



# Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Jun 10, 2019 – 12:41 AM EDT

PDB ID : 6OG2  
EMDB ID: : EMD-20050  
Title : Focus classification structure of the hyperactive ClpB mutant K476C, bound to casein, post-state  
Authors : Rizo, A.R.; Lin, J.-B.; Gates, S.N.; Tse, E.; Bart, S.M.; Castellano, L.M.; Dimaio, F.; Shorter, J.; Southworth, D.R.  
Deposited on : 2019-04-01  
Resolution : 4.10 Å(reported)

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report for a publicly released PDB/EMDB entry.

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

---

MolProbity : 4.02b-467  
Mogul : 1.8.0 (224370), CSD as540be (2019)  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.3.2

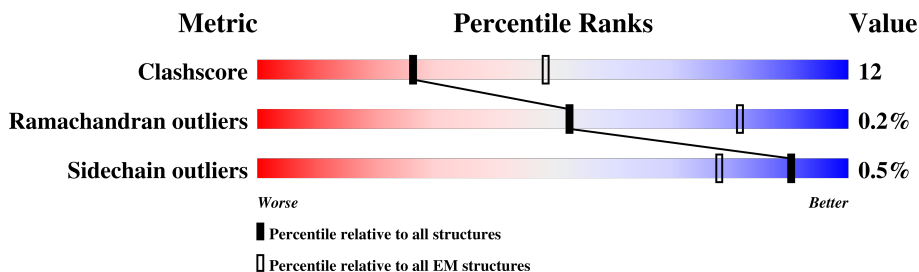
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 4.10 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	136327	1886
Ramachandran outliers	132723	1663
Sidechain outliers	132532	1531

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	867	46% 17% 37%
1	F	867	46% 18% 36%

## 2 Entry composition [i](#)

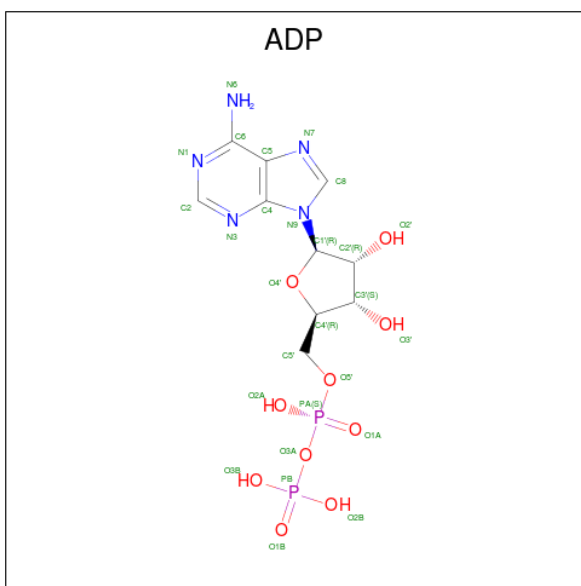
There are 2 unique types of molecules in this entry. The entry contains 8847 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Hyperactive disaggregase ClpB.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	F	558	Total	C	N	O	S	0	0
			4426	2779	806	826	15		
1	A	548	Total	C	N	O	S	0	0
			4340	2726	787	812	15		

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula:  $C_{10}H_{15}N_5O_{10}P_2$ ).



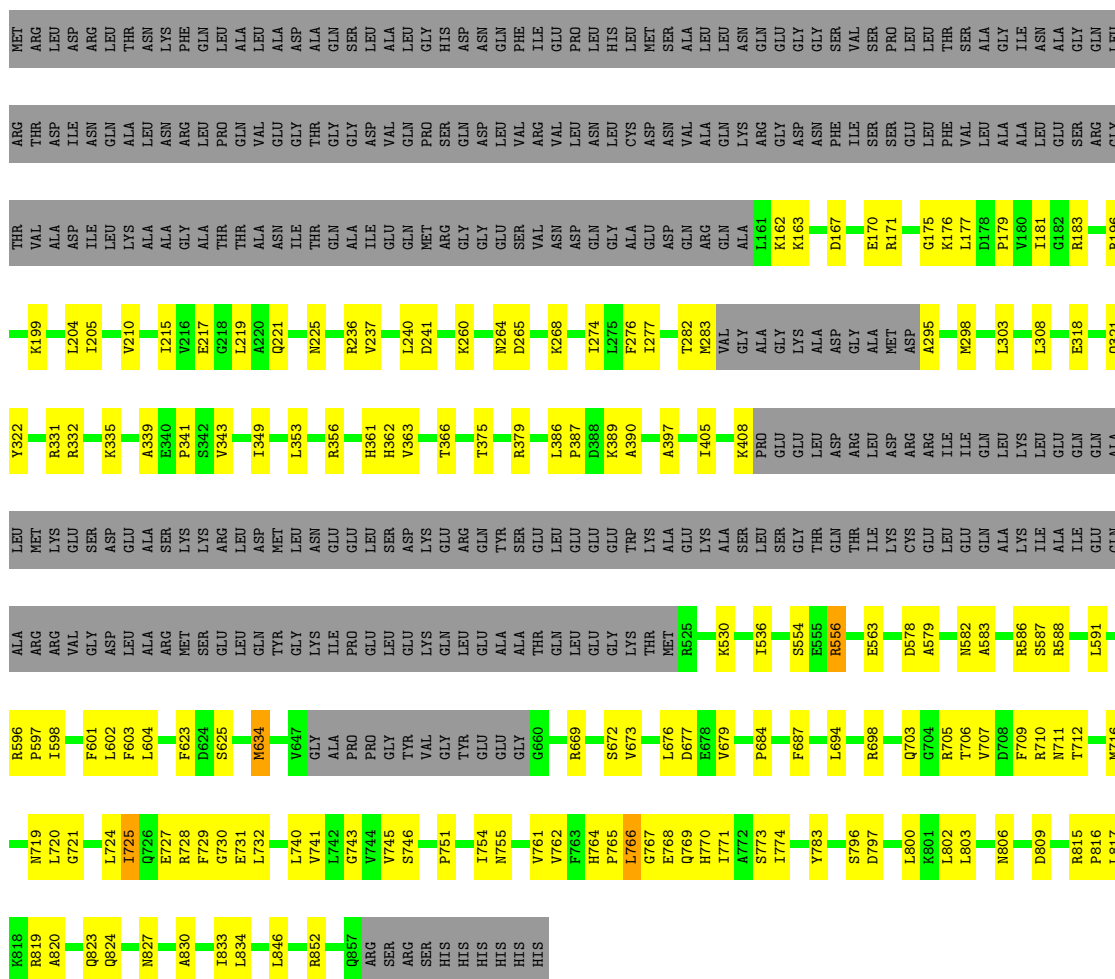
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
2	F	1	Total	C	N	O	P	0
			27	10	5	10	2	
2	A	1	Total	C	N	O	P	0
			54	20	10	20	4	
2	A	1	Total	C	N	O	P	0
			54	20	10	20	4	

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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: Hyperactive disaggregase ClpB

Chain F: 





## 4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	91601	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	56	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

## 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: ADP

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  >2	RMSZ	# Z  >2
1	A	0.32	0/4405	0.59	0/5940
1	F	0.31	0/4487	0.62	0/6048
All	All	0.31	0/8892	0.60	0/11988

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	4340	0	4404	96	0
1	F	4426	0	4515	122	0
2	A	54	0	24	1	0
2	F	27	0	12	0	0
All	All	8847	0	8955	215	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 12.

All (215) 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:F:802:LEU:CD2	1:F:803:LEU:HD12	1.61	1.29
1:F:724:LEU:O	1:F:725:ILE:HG13	1.40	1.22
1:F:802:LEU:CD2	1:F:803:LEU:CD1	2.27	1.13
1:F:802:LEU:HD22	1:F:803:LEU:CD1	1.78	1.13
1:F:802:LEU:HD23	1:F:803:LEU:HD12	1.14	1.07
1:F:732:LEU:H	1:F:766:LEU:HD22	1.22	1.03
1:F:803:LEU:HG	1:F:806:ASN:ND2	1.80	0.96
1:F:803:LEU:HG	1:F:806:ASN:HD21	1.30	0.94
1:F:724:LEU:O	1:F:725:ILE:CG1	2.21	0.89
1:F:732:LEU:H	1:F:766:LEU:CD2	1.95	0.79
1:F:816:PRO:HA	1:F:819:ARG:HB2	1.72	0.72
1:F:764:HIS:HB2	1:F:766:LEU:HG	1.72	0.70
1:F:634:MET:SD	1:F:679:VAL:HG13	2.34	0.67
1:A:230:GLU:HA	1:A:233:LYS:HG2	1.77	0.67
1:F:720:LEU:HD23	1:F:745:VAL:HA	1.78	0.65
1:F:732:LEU:N	1:F:766:LEU:HD22	2.05	0.65
1:F:260:LYS:HG2	1:F:264:ASN:HD22	1.61	0.65
1:F:732:LEU:O	1:F:766:LEU:CD2	2.44	0.64
1:F:177:LEU:HB2	1:F:221:GLN:HE21	1.61	0.64
1:A:202:PRO:HG2	1:A:311:VAL:HG13	1.79	0.64
1:F:181:ILE:HD12	1:F:349:ILE:HA	1.81	0.63
1:F:728:ARG:HB3	1:F:768:GLU:H	1.65	0.62
1:A:600:SER:HA	1:A:714:VAL:HG22	1.82	0.62
1:F:623:PHE:O	1:F:669:ARG:NH2	2.34	0.61
1:F:563:GLU:HG3	1:F:578:ASP:HA	1.82	0.61
1:F:586:ARG:HG2	1:F:591:LEU:HD23	1.83	0.61
1:F:362:HIS:HB3	1:F:405:ILE:HG12	1.81	0.61
1:A:559:LEU:HD11	1:A:585:ARG:HG3	1.84	0.60
1:F:803:LEU:CG	1:F:806:ASN:HD21	2.10	0.60
1:F:386:LEU:HA	1:F:389:LYS:HB2	1.85	0.59
1:F:588:ARG:HH12	1:F:711:ASN:HA	1.67	0.59
1:F:802:LEU:HD22	1:F:803:LEU:HD13	1.78	0.58
1:F:554:SER:OG	1:F:556:ARG:NH1	2.36	0.58
1:F:603:PHE:HB2	1:F:719:ASN:HA	1.83	0.58
1:A:673:VAL:HG23	1:A:713:VAL:HB	1.85	0.58
1:F:820:ALA:O	1:F:823:GLN:NE2	2.34	0.58
1:F:196:ARG:HH22	1:A:392:ASP:HB2	1.69	0.58
1:A:605:GLY:HA3	1:A:763:PHE:HB2	1.85	0.58
1:F:199:LYS:HD2	1:F:331:ARG:HG3	1.86	0.58
1:A:588:ARG:NH2	1:A:622:MET:SD	2.76	0.57
1:F:265:ASP:O	1:F:268:LYS:NZ	2.38	0.57
1:A:255:PHE:HE2	1:A:296:GLY:H	1.53	0.57

*Continued on next page...*



*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:221:GLN:O	1:F:225:ASN:ND2	2.37	0.57
1:F:583:ALA:O	1:F:587:SER:N	2.36	0.57
1:F:728:ARG:NH1	1:F:768:GLU:OE1	2.38	0.57
1:F:783:TYR:OH	1:F:824:GLN:NE2	2.38	0.57
1:A:720:LEU:HD22	1:A:745:VAL:HA	1.87	0.57
1:F:167:ASP:OD2	1:F:236:ARG:NH1	2.38	0.57
1:F:698:ARG:HE	1:F:706:THR:HG23	1.70	0.57
1:A:265:ASP:HA	1:A:268:LYS:HD3	1.87	0.56
1:A:193:VAL:HG12	1:A:196:ARG:HH21	1.71	0.56
1:F:241:ASP:N	1:F:241:ASP:OD1	2.36	0.56
1:F:240:LEU:HD22	1:F:277:ILE:HG23	1.88	0.56
1:F:732:LEU:HB2	1:F:766:LEU:HA	1.87	0.55
1:F:729:PHE:H	1:F:767:GLY:HA2	1.70	0.55
1:A:741:VAL:HA	1:A:744:VAL:HG12	1.87	0.55
1:A:780:LYS:HA	1:A:783:TYR:HB2	1.88	0.55
1:A:265:ASP:OD2	1:A:265:ASP:N	2.40	0.54
1:A:190:THR:HG21	1:A:215:ILE:HG21	1.87	0.54
1:A:789:ARG:NH1	1:A:833:ILE:O	2.40	0.54
1:F:724:LEU:O	1:F:725:ILE:CB	2.55	0.54
1:A:563:GLU:O	1:A:567:HIS:ND1	2.41	0.54
1:F:684:PRO:HA	1:F:687:PHE:HB2	1.89	0.54
1:F:698:ARG:HG3	1:F:707:VAL:H	1.72	0.54
1:F:162:LYS:NZ	1:F:163:LYS:HD2	2.23	0.54
1:F:751:PRO:O	1:F:755:ASN:ND2	2.40	0.54
1:F:597:PRO:HB3	1:F:694:LEU:HD22	1.90	0.54
1:F:237:VAL:HG22	1:F:274:ILE:HB	1.91	0.53
1:F:797:ASP:HA	1:F:800:LEU:HB2	1.90	0.53
1:A:646:LEU:HA	1:A:661:TYR:HB2	1.91	0.52
1:A:204:LEU:H	1:A:313:ALA:HA	1.74	0.52
1:F:604:LEU:HD13	1:F:721:GLY:HA2	1.91	0.52
1:A:592:ALA:HB1	1:A:596:ARG:HH21	1.74	0.52
1:F:588:ARG:NH2	1:F:712:THR:O	2.42	0.52
1:F:677:ASP:OD1	1:F:677:ASP:N	2.41	0.51
1:A:213:THR:HA	1:A:217:GLU:HG3	1.92	0.51
1:A:363:VAL:HA	1:A:529:ASN:HB2	1.92	0.51
1:A:361:HIS:NE2	1:A:395:ASP:OD1	2.44	0.51
1:F:765:PRO:O	1:F:766:LEU:O	2.28	0.51
1:F:823:GLN:HG3	1:F:852:ARG:HA	1.92	0.51
1:A:167:ASP:OD1	1:A:169:THR:OG1	2.26	0.51
1:A:283:MET:HE2	1:A:299:LEU:HD21	1.92	0.51
1:F:386:LEU:O	1:F:390:ALA:N	2.44	0.51

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:768:GLU:O	1:F:769:GLN:NE2	2.44	0.51
1:A:554:SER:HB2	1:A:557:GLU:HG2	1.91	0.51
1:A:296:GLY:O	1:A:300:LYS:NZ	2.44	0.51
1:A:741:VAL:O	1:A:745:VAL:N	2.42	0.51
1:F:833:ILE:HG22	1:F:834:LEU:HD22	1.92	0.51
1:F:366:THR:HB	1:F:530:LYS:HD2	1.93	0.50
1:F:303:LEU:HD22	1:F:308:LEU:HD11	1.94	0.50
1:A:806:ASN:HD21	1:A:821:ILE:HD11	1.76	0.50
1:F:167:ASP:HB3	1:F:170:GLU:HB2	1.93	0.50
1:A:563:GLU:HA	1:A:566:LEU:HB2	1.92	0.49
1:F:724:LEU:HD13	1:F:743:GLY:O	2.12	0.49
1:F:672:SER:OG	1:F:673:VAL:N	2.46	0.49
1:A:405:ILE:HG12	1:A:527:LEU:HA	1.94	0.49
1:F:331:ARG:NH2	1:A:388:ASP:OD2	2.43	0.49
1:F:175:GLY:HA2	1:F:221:GLN:HE22	1.77	0.49
1:F:318:GLU:O	1:F:321:GLN:NE2	2.40	0.48
1:F:730:GLY:HA3	1:F:774:ILE:HD11	1.95	0.48
1:F:802:LEU:CD2	1:F:803:LEU:HD11	2.34	0.48
1:F:215:ILE:O	1:F:219:LEU:N	2.45	0.48
1:F:771:ILE:HG23	1:F:817:LEU:HD12	1.96	0.48
1:A:741:VAL:HG12	1:A:745:VAL:HB	1.96	0.48
1:A:187:ILE:HA	1:A:190:THR:OG1	2.14	0.48
1:A:679:VAL:HB	1:A:718:SER:HB2	1.96	0.47
1:F:181:ILE:HB	1:F:349:ILE:HG12	1.96	0.47
1:F:361:HIS:HB2	1:F:363:VAL:HG22	1.95	0.47
1:F:603:PHE:HA	1:F:762:VAL:HG23	1.96	0.47
1:A:719:ASN:ND2	1:A:723:ASP:OD1	2.47	0.47
1:F:602:LEU:HD13	1:F:604:LEU:HD23	1.95	0.47
1:A:688:ASN:HA	1:A:691:LEU:HD13	1.97	0.47
1:F:379:ARG:O	1:F:379:ARG:NH1	2.40	0.47
1:A:190:THR:HG21	1:A:215:ILE:CG2	2.44	0.47
1:A:376:LEU:HD23	1:A:540:LEU:HD23	1.97	0.47
1:A:280:LEU:HA	1:A:283:MET:HG2	1.96	0.47
1:A:205:ILE:HB	1:A:337:PHE:HA	1.97	0.47
1:A:370:ILE:HA	1:A:394:ILE:HD11	1.97	0.47
1:A:628:ALA:H	1:A:629:MET:HE2	1.79	0.47
1:F:720:LEU:HB3	1:F:745:VAL:HG22	1.96	0.47
1:A:280:LEU:HD22	1:A:313:ALA:H	1.80	0.47
1:A:305:ARG:HG3	1:A:307:GLU:H	1.80	0.47
1:F:183:ARG:NH2	1:F:339:ALA:O	2.45	0.47
1:A:191:ILE:HG22	1:A:195:GLN:NE2	2.30	0.46

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:827:ASN:HA	1:F:830:ALA:HB3	1.97	0.46
1:F:588:ARG:NH1	1:F:710:ARG:O	2.49	0.46
1:F:596:ARG:HD3	1:F:597:PRO:HD2	1.97	0.46
1:F:625:SER:HB2	1:F:673:VAL:HG22	1.96	0.46
1:F:727:GLU:HG2	1:F:765:PRO:HA	1.98	0.46
1:F:809:ASP:OD1	1:F:809:ASP:N	2.47	0.46
1:F:815:ARG:HG3	1:F:816:PRO:HD3	1.96	0.46
1:A:263:LEU:HD23	1:A:266:LEU:HD12	1.97	0.46
1:F:601:PHE:HZ	1:F:741:VAL:HA	1.80	0.46
1:F:579:ALA:HA	1:F:582:ASN:HB2	1.98	0.46
1:F:796:SER:HB3	1:F:846:LEU:HB2	1.97	0.46
1:A:633:ASP:OD1	1:A:681:LYS:NZ	2.44	0.46
1:A:674:ILE:HD11	1:A:714:VAL:HG12	1.98	0.45
1:F:751:PRO:HA	1:F:754:ILE:HG12	1.98	0.45
1:A:559:LEU:HA	1:A:562:MET:HB2	1.99	0.45
1:F:204:LEU:HD13	1:F:215:ILE:HB	1.99	0.45
1:F:583:ALA:HA	1:F:586:ARG:HB2	1.98	0.45
1:F:740:LEU:HD22	1:F:743:GLY:HA3	1.97	0.45
1:A:205:ILE:O	1:A:338:VAL:N	2.50	0.45
1:F:171:ARG:HH21	1:F:176:LYS:HB3	1.83	0.44
1:F:343:VAL:HG11	1:F:375:THR:HG22	1.99	0.44
1:A:238:LEU:N	1:A:274:ILE:O	2.47	0.44
1:F:282:THR:OG1	1:F:283:MET:N	2.51	0.44
1:A:663:THR:O	1:A:667:ARG:N	2.40	0.44
1:A:386:LEU:HD13	1:A:389:LYS:HE2	1.99	0.44
1:A:767:GLY:HA3	1:A:770:HIS:HD2	1.83	0.44
1:A:564:GLN:O	1:A:568:HIS:ND1	2.42	0.44
1:A:758:ASP:OD2	1:A:759:GLU:N	2.51	0.44
1:A:180:VAL:HG11	1:A:218:GLY:HA3	2.00	0.43
1:A:779:LEU:HD11	1:A:803:LEU:HD11	2.00	0.43
1:F:676:LEU:HD21	1:F:679:VAL:HG21	2.00	0.43
1:A:663:THR:HG21	1:A:701:ASP:HB3	1.98	0.43
1:F:240:LEU:N	1:F:276:PHE:O	2.45	0.43
1:A:302:ALA:O	1:A:305:ARG:NH1	2.51	0.43
1:A:197:ARG:HG3	1:A:198:THR:HG23	2.00	0.43
1:A:785:ARG:HD2	1:A:789:ARG:HH21	1.83	0.43
1:A:213:THR:N	2:A:901:ADP:O1A	2.50	0.43
1:F:408:LYS:HA	1:F:408:LYS:HD3	1.79	0.43
1:A:405:ILE:HD13	1:A:527:LEU:HG	2.00	0.43
1:A:787:GLU:HG2	1:A:787:GLU:H	1.63	0.43
1:A:795:ILE:HB	1:A:798:GLU:HG3	2.00	0.43

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:598:ILE:HB	1:F:716:MET:HG2	2.01	0.43
1:A:265:ASP:O	1:A:269:GLN:NE2	2.43	0.42
1:A:539:VAL:HA	1:A:542:ARG:HD3	2.01	0.42
1:A:611:LYS:HB3	1:A:631:ARG:HH22	1.84	0.42
1:F:179:PRO:HD2	1:F:353:LEU:HD11	2.01	0.42
1:A:646:LEU:HG	1:A:647:VAL:HG23	2.01	0.42
1:F:204:LEU:HD22	1:F:215:ILE:HD12	2.02	0.42
1:A:190:THR:O	1:A:194:LEU:HB2	2.20	0.42
1:A:644:SER:HB2	1:A:649:ALA:HA	2.01	0.42
1:A:807:GLY:H	1:A:817:LEU:HD23	1.84	0.42
1:F:265:ASP:OD1	1:F:265:ASP:N	2.50	0.42
1:F:709:PHE:HA	1:F:712:THR:HB	2.01	0.42
1:A:171:ARG:HA	1:A:174:GLN:HE21	1.83	0.42
1:F:731:GLU:HG2	1:F:770:HIS:HB2	2.02	0.42
1:A:256:GLU:HG3	1:A:297:ASN:H	1.85	0.42
1:F:724:LEU:CD1	1:F:743:GLY:O	2.68	0.42
1:A:526:LEU:HG	1:A:526:LEU:O	2.20	0.42
1:F:210:VAL:HA	1:F:387:PRO:HB2	2.01	0.42
1:A:223:ILE:HD13	1:A:228:VAL:HG11	2.01	0.41
1:A:232:LEU:HD12	1:A:235:ARG:HD2	2.02	0.41
1:A:380:TYR:HB3	1:A:544:THR:HG21	2.02	0.41
1:A:681:LYS:HE3	1:A:681:LYS:HB2	1.90	0.41
1:F:295:ALA:O	1:F:322:TYR:OH	2.31	0.41
1:F:728:ARG:HB3	1:F:768:GLU:N	2.32	0.41
1:F:740:LEU:HA	1:F:740:LEU:HD23	1.81	0.41
1:F:298:MET:HA	1:A:244:ALA:HA	2.03	0.41
1:F:601:PHE:CZ	1:F:741:VAL:HA	2.56	0.41
1:A:689:ILE:HG13	1:A:690:LEU:HD13	2.02	0.41
1:A:777:ILE:H	1:A:777:ILE:HG12	1.59	0.41
1:F:283:MET:O	1:F:322:TYR:OH	2.38	0.41
1:F:341:PRO:HD2	1:F:387:PRO:HD3	2.01	0.41
1:A:245:LEU:HD23	1:A:245:LEU:HA	1.78	0.41
1:A:323:ILE:HD12	1:A:323:ILE:HA	1.91	0.41
1:A:610:GLY:HA2	1:A:613:GLU:HB3	2.01	0.41
1:F:205:ILE:HD12	1:F:335:LYS:HB3	2.03	0.41
1:A:171:ARG:HA	1:A:174:GLN:HG2	2.03	0.41
1:A:588:ARG:HD3	1:A:588:ARG:HA	1.94	0.41
1:A:738:LYS:HE3	1:A:738:LYS:HB3	1.87	0.41
1:F:321:GLN:HG3	1:F:321:GLN:H	1.74	0.41
1:F:770:HIS:CD2	1:F:773:SER:HB3	2.56	0.41
1:A:644:SER:OG	1:A:645:ARG:NH1	2.53	0.41

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:802:LEU:HD22	1:A:824:GLN:HE22	1.86	0.41
1:F:177:LEU:HD12	1:F:217:GLU:HG2	2.02	0.40
1:A:546:ILE:HD11	1:A:550:ARG:HB2	2.03	0.40
1:F:397:ALA:HB1	1:F:536:ILE:HG12	2.03	0.40
1:F:703:GLN:OE1	1:F:705:ARG:NH2	2.52	0.40
1:F:746:SER:HB3	1:F:754:ILE:HG21	2.02	0.40
1:F:579:ALA:HB3	1:F:761:VAL:HG11	2.02	0.40
1:A:606:PRO:HD2	1:A:609:VAL:HG11	2.04	0.40
1:A:664:GLU:HA	1:A:667:ARG:HB2	2.03	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	542/867 (62%)	486 (90%)	56 (10%)	0	100	100
1	F	550/867 (63%)	470 (86%)	78 (14%)	2 (0%)	36	76
All	All	1092/1734 (63%)	956 (88%)	134 (12%)	2 (0%)	53	84

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	725	ILE
1	F	766	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	463/726 (64%)	462 (100%)	1 (0%)	94	96
1	F	475/726 (65%)	471 (99%)	4 (1%)	83	91
All	All	938/1452 (65%)	933 (100%)	5 (0%)	90	95

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	332	ARG
1	F	356	ARG
1	F	556	ARG
1	F	634	MET
1	A	631	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	221	GLN
1	F	264	ASN
1	F	385	GLN
1	F	641	HIS
1	F	711	ASN
1	F	755	ASN
1	F	770	HIS
1	F	824	GLN
1	A	174	GLN
1	A	573	GLN
1	A	726	GLN
1	A	770	HIS
1	A	806	ASN
1	A	824	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

3 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	ADP	A	901	-	24,29,29	0.95	1 (4%)	25,45,45	1.43	3 (12%)
2	ADP	A	902	-	24,29,29	1.01	1 (4%)	25,45,45	1.39	3 (12%)
2	ADP	F	901	-	24,29,29	0.98	1 (4%)	25,45,45	1.51	3 (12%)

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	ADP	A	901	-	-	4/12/32/32	0/3/3/3
2	ADP	A	902	-	-	0/12/32/32	0/3/3/3
2	ADP	F	901	-	-	4/12/32/32	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	901	ADP	C5-C4	3.03	1.47	1.40
2	A	902	ADP	C5-C4	3.02	1.47	1.40
2	A	901	ADP	C5-C4	2.94	1.47	1.40

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	901	ADP	PA-O3A-PB	-3.58	121.19	132.57
2	A	902	ADP	PA-O3A-PB	-3.46	121.57	132.57
2	F	901	ADP	PA-O3A-PB	-3.46	121.58	132.57
2	F	901	ADP	N3-C2-N1	-3.25	123.44	128.68
2	A	902	ADP	N3-C2-N1	-3.12	123.65	128.68
2	A	901	ADP	N3-C2-N1	-3.03	123.80	128.68
2	A	901	ADP	C4-C5-N7	-2.67	106.62	109.40
2	F	901	ADP	C4-C5-N7	-2.44	106.86	109.40
2	A	902	ADP	C4-C5-N7	-2.10	107.21	109.40

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	901	ADP	C5'-O5'-PA-O3A
2	A	901	ADP	C5'-O5'-PA-O1A
2	A	901	ADP	C5'-O5'-PA-O2A
2	F	901	ADP	C3'-C4'-C5'-O5'
2	F	901	ADP	O4'-C4'-C5'-O5'
2	F	901	ADP	C5'-O5'-PA-O1A
2	A	901	ADP	O4'-C4'-C5'-O5'
2	A	901	ADP	C5'-O5'-PA-O3A

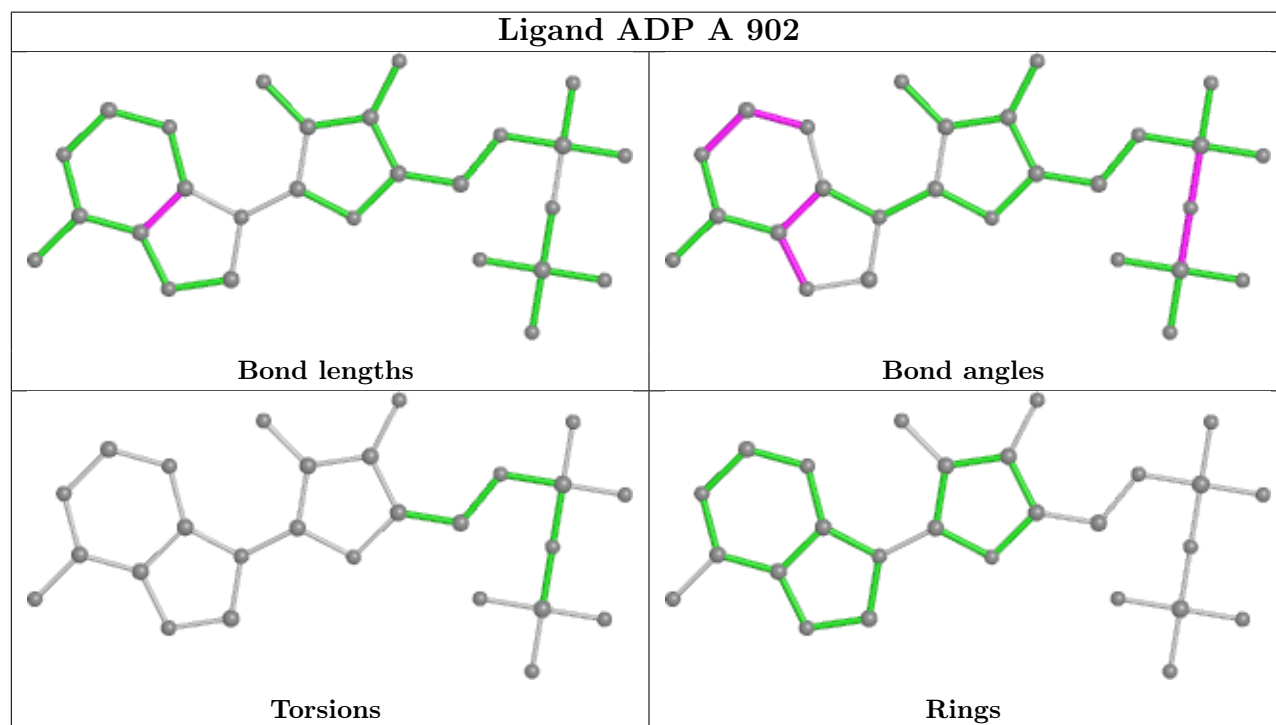
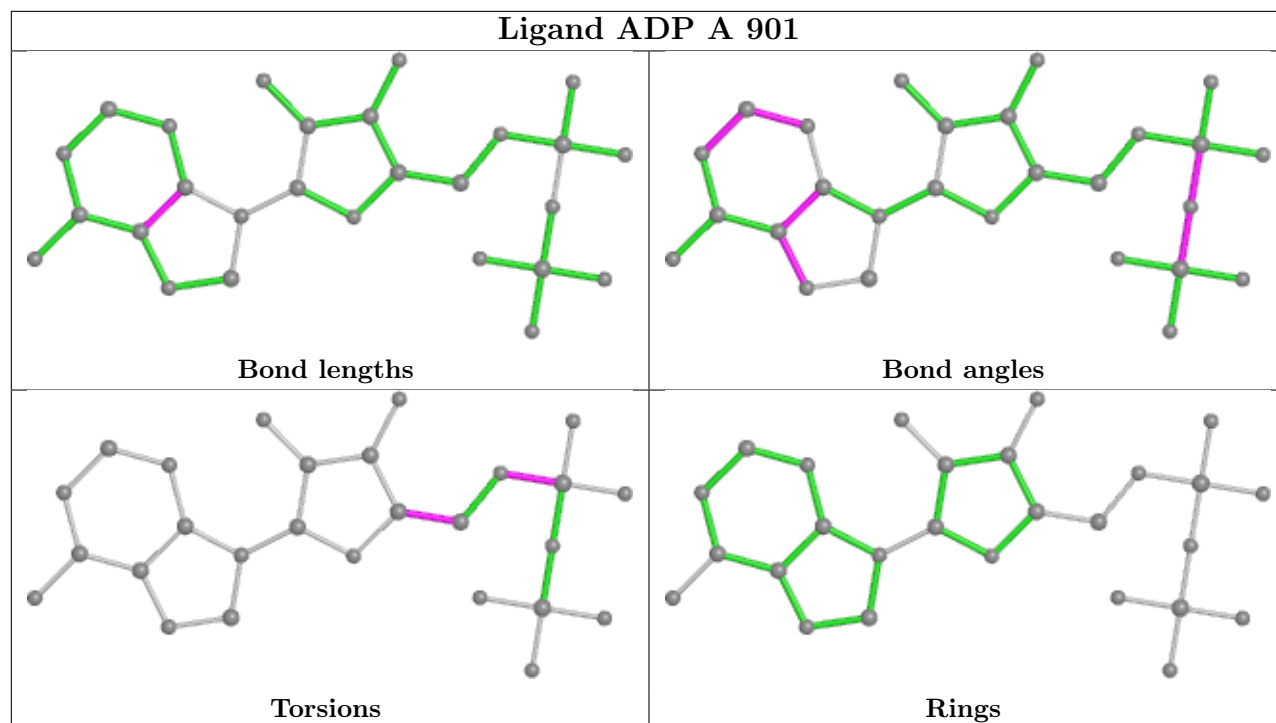
There are no ring outliers.

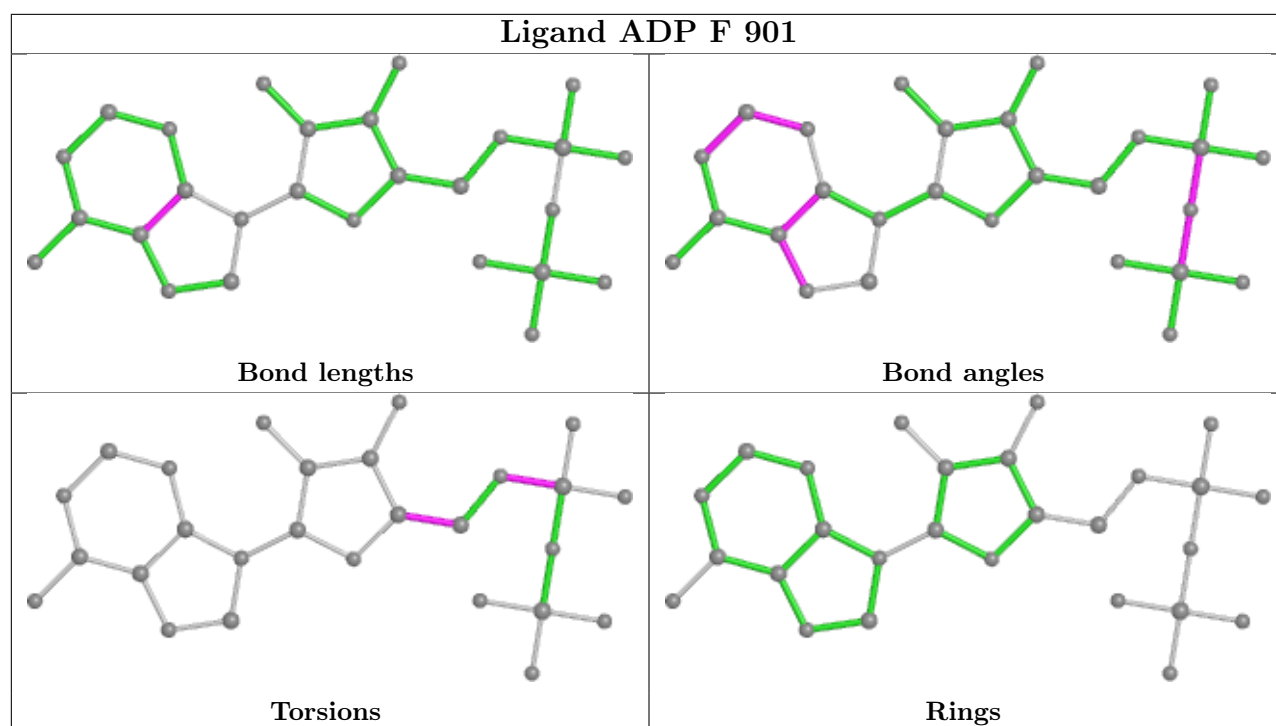
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	901	ADP	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.