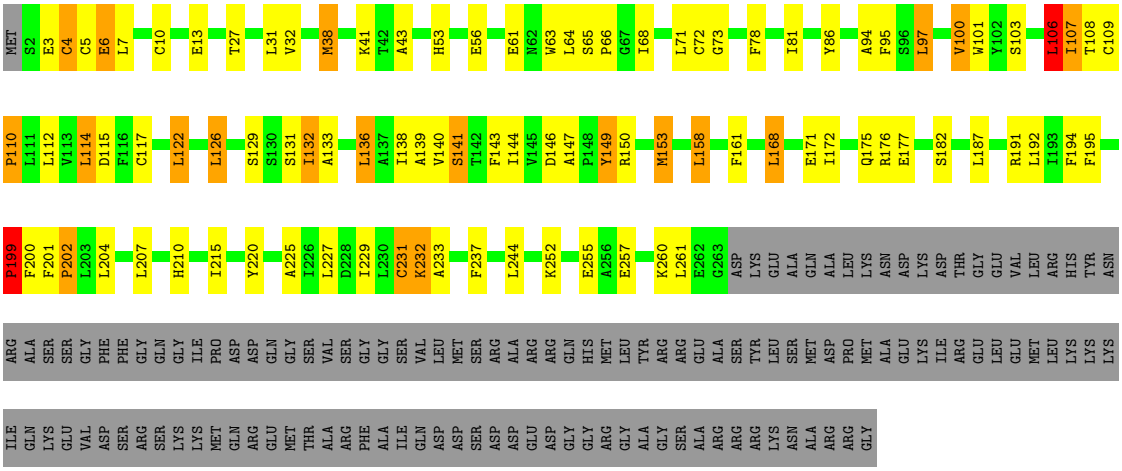
Mol	Chain	Residues	Atoms	AltConf
4	A	3	Total O 3 3	0
4	B	3	Total O 3 3	0
4	C	3	Total O 3 3	0

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. 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. 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.

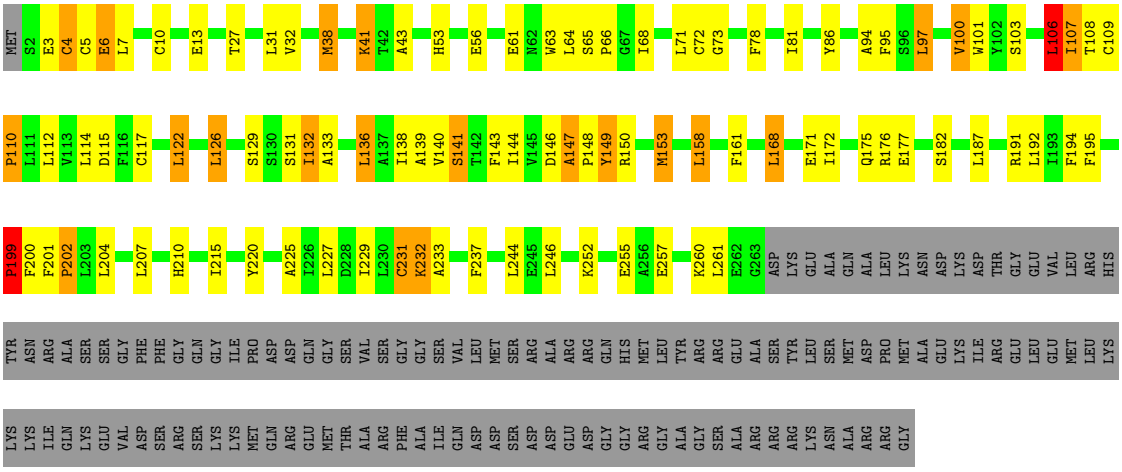
• Molecule 1: BlCHR2

Chain A:



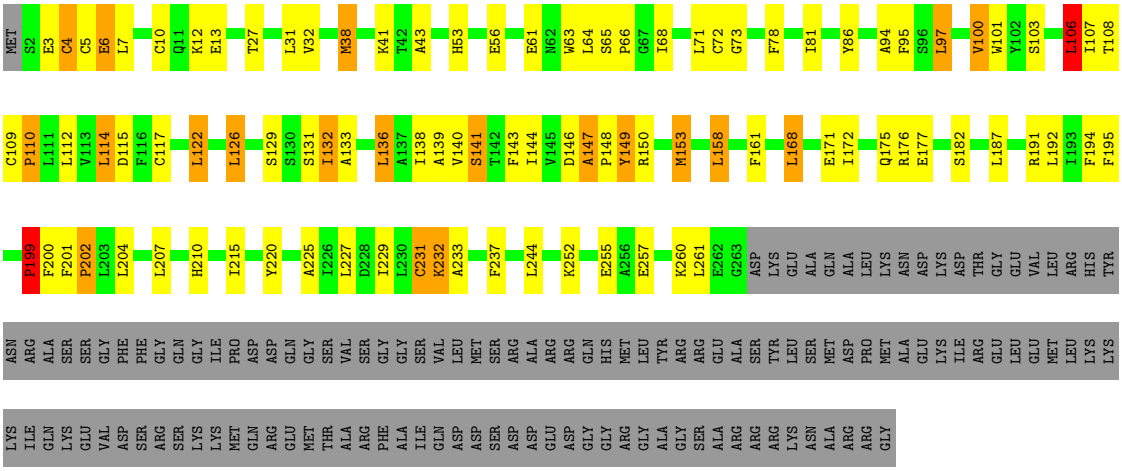
• Molecule 1: BlCHR2

Chain B:



• Molecule 1: BlCHR2

Chain C:


MET S2 E3 C4 C5 E6 L7 C10 Q11 K12 E13 T27 L31 V32 M38 K41 T42 A43 H53 E56 E61 N62 W63 L64 S65 P66 G67 I68 L71 C72 G73 F78 I81 Y86 A94 F95 S96 L97 V100 W101 Y102 S103 L106 I107 T108
C109 P110 L111 L112 V113 L114 D115 F116 C117 L122 L126 S129 S130 S131 I132 A133 L136 A137 I138 A139 V140 S141 T142 F143 I144 V145 D146 A147 P148 Y149 R150 M153 L158 F161 L168 E171 I172 Q175 R176 E177 S182 L187 R191 L192 I193 F194 F195
P199 F200 F201 P202 L203 L204 L207 H210 I215 Y220 A225 I226 L227 D228 I229 L230 C231 K232 A233 F237 L244 K252 E255 A256 E257 K260 L261 E262 G263 ASP LYS GLU ALA GLN ALA LEU LYS ASN ASP LYS ASP THR GLY GLU VAL LEU ARG HIS TYR
ASN ARG ALA SER SER GLY PHE PHE GLY GLN GLY ILE PRO ASP ASP GLN GLY SER VAL SER GLY GLY SER VAL LEU MET SER ARG ALA ARG ARG GLN HIS MET LEU TYR ARG ARG GLU ALA SER TYR LEU SER MET ASP PRO MET ALA GLU LYS ILE ARG GLU LEU GLU MET LEU LYS LYS
LYS ILE GLN LYS GLU VAL ASP SER ARG SER LYS LYS MET GLN ARG GLU MET THR ALA ARG PHE ALA ILE GLN ASP ASP SER ASP ASP GLU ASP GLY GLY ARG GLY ALA GLY SER ALA ARG ARG ARG LYS ASN ALA ARG ARG GLY

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	40700	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.41	0/2135	0.58	3/2915 (0.1%)
1	B	0.41	0/2135	0.58	3/2915 (0.1%)
1	C	0.41	0/2135	0.58	3/2915 (0.1%)
All	All	0.41	0/6405	0.58	9/8745 (0.1%)

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	110	PRO	CA-N-CD	-6.51	102.39	111.50
1	A	110	PRO	CA-N-CD	-6.50	102.39	111.50
1	C	110	PRO	CA-N-CD	-6.50	102.40	111.50
1	B	202	PRO	CA-N-CD	-5.95	103.18	111.50
1	C	202	PRO	CA-N-CD	-5.95	103.18	111.50
1	A	202	PRO	CA-N-CD	-5.93	103.20	111.50
1	A	199	PRO	CA-N-CD	-5.61	103.65	111.50
1	C	199	PRO	CA-N-CD	-5.60	103.66	111.50
1	B	199	PRO	CA-N-CD	-5.59	103.67	111.50

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2069	0	2016	89	0
1	B	2069	0	2016	88	0
1	C	2069	0	2016	84	0
2	A	6	0	0	1	0
2	B	6	0	0	1	0
2	C	6	0	0	1	0
3	A	20	0	27	21	0
3	B	20	0	27	20	0
3	C	20	0	27	20	0
4	A	3	0	0	1	0
4	B	3	0	0	1	0
4	C	3	0	0	1	0
All	All	6294	0	6129	218	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 18.

All (218) 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:81:ILE:HG21	1:B:153:MET:HE3	1.36	1.06
1:B:136:LEU:HD21	3:B:407:RET:H10	1.37	1.05
1:A:153:MET:HE3	1:C:81:ILE:HG21	1.36	1.05
1:B:94:ALA:CB	1:C:144:ILE:HG22	1.87	1.04
1:C:136:LEU:HD21	3:C:407:RET:H10	1.37	1.04
1:A:94:ALA:CB	1:B:144:ILE:HG22	1.87	1.04
1:A:136:LEU:HD21	3:A:407:RET:H10	1.37	1.03
1:A:144:ILE:HG22	1:C:94:ALA:CB	1.87	1.03
1:B:81:ILE:HG21	1:C:153:MET:HE3	1.36	1.03
1:A:136:LEU:HD21	3:A:407:RET:C10	1.92	0.99
1:A:110:PRO:HG3	1:A:133:ALA:HB2	1.43	0.99
1:B:136:LEU:HD21	3:B:407:RET:C10	1.92	0.99
1:C:136:LEU:HD21	3:C:407:RET:C10	1.92	0.98
1:C:110:PRO:HG3	1:C:133:ALA:HB2	1.43	0.98
1:B:110:PRO:HG3	1:B:133:ALA:HB2	1.43	0.97
1:A:153:MET:CE	1:C:81:ILE:HG21	2.00	0.90
1:B:81:ILE:HG21	1:C:153:MET:CE	2.00	0.90
1:A:81:ILE:HG21	1:B:153:MET:CE	2.00	0.90
1:A:144:ILE:HG22	1:C:94:ALA:HB1	1.56	0.87
1:A:94:ALA:HB1	1:B:144:ILE:HG22	1.57	0.87
1:C:202:PRO:CD	3:C:407:RET:H7	2.06	0.86
1:B:94:ALA:HB1	1:C:144:ILE:HG22	1.57	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:202:PRO:CD	3:B:407:RET:H7	2.06	0.85
1:A:202:PRO:CD	3:A:407:RET:H7	2.06	0.84
1:C:158:LEU:HD23	3:C:407:RET:H162	1.61	0.83
1:A:158:LEU:HD23	3:A:407:RET:H162	1.61	0.83
1:A:78:PHE:CZ	1:B:138:ILE:HG12	2.14	0.83
1:B:158:LEU:HD23	3:B:407:RET:H162	1.61	0.82
1:A:138:ILE:HG12	1:C:78:PHE:CZ	2.14	0.82
1:B:78:PHE:CZ	1:C:138:ILE:HG12	2.14	0.82
1:B:202:PRO:HG3	3:B:407:RET:H7	1.62	0.82
1:A:202:PRO:HG3	3:A:407:RET:H7	1.62	0.81
1:C:202:PRO:HG3	3:C:407:RET:H7	1.62	0.81
1:A:202:PRO:HD3	3:A:407:RET:H7	1.63	0.81
1:B:202:PRO:HD3	3:B:407:RET:H7	1.63	0.81
1:C:202:PRO:HD3	3:C:407:RET:H7	1.63	0.80
1:C:202:PRO:CG	3:C:407:RET:H7	2.11	0.80
1:B:202:PRO:CG	3:B:407:RET:H7	2.11	0.79
1:A:202:PRO:CG	3:A:407:RET:H7	2.12	0.79
1:B:202:PRO:HG3	3:B:407:RET:C16	2.12	0.79
1:A:202:PRO:HG3	3:A:407:RET:C16	2.12	0.79
1:C:202:PRO:HG3	3:C:407:RET:C16	2.12	0.79
1:C:202:PRO:HD3	3:C:407:RET:C7	2.14	0.78
1:B:202:PRO:HD3	3:B:407:RET:C7	2.14	0.78
1:B:94:ALA:HB3	1:C:144:ILE:HG22	1.66	0.77
1:A:202:PRO:HD3	3:A:407:RET:C7	2.14	0.77
1:A:144:ILE:HG22	1:C:94:ALA:HB3	1.65	0.77
1:B:110:PRO:HD3	1:B:132:ILE:HG22	1.67	0.76
1:C:110:PRO:HD3	1:C:132:ILE:HG22	1.67	0.76
1:A:110:PRO:HD3	1:A:132:ILE:HG22	1.67	0.75
1:A:94:ALA:HB3	1:B:144:ILE:HG22	1.65	0.75
1:C:72:CYS:SG	2:C:404:K:K	2.39	0.74
1:A:72:CYS:SG	2:A:404:K:K	2.39	0.74
1:B:72:CYS:SG	2:B:404:K:K	2.39	0.74
1:A:78:PHE:HZ	1:B:138:ILE:HG12	1.53	0.73
1:B:78:PHE:HZ	1:C:138:ILE:HG12	1.53	0.72
1:B:94:ALA:HB1	1:C:144:ILE:CG2	2.20	0.72
1:A:138:ILE:HG12	1:C:78:PHE:HZ	1.53	0.72
1:A:144:ILE:CG2	1:C:94:ALA:HB1	2.20	0.71
1:A:94:ALA:HB1	1:B:144:ILE:CG2	2.20	0.71
1:C:202:PRO:HG3	3:C:407:RET:H161	1.73	0.69
1:B:202:PRO:HG3	3:B:407:RET:H161	1.73	0.69
1:A:202:PRO:HG3	3:A:407:RET:H161	1.73	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:97:LEU:O	4:B:501:HOH:O	2.11	0.69
1:C:97:LEU:O	4:C:501:HOH:O	2.11	0.68
1:C:158:LEU:HD23	3:C:407:RET:C16	2.24	0.68
1:A:97:LEU:O	4:A:501:HOH:O	2.11	0.68
1:B:81:ILE:CG2	1:C:153:MET:CE	2.72	0.67
1:B:143:PHE:CE1	1:B:210:HIS:NE2	2.63	0.67
1:B:27:THR:HG21	1:B:225:ALA:HB1	1.77	0.66
1:A:158:LEU:HD23	3:A:407:RET:C16	2.24	0.66
1:A:81:ILE:CG2	1:B:153:MET:CE	2.72	0.66
1:B:158:LEU:HD23	3:B:407:RET:C16	2.24	0.66
1:A:143:PHE:CE1	1:A:210:HIS:NE2	2.63	0.66
1:C:143:PHE:CE1	1:C:210:HIS:NE2	2.63	0.66
1:A:153:MET:CE	1:C:81:ILE:CG2	2.72	0.65
1:C:27:THR:HG21	1:C:225:ALA:HB1	1.77	0.65
1:A:27:THR:HG21	1:A:225:ALA:HB1	1.77	0.64
1:B:81:ILE:CG2	1:C:149:TYR:HB3	2.30	0.62
1:A:81:ILE:CG2	1:B:149:TYR:HB3	2.30	0.62
1:B:231:CYS:O	1:B:232:LYS:C	2.38	0.62
1:A:231:CYS:O	1:A:232:LYS:C	2.38	0.62
1:A:149:TYR:HB3	1:C:81:ILE:CG2	2.30	0.62
1:A:202:PRO:HG3	3:A:407:RET:C7	2.30	0.62
1:B:78:PHE:CE2	1:C:138:ILE:HG12	2.36	0.61
1:B:202:PRO:HG3	3:B:407:RET:C7	2.30	0.61
1:A:138:ILE:HG12	1:C:78:PHE:CE2	2.36	0.60
1:A:112:LEU:HD11	1:A:232:LYS:HD3	1.84	0.60
1:A:139:ALA:CB	3:A:407:RET:H42	2.32	0.60
1:C:231:CYS:O	1:C:232:LYS:C	2.38	0.60
1:C:139:ALA:CB	3:C:407:RET:H42	2.32	0.60
1:A:78:PHE:CE2	1:B:138:ILE:HG12	2.36	0.60
1:B:139:ALA:CB	3:B:407:RET:H42	2.32	0.60
1:C:202:PRO:HG3	3:C:407:RET:C7	2.30	0.59
1:A:27:THR:HG22	1:A:229:ILE:HD11	1.83	0.59
1:B:27:THR:HG22	1:B:229:ILE:HD11	1.83	0.59
1:C:27:THR:HG22	1:C:229:ILE:HD11	1.83	0.59
1:B:108:THR:HB	1:B:232:LYS:HD2	1.85	0.59
1:B:4:CYS:HB3	1:B:10:CYS:HB2	1.84	0.59
1:C:108:THR:HB	1:C:232:LYS:HD2	1.85	0.59
1:C:4:CYS:HB3	1:C:10:CYS:HB2	1.84	0.59
1:C:38:MET:HB3	1:C:66:PRO:HG3	1.85	0.58
1:A:4:CYS:HB3	1:A:10:CYS:HB2	1.84	0.58
1:A:108:THR:HB	1:A:232:LYS:HD2	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:112:LEU:HD11	1:C:232:LYS:HD3	1.84	0.58
1:B:38:MET:HB3	1:B:66:PRO:HG3	1.85	0.58
1:B:112:LEU:HD11	1:B:232:LYS:HD3	1.84	0.58
1:A:38:MET:HB3	1:A:66:PRO:HG3	1.85	0.58
1:A:94:ALA:CB	1:B:144:ILE:CG2	2.73	0.57
1:A:106:LEU:O	1:A:110:PRO:HD2	2.06	0.56
1:C:106:LEU:O	1:C:110:PRO:HD2	2.06	0.55
1:B:106:LEU:O	1:B:110:PRO:HD2	2.06	0.55
1:B:143:PHE:CD1	1:B:210:HIS:NE2	2.75	0.55
1:C:143:PHE:CD1	1:C:210:HIS:NE2	2.75	0.55
1:A:143:PHE:CD1	1:A:210:HIS:NE2	2.75	0.55
1:C:32:VAL:HG23	1:C:73:GLY:HA3	1.90	0.54
1:B:202:PRO:HG3	3:B:407:RET:H163	1.87	0.53
1:B:32:VAL:HG23	1:B:73:GLY:HA3	1.90	0.53
1:A:32:VAL:HG23	1:A:73:GLY:HA3	1.90	0.53
1:C:202:PRO:HG3	3:C:407:RET:H163	1.87	0.53
1:A:144:ILE:CG2	1:C:94:ALA:CB	2.73	0.52
1:B:94:ALA:CB	1:C:144:ILE:CG2	2.73	0.52
1:C:202:PRO:HD2	3:C:407:RET:H193	1.92	0.52
1:A:202:PRO:HG3	3:A:407:RET:H163	1.88	0.52
1:B:202:PRO:HD2	3:B:407:RET:H193	1.92	0.52
1:B:139:ALA:HA	3:B:407:RET:H42	1.93	0.51
1:A:202:PRO:HD2	3:A:407:RET:H193	1.92	0.51
1:A:139:ALA:HA	3:A:407:RET:H42	1.93	0.51
1:B:95:PHE:CD2	1:C:141:SER:HB2	2.46	0.51
1:A:141:SER:HB2	1:C:95:PHE:CD2	2.46	0.50
1:C:68:ILE:HG22	1:C:232:LYS:HG3	1.94	0.50
1:B:109:CYS:HB3	1:B:132:ILE:CG2	2.42	0.50
1:A:95:PHE:CD2	1:B:141:SER:HB2	2.46	0.50
1:B:68:ILE:HG22	1:B:232:LYS:HG3	1.94	0.50
1:C:139:ALA:HA	3:C:407:RET:H42	1.93	0.50
1:C:109:CYS:HB3	1:C:132:ILE:CG2	2.42	0.49
1:A:109:CYS:HB3	1:A:132:ILE:CG2	2.42	0.49
1:A:68:ILE:HG22	1:A:232:LYS:HG3	1.94	0.48
1:A:107:ILE:H	1:A:107:ILE:HG13	1.41	0.48
1:B:201:PHE:CZ	1:B:227:LEU:HB3	2.49	0.48
1:A:78:PHE:CE1	1:B:153:MET:HG2	2.49	0.48
1:C:110:PRO:HG3	1:C:133:ALA:CB	2.30	0.48
1:A:149:TYR:HB3	1:C:81:ILE:HG23	1.96	0.48
1:A:153:MET:HG2	1:C:78:PHE:CE1	2.49	0.47
1:A:81:ILE:HG23	1:B:149:TYR:HB3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:101:TRP:O	1:C:140:VAL:HG13	2.15	0.47
1:B:81:ILE:HG23	1:C:149:TYR:HB3	1.96	0.47
1:B:101:TRP:O	1:B:140:VAL:HG13	2.15	0.47
1:C:201:PHE:CZ	1:C:227:LEU:HB3	2.49	0.47
1:A:201:PHE:CZ	1:A:227:LEU:HB3	2.49	0.47
1:B:78:PHE:CE1	1:C:153:MET:HG2	2.49	0.47
1:B:161:PHE:CE2	1:B:199:PRO:HD3	2.50	0.47
1:C:187:LEU:HA	1:C:187:LEU:HD12	1.65	0.47
1:A:31:LEU:HD23	1:A:233:ALA:HB2	1.97	0.47
1:B:31:LEU:HD23	1:B:233:ALA:HB2	1.97	0.46
1:A:110:PRO:HG3	1:A:133:ALA:CB	2.30	0.46
1:B:110:PRO:HG3	1:B:133:ALA:CB	2.30	0.46
1:C:31:LEU:HD23	1:C:233:ALA:HB2	1.97	0.46
1:C:114:LEU:HD23	1:C:114:LEU:HA	1.78	0.46
1:A:161:PHE:CE2	1:A:199:PRO:HD3	2.50	0.46
1:C:161:PHE:CE2	1:C:199:PRO:HD3	2.50	0.46
1:A:101:TRP:O	1:A:140:VAL:HG13	2.15	0.46
1:B:126:LEU:HD13	1:B:126:LEU:HA	1.74	0.46
1:B:97:LEU:HD12	1:B:97:LEU:HA	1.84	0.45
1:A:202:PRO:HD3	3:A:407:RET:H181	1.98	0.45
1:B:107:ILE:H	1:B:107:ILE:HG13	1.41	0.45
1:C:136:LEU:CD2	3:C:407:RET:H10	2.27	0.45
1:A:114:LEU:HD23	1:A:114:LEU:HA	1.78	0.45
1:B:136:LEU:CD2	3:B:407:RET:H10	2.28	0.45
1:A:97:LEU:HD12	1:A:97:LEU:HA	1.84	0.44
1:A:195:PHE:O	1:A:199:PRO:HG2	2.17	0.44
1:B:195:PHE:O	1:B:199:PRO:HG2	2.17	0.44
1:A:6:GLU:H	1:A:6:GLU:HG3	1.38	0.44
1:B:187:LEU:HA	1:B:187:LEU:HD12	1.65	0.44
1:C:195:PHE:O	1:C:199:PRO:HG2	2.17	0.44
1:B:202:PRO:HD3	3:B:407:RET:H181	1.98	0.44
3:C:407:RET:H191	3:C:407:RET:H11	1.72	0.44
1:B:168:LEU:HD23	1:B:168:LEU:HA	1.90	0.44
1:C:6:GLU:H	1:C:6:GLU:HG3	1.38	0.44
1:C:202:PRO:HD3	3:C:407:RET:H181	1.98	0.43
1:C:126:LEU:HD13	1:C:126:LEU:HA	1.74	0.43
1:C:12:LYS:HB3	1:C:12:LYS:HE2	1.78	0.42
1:A:43:ALA:HB2	1:A:63:TRP:HH2	1.84	0.42
1:A:158:LEU:HD23	1:A:158:LEU:HA	1.79	0.42
1:A:204:LEU:HB3	1:A:220:TYR:HE1	1.83	0.42
1:B:139:ALA:CA	3:B:407:RET:H42	2.49	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:43:ALA:HB2	1:C:63:TRP:HH2	1.84	0.42
1:C:117:CYS:HA	1:C:122:LEU:HB2	2.01	0.42
1:C:139:ALA:CA	3:C:407:RET:H42	2.50	0.42
1:A:126:LEU:HD13	1:A:126:LEU:HA	1.74	0.42
1:A:136:LEU:CD2	3:A:407:RET:H10	2.28	0.42
1:B:204:LEU:HB3	1:B:220:TYR:HE1	1.83	0.42
1:A:117:CYS:HA	1:A:122:LEU:HB2	2.01	0.42
1:A:143:PHE:HE1	1:A:210:HIS:HE2	1.58	0.42
1:C:204:LEU:HB3	1:C:220:TYR:HE1	1.83	0.42
1:C:106:LEU:O	1:C:110:PRO:CD	2.68	0.42
1:A:139:ALA:CA	3:A:407:RET:H42	2.50	0.41
1:A:106:LEU:O	1:A:110:PRO:CD	2.68	0.41
1:A:187:LEU:HD12	1:A:187:LEU:HA	1.65	0.41
1:B:6:GLU:H	1:B:6:GLU:HG3	1.38	0.41
1:B:100:VAL:HB	1:B:103:SER:HB3	2.03	0.41
1:C:168:LEU:HD13	1:C:172:ILE:HD11	2.02	0.41
3:A:407:RET:H191	3:A:407:RET:H11	1.72	0.41
1:B:106:LEU:O	1:B:110:PRO:CD	2.68	0.41
1:B:168:LEU:HD13	1:B:172:ILE:HD11	2.02	0.41
1:B:43:ALA:HB2	1:B:63:TRP:HH2	1.84	0.41
1:A:168:LEU:HD13	1:A:172:ILE:HD11	2.02	0.41
1:A:168:LEU:HD23	1:A:168:LEU:HA	1.90	0.41
1:B:117:CYS:HA	1:B:122:LEU:HB2	2.01	0.41
1:A:100:VAL:HB	1:A:103:SER:HB3	2.03	0.41
1:B:202:PRO:CD	3:B:407:RET:H193	2.51	0.41
1:C:100:VAL:HB	1:C:103:SER:HB3	2.03	0.40
1:B:147:ALA:HB3	1:B:148:PRO:HD3	2.03	0.40
1:C:147:ALA:HB3	1:C:148:PRO:HD3	2.04	0.40
1:A:202:PRO:CD	3:A:407:RET:H193	2.51	0.40
1:B:41:LYS:HD3	1:B:41:LYS:HA	1.98	0.40
1:B:246:LEU:HD23	1:B:246:LEU:HA	1.91	0.40
1:A:161:PHE:CZ	1:A:199:PRO:HD3	2.57	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 PDB entries followed by that with respect to all EM

entries.

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	260/391 (66%)	237 (91%)	18 (7%)	5 (2%)	6 17
1	B	260/391 (66%)	237 (91%)	18 (7%)	5 (2%)	6 17
1	C	260/391 (66%)	237 (91%)	18 (7%)	5 (2%)	6 17
All	All	780/1173 (66%)	711 (91%)	54 (7%)	15 (2%)	9 17

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	232	LYS
1	B	232	LYS
1	C	232	LYS
1	A	53	HIS
1	A	147	ALA
1	A	231	CYS
1	B	53	HIS
1	B	147	ALA
1	B	231	CYS
1	C	53	HIS
1	C	147	ALA
1	C	231	CYS
1	A	106	LEU
1	B	106	LEU
1	C	106	LEU

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 PDB entries followed by that with respect to all EM entries.

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	213/319 (67%)	161 (76%)	52 (24%)	0 1
1	B	213/319 (67%)	161 (76%)	52 (24%)	0 1
1	C	213/319 (67%)	161 (76%)	52 (24%)	0 1

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	639/957 (67%)	483 (76%)	156 (24%)	2 1

All (156) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	GLU
1	A	4	CYS
1	A	5	CYS
1	A	6	GLU
1	A	7	LEU
1	A	13	GLU
1	A	38	MET
1	A	41	LYS
1	A	56	GLU
1	A	61	GLU
1	A	64	LEU
1	A	65	SER
1	A	71	LEU
1	A	86	TYR
1	A	97	LEU
1	A	100	VAL
1	A	106	LEU
1	A	107	ILE
1	A	114	LEU
1	A	115	ASP
1	A	122	LEU
1	A	126	LEU
1	A	129	SER
1	A	131	SER
1	A	132	ILE
1	A	136	LEU
1	A	141	SER
1	A	146	ASP
1	A	149	TYR
1	A	150	ARG
1	A	153	MET
1	A	158	LEU
1	A	168	LEU
1	A	171	GLU
1	A	175	GLN
1	A	176	ARG
1	A	177	GLU

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Mol	Chain	Res	Type
1	A	182	SER
1	A	191	ARG
1	A	192	LEU
1	A	194	PHE
1	A	199	PRO
1	A	200	PHE
1	A	207	LEU
1	A	215	ILE
1	A	237	PHE
1	A	244	LEU
1	A	252	LYS
1	A	255	GLU
1	A	257	GLU
1	A	260	LYS
1	A	261	LEU
1	B	3	GLU
1	B	4	CYS
1	B	5	CYS
1	B	6	GLU
1	B	7	LEU
1	B	13	GLU
1	B	38	MET
1	B	41	LYS
1	B	56	GLU
1	B	61	GLU
1	B	64	LEU
1	B	65	SER
1	B	71	LEU
1	B	86	TYR
1	B	97	LEU
1	B	100	VAL
1	B	106	LEU
1	B	107	ILE
1	B	114	LEU
1	B	115	ASP
1	B	122	LEU
1	B	126	LEU
1	B	129	SER
1	B	131	SER
1	B	132	ILE
1	B	136	LEU
1	B	141	SER

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Mol	Chain	Res	Type
1	B	146	ASP
1	B	149	TYR
1	B	150	ARG
1	B	153	MET
1	B	158	LEU
1	B	168	LEU
1	B	171	GLU
1	B	175	GLN
1	B	176	ARG
1	B	177	GLU
1	B	182	SER
1	B	191	ARG
1	B	192	LEU
1	B	194	PHE
1	B	199	PRO
1	B	200	PHE
1	B	207	LEU
1	B	215	ILE
1	B	237	PHE
1	B	244	LEU
1	B	252	LYS
1	B	255	GLU
1	B	257	GLU
1	B	260	LYS
1	B	261	LEU
1	C	3	GLU
1	C	4	CYS
1	C	5	CYS
1	C	6	GLU
1	C	7	LEU
1	C	13	GLU
1	C	38	MET
1	C	41	LYS
1	C	56	GLU
1	C	61	GLU
1	C	64	LEU
1	C	65	SER
1	C	71	LEU
1	C	86	TYR
1	C	97	LEU
1	C	100	VAL
1	C	106	LEU

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Mol	Chain	Res	Type
1	C	107	ILE
1	C	114	LEU
1	C	115	ASP
1	C	122	LEU
1	C	126	LEU
1	C	129	SER
1	C	131	SER
1	C	132	ILE
1	C	136	LEU
1	C	141	SER
1	C	146	ASP
1	C	149	TYR
1	C	150	ARG
1	C	153	MET
1	C	158	LEU
1	C	168	LEU
1	C	171	GLU
1	C	175	GLN
1	C	176	ARG
1	C	177	GLU
1	C	182	SER
1	C	191	ARG
1	C	192	LEU
1	C	194	PHE
1	C	199	PRO
1	C	200	PHE
1	C	207	LEU
1	C	215	ILE
1	C	237	PHE
1	C	244	LEU
1	C	252	LYS
1	C	255	GLU
1	C	257	GLU
1	C	260	LYS
1	C	261	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	99	GLN
1	B	99	GLN
1	C	99	GLN

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

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 21 ligands modelled in this entry, 18 are monoatomic - leaving 3 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	RET	A	407	1	20,20,21	0.73	0	27,27,28	1.98	7 (25%)
3	RET	C	407	1	20,20,21	0.73	0	27,27,28	1.98	7 (25%)
3	RET	B	407	1	20,20,21	0.72	0	27,27,28	1.98	7 (25%)

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	RET	A	407	1	-	4/13/30/31	0/1/1/1
3	RET	C	407	1	-	4/13/30/31	0/1/1/1
3	RET	B	407	1	-	4/13/30/31	0/1/1/1

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	407	RET	C11-C10-C9	-5.05	120.10	127.31
3	B	407	RET	C11-C10-C9	-5.05	120.10	127.31
3	A	407	RET	C11-C10-C9	-5.05	120.11	127.31
3	C	407	RET	C7-C8-C9	-4.79	119.00	126.23
3	B	407	RET	C7-C8-C9	-4.78	119.01	126.23
3	A	407	RET	C7-C8-C9	-4.78	119.02	126.23
3	B	407	RET	C18-C5-C6	-3.72	120.35	124.53
3	A	407	RET	C18-C5-C6	-3.71	120.36	124.53
3	C	407	RET	C18-C5-C6	-3.71	120.37	124.53
3	B	407	RET	C18-C5-C4	2.80	118.99	113.62
3	A	407	RET	C18-C5-C4	2.80	118.99	113.62
3	C	407	RET	C18-C5-C4	2.79	118.98	113.62
3	A	407	RET	C19-C9-C10	-2.12	119.96	122.92
3	B	407	RET	C19-C9-C10	-2.12	119.96	122.92
3	C	407	RET	C19-C9-C10	-2.11	119.96	122.92
3	B	407	RET	C11-C12-C13	-2.07	120.60	126.42
3	A	407	RET	C11-C12-C13	-2.07	120.61	126.42
3	C	407	RET	C11-C12-C13	-2.06	120.63	126.42
3	B	407	RET	C3-C4-C5	-2.02	110.48	114.08
3	A	407	RET	C3-C4-C5	-2.01	110.48	114.08
3	C	407	RET	C3-C4-C5	-2.01	110.49	114.08

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	407	RET	C7-C8-C9-C19
3	B	407	RET	C7-C8-C9-C19
3	C	407	RET	C7-C8-C9-C19
3	A	407	RET	C7-C8-C9-C10
3	B	407	RET	C7-C8-C9-C10
3	C	407	RET	C7-C8-C9-C10
3	A	407	RET	C11-C12-C13-C20
3	B	407	RET	C11-C12-C13-C20
3	C	407	RET	C11-C12-C13-C20
3	A	407	RET	C11-C12-C13-C14
3	B	407	RET	C11-C12-C13-C14
3	C	407	RET	C11-C12-C13-C14

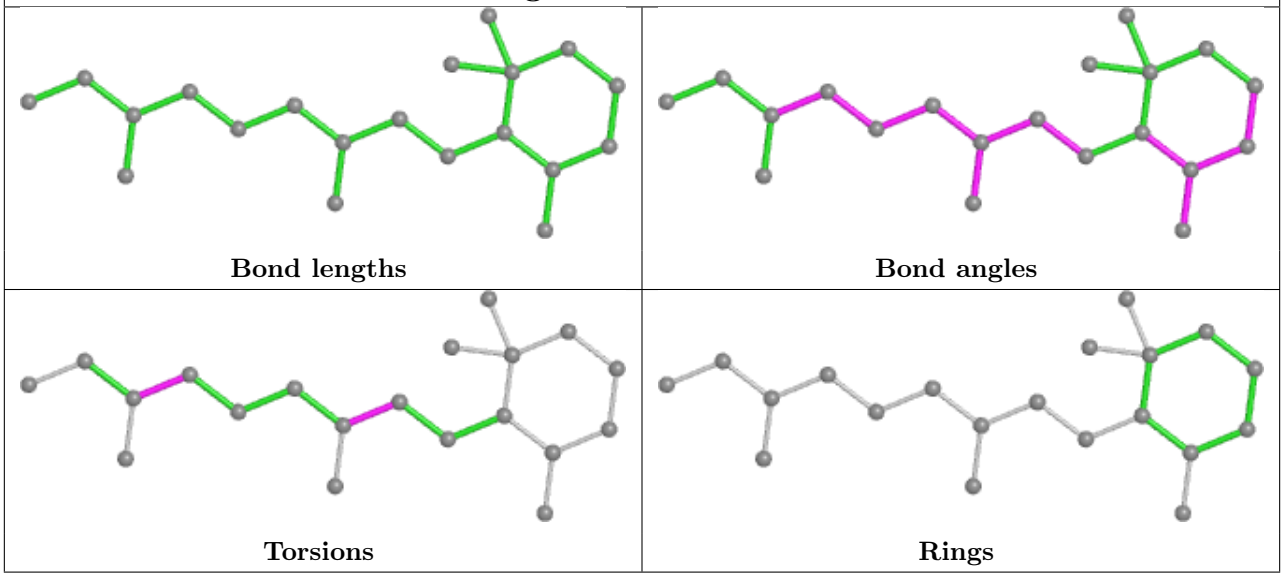
There are no ring outliers.

3 monomers are involved in 61 short contacts:

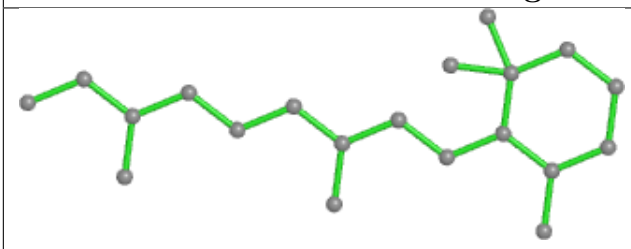
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	407	RET	21	0
3	C	407	RET	20	0
3	B	407	RET	20	0

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.

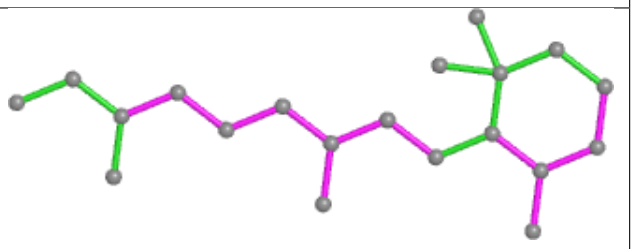
Ligand RET A 407



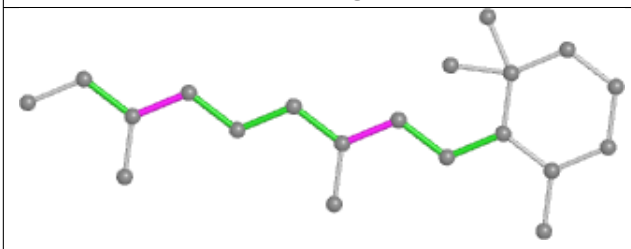
Ligand RET C 407



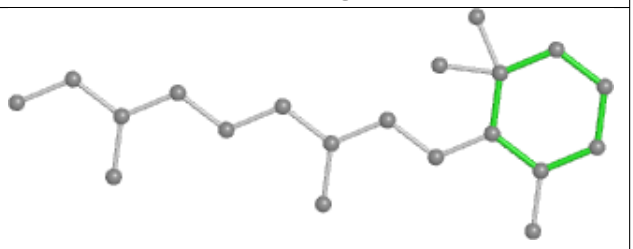
Bond lengths



Bond angles

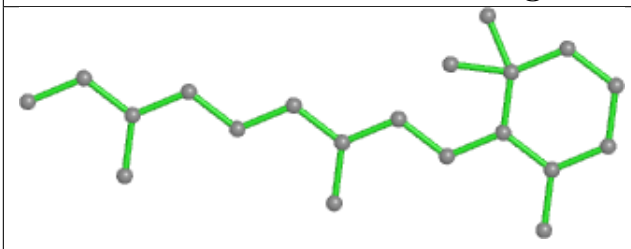


Torsions

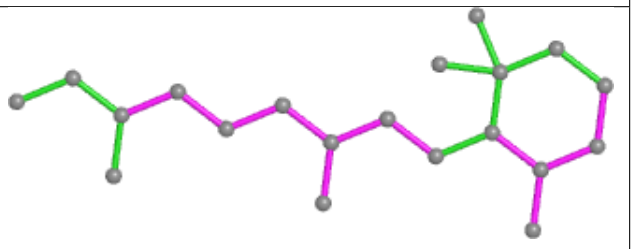


Rings

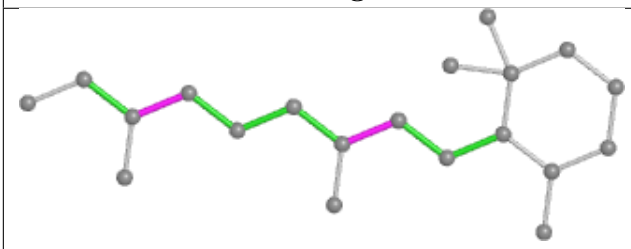
Ligand RET B 407



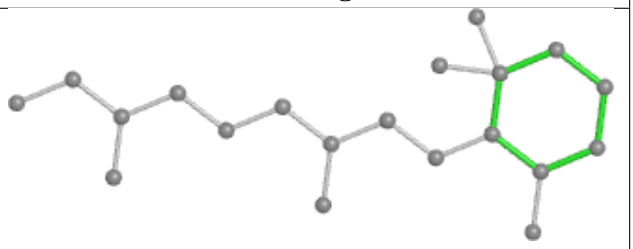
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.