WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Jul 8, 2025 – 03:16 PM JST

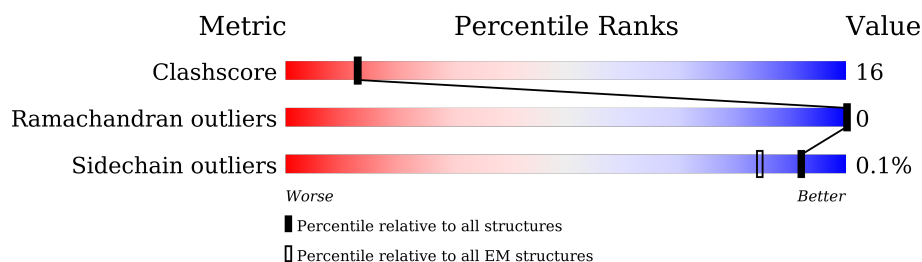|		
PDB ID	:	8YK0 / pdb_00008yk0
EMDB ID	:	EMD-39356
Title	:	Cryo-EM structure of human GPR156-Gi3 complex
Authors	:	Ma, X.Y.; Chen, L.N.; Liao, M.H.; Zhang, L.Y.; Xi, K.; Guo, J.M.
Deposited on	:	2024-03-03
Resolution	:	2.40 Å(reported)

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.40 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	Percentile Ranks	Value
Clashscore		16
Ramachandran outliers		0
Sidechain outliers		0.1%

Worse   *Better*

▐ Percentile relative to all structures
▯ Percentile relative to all EM structures

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	B	298	68% 32%
2	D	338	77% 23%
3	G	57	70% 30%
4	C	349	48% 15% • 36%
5	A	317	69% 30%

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
7	CLR	B	407	-	-	X	-

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2   Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 9831 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 Probable G-protein coupled receptor 156.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	B	298	Total 2226	C 1466	N 360	O 384	S 16	0	0

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	D	338	Total 2506	C 1555	N 442	O 490	S 19	0	0

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	57	Total 424	C 265	N 72	O 84	S 3	0	0

- Molecule 4 is a protein called Guanine nucleotide-binding protein G(i) subunit alpha-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	222	Total 1754	C 1121	N 292	O 331	S 10	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	47	ASN	SER	conflict	UNP P08754
C	203	ALA	GLY	conflict	UNP P08754
C	245	ALA	GLU	conflict	UNP P08754
C	326	SER	ALA	conflict	UNP P08754

- Molecule 5 is a protein called Probable G-protein coupled receptor 156.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	A	317	Total 2401	C 1572	N 393	O 418	S 18	0	0

- Molecule 6 is (21R,24R,27S)-24,27,28-trihydroxy-18,24-dioxo-19,23,25-trioxa-24lambda 5 -p hosphaoctacosan-21-yl (9Z)-octadec-9-enoate (CCD ID: MW9) (formula: $C_{42}H_{81}O_{10}P$).

MW9
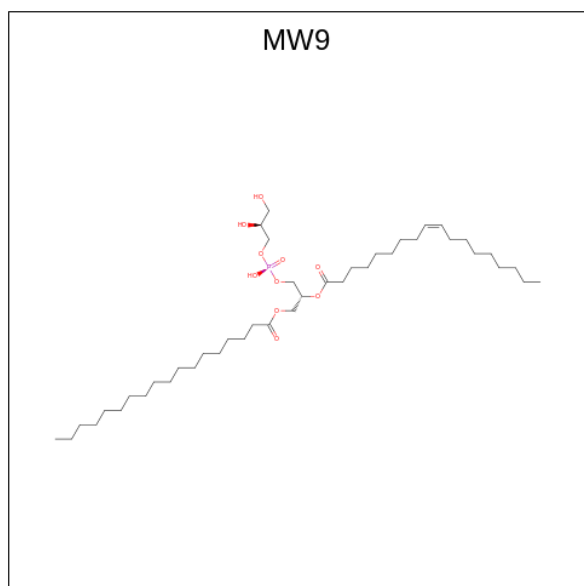
Mol	Chain	Residues	Atoms				AltConf
6	B	1	Total 53	C 42	O 10	P 1	0
6	B	1	Total 53	C 42	O 10	P 1	0
6	A	1	Total 53	C 42	O 10	P 1	0
6	A	1	Total 53	C 42	O 10	P 1	0

- Molecule 7 is CHOLESTEROL (CCD ID: CLR) (formula: $C_{27}H_{46}O$).

CLR

Mol	Chain	Residues	Atoms			AltConf
7	B	1	Total 28	C 27	O 1	0
7	B	1	Total 28	C 27	O 1	0
7	B	1	Total 28	C 27	O 1	0
7	B	1	Total 28	C 27	O 1	0
7	B	1	Total 28	C 27	O 1	0
7	B	1	Total 28	C 27	O 1	0
7	A	1	Total 28	C 27	O 1	0
7	A	1	Total 28	C 27	O 1	0
7	A	1	Total 28	C 27	O 1	0
7	A	1	Total 28	C 27	O 1	0
7	A	1	Total 28	C 27	O 1	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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.
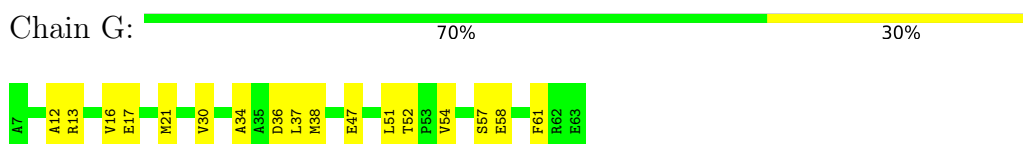
- Molecule 1: Probable G-protein coupled receptor 156

Chain B:
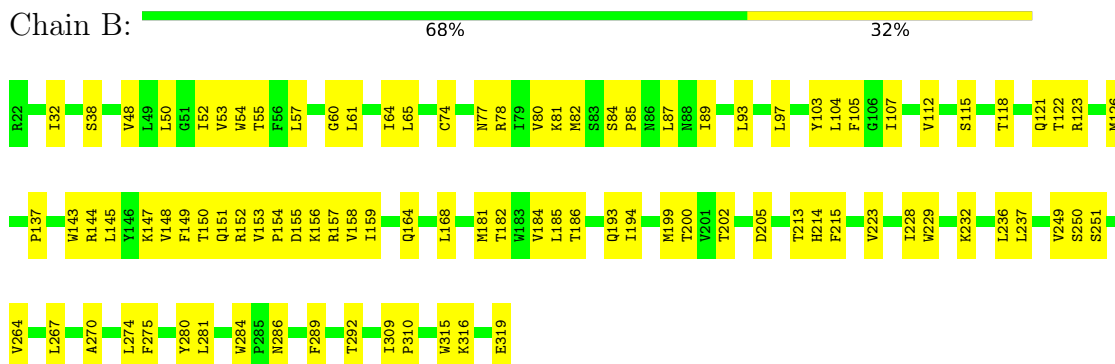
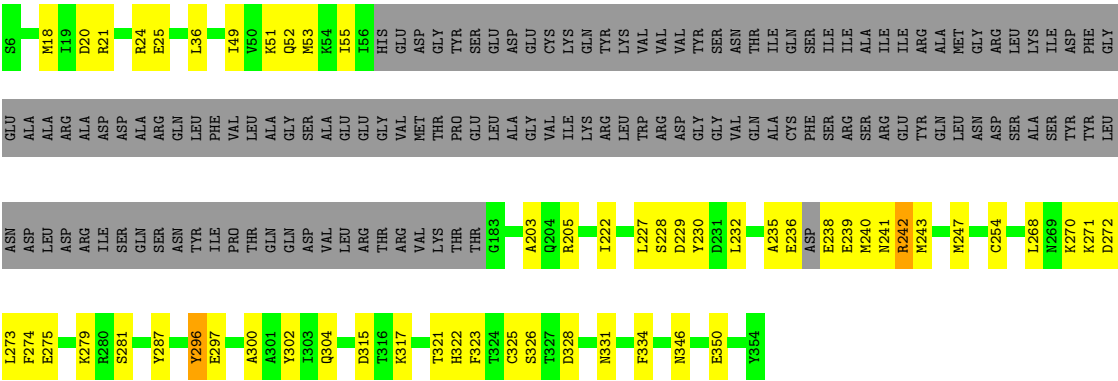- Molecule 2: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1

Chain D:
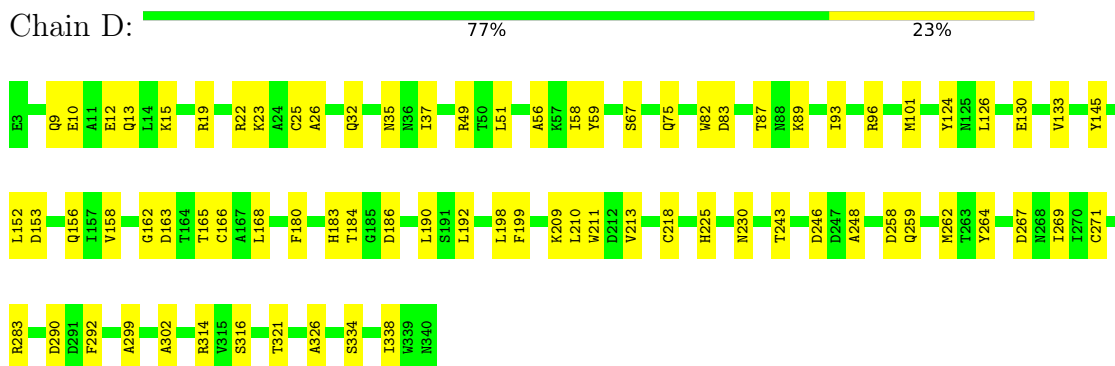
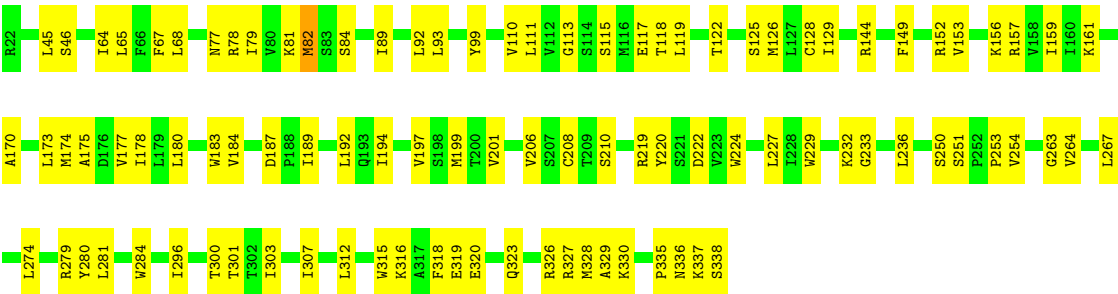- Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2

Chain G:

- Molecule 4: Guanine nucleotide-binding protein G(i) subunit alpha-3

Chain C:

S6 M18 I19 D20 R21 R24 E25 L36 I49 V50 K51 Q52 M53 K54 I55 I56 HIS GLU ASP GLY TYR SER GLU ASP GLU CYS LYS GLN TYR LYS VAL VAL VAL TYR SER ASN THR ILE GLN SER ILE ILE ALA ILE ILE ARG ALA MET GLY ARG LEU LYS ILE ASP PHE GLY

GLU ALA ALA ARG ALA ASP ASP ALA ARG GLN LEU PHE VAL LEU ALA GLY SER ALA GLU GLU GLY VAL MET THR PRO GLU LEU ALA GLY VAL ILE LYS ARG LEU TRP ARG ASP GLY GLY VAL GLN ILE ALA CYS PHE SER ARG SER ARG GLU TYR GLN LEU ASN ASP SER ALA SER TYR TYR LEU

ASN ASP LEU ASP ARG ILE SER GLN SER ASN TYR ILE PRO THR GLN GLN ASP VAL LEU ARG THR ARG VAL LYS THR THR G183 A203 Q204 R205 I222 L227 S228 D229 Y230 D231 L232 A235 E236 ASP E238 E239 M240 N241 R242 M243 M247 C254 L268 N269 K270 K271 D272

L273 F274 E275 K279 R280 S281 Y287 Y296 E297 A300 A301 Y302 I303 Q304 D315 T316 K317 T321 H322 F323 T324 C325 S326 T327 D328 N331 F334 N346 E350 Y354

• Molecule 5: Probable G-protein coupled receptor 156

Chain A:

69%   30%

R22 L45 S46 I64 L65 F66 F67 L68 N77 R78 I79 V80 K81 M82 S83 S84 I89 L92 L93 Y99 V110 L111 V112 G113 S114 S115 M116 E117 T118 L119 T122 S125 M126 L127 C128 I129 R144 F149 R152 V153 K156 R157 V158 I159 I160 K161

A170 L173 M174 A175 D176 V177 I178 L179 L180 W183 V184 D187 P188 I189 L192 Q193 I194 V197 S198 M199 T200 V201 V206 S207 C208 T209 S210 R219 Y220 S221 D222 V223 W224 L227 I228 W229 K232 G233 L236 S250 S251 P252 P253 V254 G263 V264 L267

L274 R279 Y280 L281 W284 I296 T300 T301 T302 I303 I307 L312 W315 K316 A317 F318 E319 E320 Q323 R326 R327 M328 A329 K330 P335 N336 K337 S338

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1153971	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	52	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	1500	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: CLR, MW9

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	B	0.32	0/2272	0.57	1/3103 (0.0%)
2	D	0.31	1/2552 (0.0%)	0.46	1/3473 (0.0%)
3	G	0.28	0/430	0.62	0/584
4	C	0.31	0/1783	0.55	2/2397 (0.1%)
5	A	0.38	1/2451 (0.0%)	0.54	3/3341 (0.1%)
All	All	0.33	2/9488 (0.0%)	0.53	7/12898 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	82	MET	C-N	11.47	1.49	1.33
2	D	292	PHE	C-N	5.95	1.42	1.33

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	C	242	ARG	N-CA-C	-7.96	103.31	112.87
4	C	296	TYR	N-CA-C	6.42	117.94	111.07
5	A	323	GLN	N-CA-C	-6.17	106.39	114.04
1	B	38	SER	CB-CA-C	-5.43	110.29	116.54
2	D	184	THR	N-CA-C	-5.34	105.99	112.88

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	B	2226	0	2277	88	0
2	D	2506	0	2348	51	0
3	G	424	0	414	19	0
4	C	1754	0	1710	43	0
5	A	2401	0	2455	95	0
6	A	106	0	0	4	0
6	B	106	0	0	1	0
7	A	140	0	230	32	0
7	B	168	0	276	41	0
All	All	9831	0	9710	319	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 16.

The worst 5 of 319 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:B:275:PHE:CE2	7:A:401:CLR:H21	1.98	0.98
7:B:407:CLR:H72	7:B:408:CLR:C7	1.95	0.97
5:A:192:LEU:CD1	5:A:194:ILE:HG23	1.97	0.94
5:A:192:LEU:HD13	5:A:194:ILE:HG23	1.52	0.88
7:B:404:CLR:H112	5:A:281:LEU:HD21	1.55	0.88

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	B	296/298 (99%)	280 (95%)	16 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	D	336/338 (99%)	328 (98%)	8 (2%)	0	100	100
3	G	55/57 (96%)	53 (96%)	2 (4%)	0	100	100
4	C	216/349 (62%)	209 (97%)	7 (3%)	0	100	100
5	A	315/317 (99%)	292 (93%)	23 (7%)	0	100	100
All	All	1218/1359 (90%)	1162 (95%)	56 (5%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	B	241/266 (91%)	241 (100%)	0	100	100
2	D	257/281 (92%)	257 (100%)	0	100	100
3	G	43/46 (94%)	42 (98%)	1 (2%)	45	66
4	C	184/306 (60%)	184 (100%)	0	100	100
5	A	263/284 (93%)	263 (100%)	0	100	100
All	All	988/1183 (84%)	987 (100%)	1 (0%)	92	97

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	G	54	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
5	A	323	GLN
5	A	314	GLN
5	A	265	ASN
5	A	193	GLN

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Mol	Chain	Res	Type
5	A	311	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 ⓘ

15 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	$\#|Z| > 2$
7	CLR	B	404	-	31,31,31	0.68	1 (3%)	48,48,48	1.80	11 (22%)
6	MW9	B	401	-	52,52,52	1.19	4 (7%)	55,58,58	1.17	3 (5%)
7	CLR	A	406	-	31,31,31	0.84	1 (3%)	48,48,48	1.70	10 (20%)
7	CLR	A	401	-	31,31,31	0.80	1 (3%)	48,48,48	1.39	7 (14%)
6	MW9	A	403	-	52,52,52	1.15	4 (7%)	55,58,58	1.21	3 (5%)
7	CLR	B	408	-	31,31,31	0.66	1 (3%)	48,48,48	1.81	12 (25%)
7	CLR	B	407	-	31,31,31	0.85	0	48,48,48	0.99	2 (4%)
6	MW9	A	404	-	52,52,52	1.14	4 (7%)	55,58,58	1.19	3 (5%)
7	CLR	A	407	-	31,31,31	0.67	1 (3%)	48,48,48	1.81	11 (22%)
7	CLR	B	405	-	31,31,31	0.67	1 (3%)	48,48,48	1.81	11 (22%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
7	CLR	B	403	-	31,31,31	0.67	1 (3%)	48,48,48	1.80	11 (22%)
6	MW9	B	402	-	52,52,52	1.13	4 (7%)	55,58,58	1.22	3 (5%)
7	CLR	B	406	-	31,31,31	0.66	1 (3%)	48,48,48	1.81	11 (22%)
7	CLR	A	405	-	31,31,31	0.66	1 (3%)	48,48,48	1.81	11 (22%)
7	CLR	A	402	-	31,31,31	0.67	1 (3%)	48,48,48	1.81	11 (22%)

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
7	CLR	B	404	-	-	0/10/68/68	0/4/4/4
6	MW9	B	401	-	-	34/57/57/57	-
7	CLR	A	406	-	-	4/10/68/68	0/4/4/4
7	CLR	A	401	-	-	2/10/68/68	0/4/4/4
6	MW9	A	403	-	-	26/57/57/57	-
7	CLR	B	408	-	-	0/10/68/68	0/4/4/4
7	CLR	B	407	-	-	4/10/68/68	0/4/4/4
6	MW9	A	404	-	-	33/57/57/57	-
7	CLR	A	407	-	-	0/10/68/68	0/4/4/4
7	CLR	B	405	-	-	0/10/68/68	0/4/4/4
7	CLR	B	403	-	-	0/10/68/68	0/4/4/4
6	MW9	B	402	-	-	33/57/57/57	-
7	CLR	B	406	-	-	0/10/68/68	0/4/4/4
7	CLR	A	405	-	-	0/10/68/68	0/4/4/4
7	CLR	A	402	-	-	0/10/68/68	0/4/4/4

The worst 5 of 26 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	401	MW9	C9-C8	-3.59	1.31	1.51
6	B	401	MW9	O1-C17	3.56	1.43	1.33
6	B	402	MW9	C9-C8	-3.19	1.33	1.51
6	A	403	MW9	C9-C8	-3.17	1.33	1.51
6	A	404	MW9	C9-C8	-3.17	1.33	1.51

The worst 5 of 120 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	B	406	CLR	C13-C17-C20	-5.91	110.23	119.49
7	A	402	CLR	C13-C17-C20	-5.89	110.26	119.49
7	B	404	CLR	C13-C17-C20	-5.88	110.27	119.49
7	A	405	CLR	C13-C17-C20	-5.84	110.34	119.49
7	B	408	CLR	C13-C17-C20	-5.84	110.35	119.49

There are no chirality outliers.

5 of 136 torsion outliers are listed below:

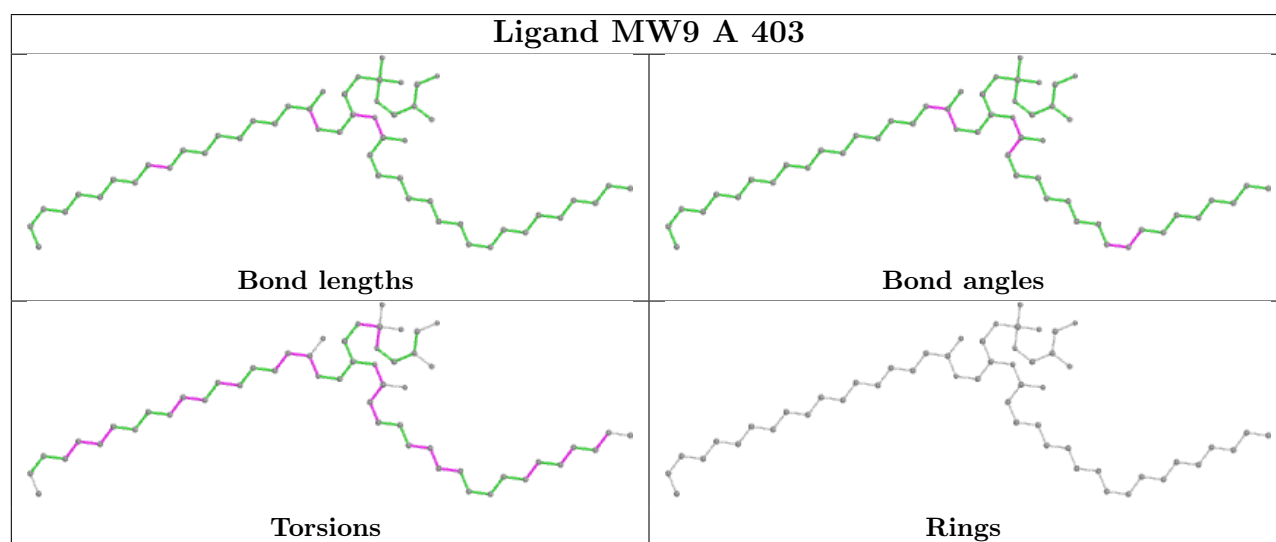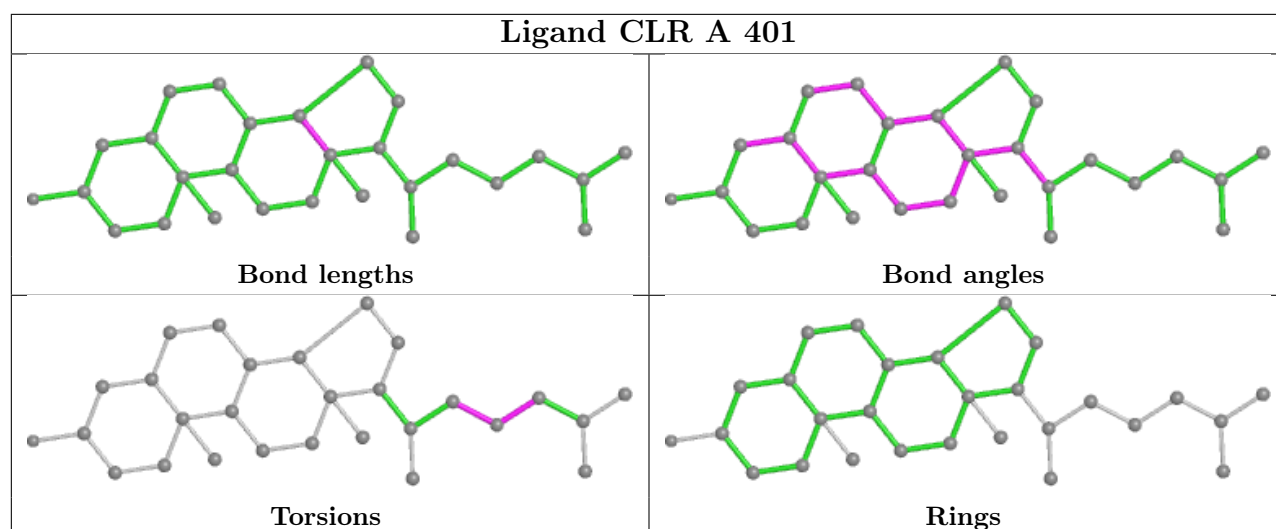| Mol	Chain	Res	Type	Atoms
6	B	401	MW9	O1-C18-C19-O8
6	B	401	MW9	C21-C22-C23-O6
6	B	401	MW9	C25-C24-O8-C19
6	B	401	MW9	C21-O5-P-O3
6	B	402	MW9	O9-C24-O8-C19

There are no ring outliers.

13 monomers are involved in 73 short contacts:

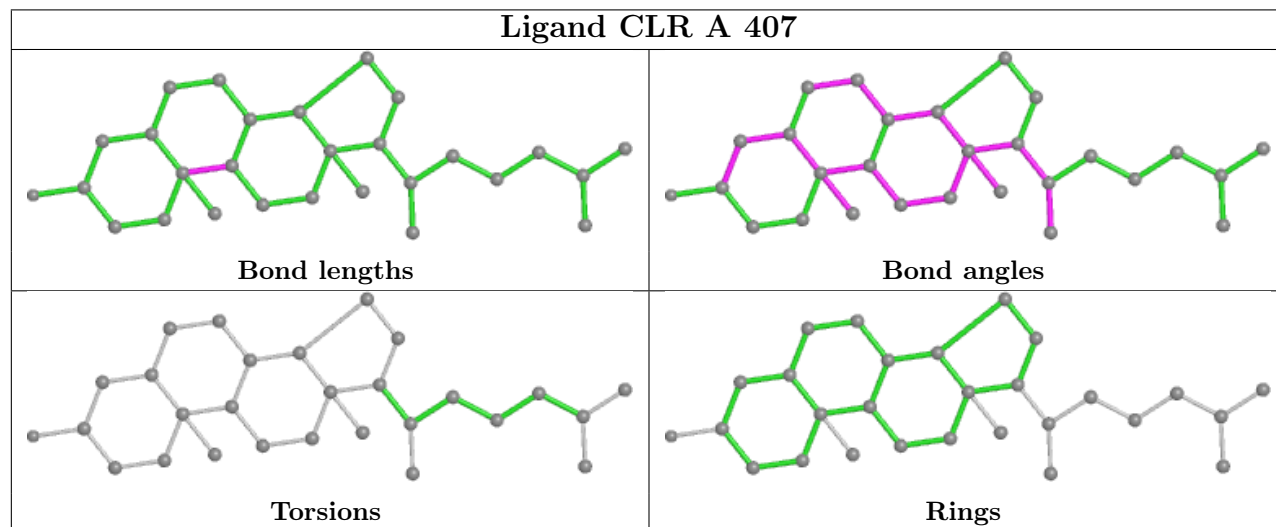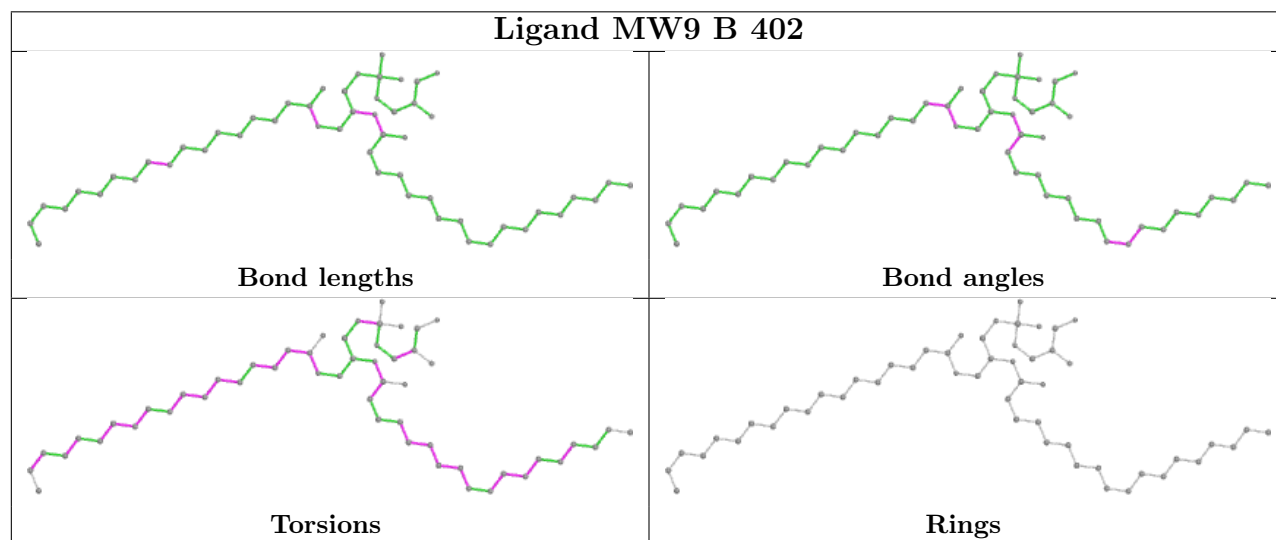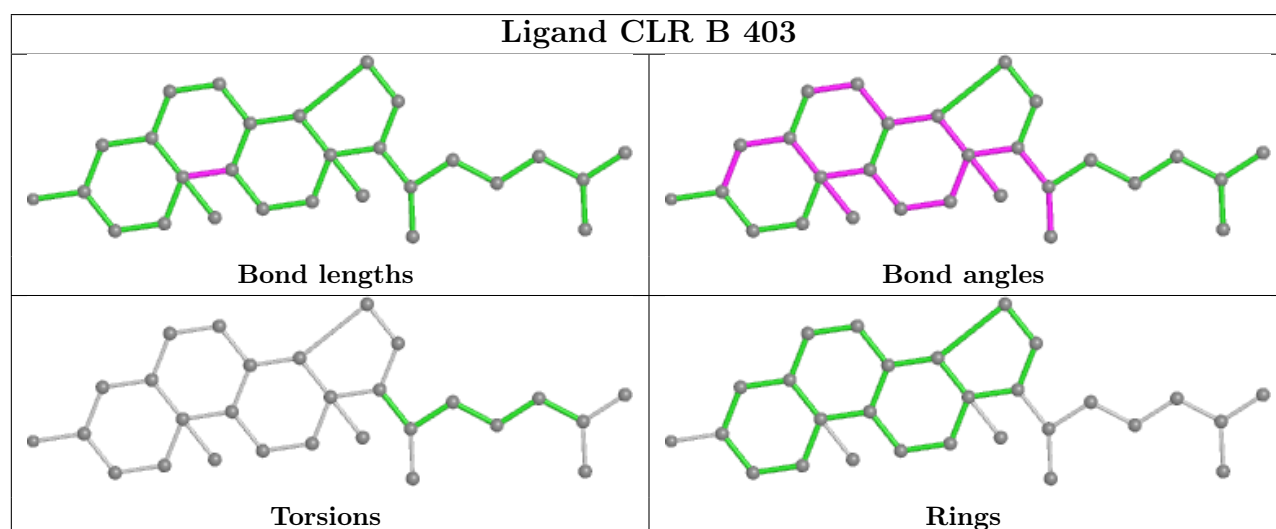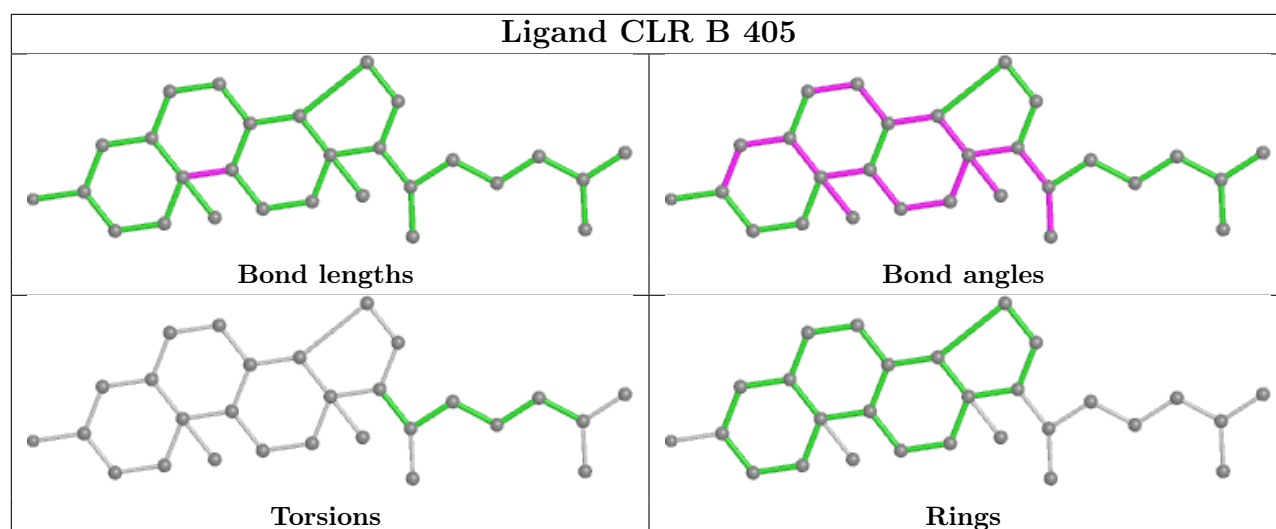| Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	404	CLR	5	0
6	B	401	MW9	1	0
7	A	406	CLR	2	0
7	A	401	CLR	14	0
6	A	403	MW9	4	0
7	B	408	CLR	19	0
7	B	407	CLR	22	0
7	A	407	CLR	2	0
7	B	405	CLR	2	0
7	B	403	CLR	4	0
7	B	406	CLR	2	0
7	A	405	CLR	11	0
7	A	402	CLR	3	0

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 CLR B 404	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand MW9 B 401	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLR A 406	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLR A 401

Bond lengths

Bond angles

Torsions

Rings

Ligand MW9 A 403

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR B 408

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR B 407

Bond lengths

Bond angles

Torsions

Rings

Ligand MW9 A 404

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR A 407

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR B 405

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR B 403

Bond lengths

Bond angles

Torsions

Rings

Ligand MW9 B 402

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR B 406

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR A 405

Bond lengths

Bond angles

Torsions

Rings

Ligand CLR A 402

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.