



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 01:52 PM UTC

PDB ID : 2YU1 / pdb_00002yu1
Title : Crystal structure of hJHDM1A complexed with α -ketoglutarate
Authors : Han, Z.
Deposited on : 2007-04-05
Resolution : 2.70 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

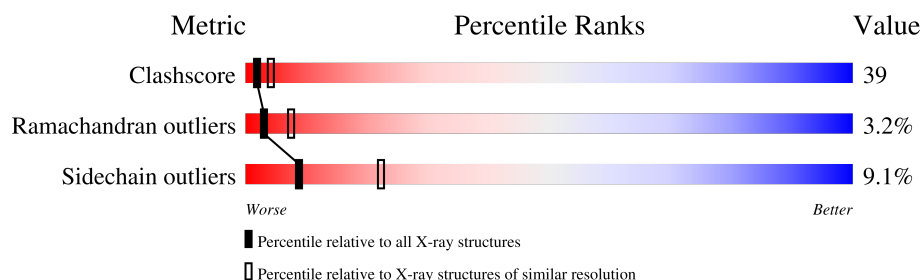
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)

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

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	451	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 3255 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 JmjC domain-containing histone demethylation protein 1A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	386	3170	2040	527	581	22	0	0	0

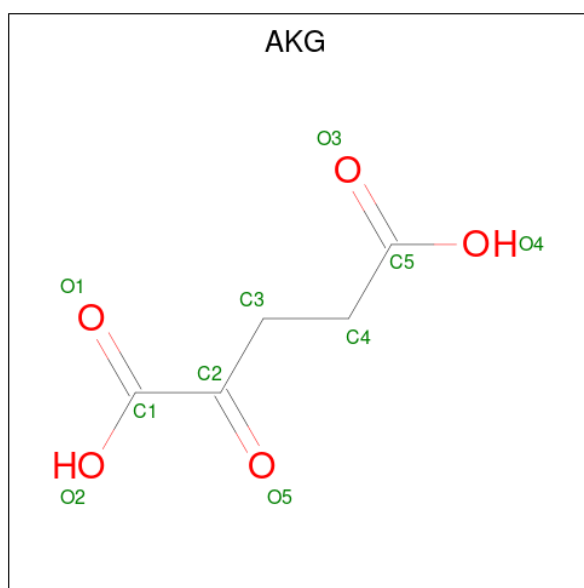
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	252	SER	LYS	engineered mutation	UNP Q9Y2K7

- Molecule 2 is FE (II) ION (CCD ID: FE2) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Fe 1 1	0	0

- Molecule 3 is 2-OXOGLUTARIC ACID (CCD ID: AKG) (formula: C₅H₆O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			10	5	5		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	74	Total	O	0	0
			74	74		

4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	81.25Å 81.25Å 124.01Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.70	Depositor
% Data completeness (in resolution range)	99.9 (20.00-2.70)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.238 , 0.273	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3255	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

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: FE2, AKG

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	0.51	2/3256 (0.1%)	1.03	19/4418 (0.4%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	307	MET	SD-CE	7.10	1.97	1.79
1	A	156	MET	SD-CE	-5.28	1.66	1.79

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	121	MET	N-CA-C	11.37	125.54	110.53
1	A	148	PHE	N-CA-C	8.23	123.54	113.17
1	A	255	ASP	N-CA-C	-7.05	104.95	113.97
1	A	117	LYS	N-CA-C	6.73	125.14	110.80
1	A	219	SER	N-CA-C	-6.58	100.73	110.46
1	A	91	PRO	N-CA-C	6.41	122.25	113.98
1	A	482	ILE	N-CA-C	6.35	117.03	107.75
1	A	151	THR	N-CA-C	6.20	118.03	110.41
1	A	90	ASP	CA-C-N	-6.03	113.91	119.82
1	A	90	ASP	C-N-CA	-6.03	113.91	119.82
1	A	171	ASN	N-CA-C	5.56	120.33	113.50
1	A	82	ASP	N-CA-C	5.45	117.11	108.67
1	A	254	GLY	N-CA-C	-5.41	107.78	115.30
1	A	454	THR	N-CA-C	-5.39	103.58	110.53
1	A	215	PHE	N-CA-C	5.26	117.66	110.24
1	A	235	PRO	N-CA-C	5.10	116.92	110.70
1	A	119	ILE	CA-C-N	5.10	127.87	120.79
1	A	119	ILE	C-N-CA	5.10	127.87	120.79
1	A	156	MET	N-CA-C	-5.02	107.54	113.97

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	3170	0	3063	244	0
2	A	1	0	0	0	0
3	A	10	0	4	3	0
4	A	74	0	0	11	0
All	All	3255	0	3067	244	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 39.

All (244) 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:168:TRP:HB3	1:A:332:MET:HE3	1.16	1.15
1:A:122:THR:HG23	1:A:125:GLN:HE22	1.13	1.08
1:A:281:GLY:HA2	1:A:311:ILE:HD11	1.39	1.04
1:A:100:MET:HG3	1:A:101:CYS:H	1.18	1.03
1:A:102:VAL:HA	1:A:151:THR:HG21	1.06	1.02
1:A:227:GLY:HA3	1:A:292:THR:HG22	1.42	1.00
1:A:102:VAL:HA	1:A:151:THR:CG2	1.95	0.95
1:A:102:VAL:CA	1:A:151:THR:HG21	1.97	0.94
1:A:174:PRO:HG2	1:A:177:LEU:HD12	1.51	0.92
1:A:172:MET:HG2	1:A:336:VAL:HG22	1.54	0.89
1:A:228:GLY:H	1:A:292:THR:HG21	1.37	0.88
1:A:228:GLY:H	1:A:292:THR:CG2	1.85	0.88
1:A:100:MET:HG3	1:A:101:CYS:N	1.92	0.83
1:A:64:VAL:HG11	1:A:512:PRO:HD3	1.61	0.82
1:A:122:THR:HG23	1:A:125:GLN:NE2	1.94	0.82
1:A:279:PRO:HG2	1:A:282:TRP:CD1	2.14	0.82
1:A:231:PHE:HB2	1:A:268:ILE:HG22	1.64	0.80
1:A:237:THR:HG22	1:A:240:ASN:H	1.46	0.79
1:A:115:THR:HG23	1:A:116:GLN:H	1.47	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:102:VAL:HG11	1:A:146:LEU:HD21	1.67	0.77
1:A:168:TRP:HB3	1:A:332:MET:CE	2.09	0.77
1:A:290:THR:O	1:A:292:THR:HG23	1.85	0.77
1:A:81:SER:HB2	1:A:86:ILE:HD11	1.68	0.76
1:A:50:ASN:HB3	4:A:763:HOH:O	1.86	0.76
1:A:111:MET:HG3	1:A:117:LYS:H	1.51	0.76
1:A:256:ILE:HD13	1:A:261:ARG:NH1	2.01	0.75
1:A:91:PRO:HA	1:A:225:HIS:CE1	2.20	0.75
1:A:98:VAL:O	1:A:102:VAL:HG22	1.86	0.74
1:A:168:TRP:O	1:A:172:MET:HB2	1.88	0.73
1:A:107:MET:SD	1:A:122:THR:HG22	2.28	0.73
1:A:512:PRO:HG2	1:A:515:GLN:NE2	2.04	0.72
1:A:205:ARG:HG3	1:A:289:PRO:O	1.89	0.72
1:A:253:GLN:HG2	4:A:717:HOH:O	1.90	0.72
1:A:228:GLY:O	1:A:292:THR:HG21	1.93	0.69
1:A:93:PHE:CE1	1:A:156:MET:HE3	2.28	0.68
1:A:109:ASP:HA	1:A:119:ILE:HG22	1.75	0.68
1:A:113:VAL:HG11	1:A:207:CYS:HB2	1.75	0.68
1:A:112:ASP:O	1:A:114:ASN:N	2.27	0.68
1:A:197:GLN:HG2	4:A:746:HOH:O	1.93	0.68
1:A:338:GLU:HG2	1:A:349:HIS:HB2	1.75	0.67
1:A:168:TRP:CB	1:A:332:MET:HE3	2.09	0.67
1:A:279:PRO:HG2	1:A:282:TRP:NE1	2.10	0.66
1:A:288:THR:HG22	1:A:290:THR:O	1.97	0.65
1:A:144:ILE:CA	1:A:201:LEU:HD12	2.26	0.65
1:A:495:LEU:HD23	1:A:499:LEU:HD12	1.77	0.65
1:A:109:ASP:HA	1:A:119:ILE:CG2	2.27	0.65
1:A:93:PHE:HE1	1:A:156:MET:HE3	1.60	0.64
1:A:341:VAL:O	1:A:345:THR:HB	1.97	0.64
1:A:121:MET:CE	1:A:126:TRP:HA	2.27	0.64
1:A:109:ASP:CA	1:A:119:ILE:HG22	2.28	0.63
1:A:169:VAL:HB	1:A:197:GLN:NE2	2.13	0.63
1:A:100:MET:HE2	1:A:101:CYS:SG	2.40	0.61
1:A:360:SER:HB3	4:A:772:HOH:O	1.98	0.61
1:A:144:ILE:HA	1:A:201:LEU:HD12	1.81	0.61
1:A:115:THR:O	1:A:116:GLN:HB3	2.00	0.61
1:A:112:ASP:C	1:A:114:ASN:H	2.09	0.60
1:A:103:GLY:O	1:A:106:ARG:HB3	2.01	0.60
1:A:57:MET:HE3	1:A:76:LEU:HD22	1.83	0.60
1:A:87:LYS:HG2	1:A:158:GLN:CB	2.31	0.60
1:A:113:VAL:HG11	1:A:207:CYS:CB	2.32	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:485:GLU:CD	1:A:485:GLU:H	2.10	0.60
1:A:110:VAL:H	1:A:119:ILE:HA	1.66	0.60
1:A:142:ASN:ND2	1:A:203:SER:OG	2.35	0.59
1:A:317:ARG:HA	4:A:757:HOH:O	2.02	0.59
1:A:280:SER:HB2	4:A:707:HOH:O	2.01	0.59
1:A:228:GLY:H	1:A:292:THR:HG22	1.67	0.59
1:A:203:SER:HB3	1:A:207:CYS:SG	2.42	0.59
1:A:494:ILE:O	1:A:498:GLU:HG3	2.03	0.58
1:A:37:THR:HB	1:A:255:ASP:HA	1.85	0.58
1:A:227:GLY:CA	1:A:292:THR:HG22	2.26	0.58
1:A:351:THR:O	1:A:355:GLN:HG3	2.04	0.57
1:A:154:GLU:C	1:A:156:MET:H	2.11	0.57
1:A:124:ALA:HB3	1:A:125:GLN:OE1	2.05	0.57
1:A:95:VAL:O	1:A:98:VAL:HB	2.04	0.57
1:A:148:PHE:CD1	1:A:153:LEU:HB3	2.40	0.56
1:A:301:HIS:CD2	1:A:303:PHE:H	2.23	0.56
1:A:129:TYR:CE2	1:A:141:TYR:HB2	2.40	0.56
1:A:121:MET:HE2	1:A:126:TRP:CA	2.36	0.56
1:A:221:TRP:HZ3	4:A:734:HOH:O	1.88	0.55
1:A:101:CYS:O	1:A:151:THR:HB	2.07	0.55
1:A:159:ARG:HB3	1:A:221:TRP:CH2	2.41	0.55
1:A:212:HIS:CE1	3:A:701:AKG:O2	2.59	0.55
1:A:36:ARG:HH11	1:A:36:ARG:HB2	1.71	0.55
1:A:176:HIS:HA	1:A:361:MET:HE1	1.88	0.55
1:A:213:VAL:HG11	1:A:311:ILE:HD13	1.86	0.55
1:A:318:THR:O	1:A:318:THR:HG22	2.06	0.54
1:A:351:THR:HA	1:A:483:GLU:HG2	1.89	0.54
1:A:226:GLN:HG2	1:A:293:LEU:HB3	1.90	0.54
1:A:323:LYS:HB2	1:A:324:PHE:CD1	2.42	0.54
1:A:132:THR:O	1:A:133:PRO:C	2.48	0.54
1:A:172:MET:HG3	1:A:336:VAL:HA	1.89	0.53
1:A:81:SER:CB	1:A:86:ILE:HD11	2.38	0.53
1:A:175:ARG:HD2	1:A:517:PRO:C	2.33	0.53
1:A:121:MET:CE	1:A:126:TRP:CA	2.86	0.53
1:A:301:HIS:HD2	1:A:303:PHE:H	1.57	0.53
1:A:478:VAL:HG21	1:A:485:GLU:HG2	1.91	0.53
1:A:160:PRO:HG2	1:A:163:VAL:CG2	2.38	0.52
1:A:121:MET:HE2	1:A:126:TRP:HA	1.92	0.52
1:A:103:GLY:O	1:A:106:ARG:CB	2.58	0.52
1:A:159:ARG:HB2	1:A:160:PRO:HD2	1.91	0.52
1:A:160:PRO:HB2	4:A:745:HOH:O	2.08	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:331:GLU:N	1:A:331:GLU:OE1	2.43	0.52
1:A:87:LYS:HG2	1:A:158:GLN:HB3	1.90	0.52
1:A:93:PHE:CE1	1:A:156:MET:CE	2.92	0.52
1:A:111:MET:HG3	1:A:117:LYS:N	2.23	0.52
1:A:115:THR:O	1:A:116:GLN:CB	2.58	0.52
1:A:89:PRO:O	1:A:90:ASP:C	2.53	0.51
1:A:115:THR:HG23	1:A:116:GLN:N	2.20	0.51
1:A:224:ILE:HG22	1:A:272:GLN:HA	1.93	0.51
1:A:323:LYS:HD2	1:A:324:PHE:HE1	1.75	0.51
1:A:110:VAL:HG22	1:A:143:VAL:HG22	1.91	0.51
1:A:121:MET:HE2	1:A:126:TRP:HB2	1.93	0.51
1:A:92:ASP:OD2	1:A:92:ASP:N	2.43	0.51
1:A:111:MET:HG2	1:A:112:ASP:N	2.26	0.51
1:A:213:VAL:CG1	1:A:311:ILE:HD13	2.40	0.51
1:A:111:MET:CE	1:A:113:VAL:HA	2.41	0.50
1:A:305:ILE:N	1:A:306:PRO:HD2	2.26	0.50
1:A:109:ASP:HA	1:A:119:ILE:HB	1.93	0.50
1:A:324:PHE:CD1	1:A:324:PHE:N	2.80	0.50
1:A:109:ASP:HA	1:A:119:ILE:CB	2.42	0.50
1:A:69:ARG:NH1	1:A:508:LEU:HD13	2.27	0.50
1:A:133:PRO:HG2	1:A:136:GLU:HB2	1.94	0.49
1:A:144:ILE:CB	1:A:201:LEU:HD12	2.43	0.49
1:A:354:PHE:HB3	4:A:747:HOH:O	2.13	0.49
1:A:473:LEU:CD2	1:A:473:LEU:H	2.25	0.49
1:A:144:ILE:HB	1:A:201:LEU:HD12	1.94	0.49
1:A:100:MET:CG	1:A:101:CYS:N	2.69	0.49
1:A:121:MET:HE3	1:A:125:GLN:HB2	1.94	0.49
1:A:106:ARG:O	1:A:107:MET:C	2.56	0.48
1:A:102:VAL:HG23	1:A:103:GLY:N	2.29	0.48
1:A:462:ARG:HD3	4:A:764:HOH:O	2.13	0.48
1:A:36:ARG:O	1:A:36:ARG:HG3	2.12	0.48
1:A:113:VAL:CG2	1:A:140:LEU:HD13	2.42	0.48
1:A:111:MET:CG	1:A:116:GLN:HA	2.43	0.48
1:A:515:GLN:HG3	1:A:516:TRP:CE3	2.49	0.48
1:A:515:GLN:HG3	1:A:516:TRP:CZ3	2.48	0.48
1:A:172:MET:SD	1:A:514:VAL:HG11	2.54	0.48
1:A:314:ILE:HA	1:A:317:ARG:NH1	2.28	0.48
1:A:147:GLU:HG2	1:A:198:LYS:O	2.13	0.47
1:A:211:PHE:HD2	1:A:283:ILE:HG22	1.79	0.47
1:A:334:TRP:HB2	1:A:479:PRO:HD3	1.96	0.47
1:A:213:VAL:HG11	1:A:311:ILE:CD1	2.44	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:231:PHE:HB2	1:A:268:ILE:CG2	2.38	0.47
1:A:170:ASP:O	1:A:517:PRO:HB3	2.14	0.47
1:A:63:ASN:O	1:A:66:TYR:HB3	2.14	0.47
1:A:201:LEU:H	1:A:201:LEU:HD22	1.79	0.47
1:A:512:PRO:HG2	1:A:515:GLN:HE22	1.75	0.47
1:A:516:TRP:O	1:A:517:PRO:C	2.56	0.47
1:A:478:VAL:CG2	1:A:485:GLU:HG2	2.45	0.47
1:A:495:LEU:CD2	1:A:499:LEU:HD12	2.44	0.47
1:A:121:MET:HE1	1:A:126:TRP:HA	1.97	0.47
1:A:235:PRO:HB3	1:A:282:TRP:CH2	2.50	0.47
1:A:234:ILE:HB	1:A:283:ILE:HB	1.96	0.47
1:A:249:LEU:C	1:A:251:GLY:H	2.22	0.47
1:A:160:PRO:HG2	1:A:163:VAL:HG23	1.96	0.46
1:A:226:GLN:O	1:A:226:GLN:HG3	2.14	0.46
1:A:514:VAL:O	1:A:515:GLN:NE2	2.48	0.46
1:A:126:TRP:HZ3	1:A:141:TYR:HB3	1.80	0.46
1:A:42:GLU:HG2	1:A:46:THR:CG2	2.45	0.46
1:A:201:LEU:HD22	1:A:201:LEU:N	2.30	0.46
1:A:306:PRO:HD3	1:A:460:GLY:HA2	1.97	0.46
1:A:42:GLU:O	1:A:46:THR:HG23	2.16	0.45
1:A:346:ASN:O	1:A:346:ASN:ND2	2.50	0.45
1:A:148:PHE:O	1:A:150:HIS:N	2.50	0.45
1:A:231:PHE:O	1:A:267:ARG:HA	2.16	0.45
1:A:95:VAL:HG21	1:A:130:TYR:CD2	2.51	0.45
1:A:345:THR:O	1:A:345:THR:CG2	2.64	0.45
1:A:360:SER:O	1:A:364:GLU:HG3	2.17	0.45
1:A:129:TYR:OH	1:A:139:LYS:O	2.26	0.45
1:A:488:LEU:O	1:A:492:VAL:HG23	2.17	0.45
1:A:98:VAL:HG12	1:A:123:MET:HE2	1.98	0.45
1:A:172:MET:CG	1:A:336:VAL:HA	2.47	0.45
1:A:39:ASP:OD1	1:A:41:GLU:HB2	2.16	0.45
1:A:50:ASN:ND2	1:A:50:ASN:H	2.15	0.45
1:A:350:LEU:HA	1:A:481:GLY:O	2.17	0.45
1:A:134:GLU:HG3	1:A:205:ARG:CZ	2.46	0.44
1:A:334:TRP:CZ3	1:A:485:GLU:HB3	2.52	0.44
1:A:361:MET:HA	1:A:364:GLU:OE1	2.17	0.44
1:A:113:VAL:HG22	1:A:140:LEU:HB3	1.99	0.44
1:A:175:ARG:HD3	4:A:741:HOH:O	2.17	0.44
1:A:62:PHE:O	1:A:162:THR:OG1	2.28	0.44
1:A:110:VAL:O	1:A:117:LYS:O	2.36	0.44
1:A:228:GLY:N	1:A:292:THR:CG2	2.68	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:106:ARG:HG2	1:A:106:ARG:HH11	1.83	0.44
1:A:117:LYS:O	1:A:119:ILE:N	2.51	0.44
1:A:117:LYS:O	1:A:118:GLY:C	2.61	0.43
1:A:361:MET:O	1:A:364:GLU:HB2	2.18	0.43
1:A:44:LEU:HD21	1:A:287:TYR:CD2	2.54	0.43
1:A:121:MET:CE	1:A:126:TRP:N	2.81	0.43
1:A:148:PHE:C	1:A:150:HIS:H	2.27	0.43
1:A:328:PHE:HA	1:A:331:GLU:OE2	2.18	0.43
1:A:252:SER:O	1:A:254:GLY:N	2.51	0.43
1:A:105:ARG:O	1:A:105:ARG:HG2	2.19	0.43
1:A:516:TRP:CE3	1:A:516:TRP:N	2.86	0.43
1:A:77:ILE:HD11	1:A:268:ILE:HG12	1.99	0.43
1:A:104:SER:C	1:A:106:ARG:N	2.74	0.43
1:A:112:ASP:C	1:A:114:ASN:N	2.71	0.43
1:A:154:GLU:C	1:A:156:MET:N	2.77	0.43
1:A:229:LYS:NZ	1:A:288:THR:OG1	2.49	0.43
1:A:220:VAL:HG21	1:A:222:TYR:CZ	2.54	0.43
1:A:504:PRO:O	1:A:508:LEU:HG	2.18	0.43
1:A:221:TRP:HA	1:A:276:PHE:O	2.18	0.43
1:A:270:LEU:HD11	1:A:276:PHE:CD1	2.54	0.43
1:A:237:THR:CG2	1:A:239:HIS:HB3	2.50	0.42
1:A:67:ILE:HD12	1:A:67:ILE:N	2.34	0.42
1:A:122:THR:H	1:A:125:GLN:NE2	2.17	0.42
1:A:309:LEU:HD12	1:A:463:CYS:HB3	2.01	0.42
1:A:191:MET:O	1:A:191:MET:HG3	2.19	0.42
1:A:354:PHE:CZ	1:A:480:THR:HG23	2.54	0.42
1:A:354:PHE:HZ	1:A:480:THR:HG23	1.84	0.42
1:A:211:PHE:HA	1:A:284:HIS:O	2.20	0.42
1:A:99:LYS:HA	1:A:123:MET:CE	2.50	0.42
1:A:112:ASP:OD2	1:A:114:ASN:HB2	2.20	0.42
1:A:305:ILE:HG21	1:A:464:LEU:HG	2.02	0.41
1:A:333:CYS:HB3	1:A:464:LEU:HD22	2.02	0.41
1:A:476:LYS:O	1:A:477:CYS:C	2.63	0.41
1:A:91:PRO:HA	1:A:225:HIS:NE2	2.36	0.41
1:A:110:VAL:HG21	1:A:121:MET:HG3	2.02	0.41
1:A:93:PHE:HE1	1:A:156:MET:CE	2.28	0.41
1:A:148:PHE:C	1:A:150:HIS:N	2.79	0.41
1:A:501:ASN:H	1:A:501:ASN:ND2	2.19	0.41
1:A:130:TYR:O	1:A:137:ARG:NH1	2.54	0.41
1:A:232:TRP:O	1:A:284:HIS:HA	2.21	0.41
1:A:467:LYS:HA	1:A:467:LYS:HD2	1.87	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:GLY:C	1:A:120:GLU:H	2.27	0.41
1:A:202:MET:HG2	1:A:293:LEU:CD2	2.51	0.41
1:A:208:TYR:CZ	1:A:210:ASP:HA	2.56	0.41
1:A:212:HIS:NE2	3:A:701:AKG:O1	2.54	0.41
1:A:99:LYS:HA	1:A:123:MET:HE3	2.03	0.41
1:A:316:ASP:OD1	1:A:325:ARG:NH2	2.53	0.41
1:A:36:ARG:HB2	1:A:36:ARG:NH1	2.35	0.41
1:A:150:HIS:N	1:A:150:HIS:ND1	2.69	0.41
1:A:212:HIS:NE2	3:A:701:AKG:C1	2.84	0.41
1:A:245:GLU:O	1:A:249:LEU:HG	2.21	0.41
1:A:473:LEU:H	1:A:473:LEU:HD22	1.86	0.41
1:A:129:TYR:CE1	1:A:137:ARG:HG3	2.56	0.41
1:A:50:ASN:C	1:A:50:ASN:HD22	2.28	0.40
1:A:172:MET:HG2	1:A:336:VAL:CG2	2.38	0.40
1:A:224:ILE:HD12	1:A:224:ILE:N	2.36	0.40
1:A:473:LEU:HD22	1:A:473:LEU:N	2.36	0.40
1:A:251:GLY:O	1:A:252:SER:C	2.64	0.40
1:A:270:LEU:HD11	1:A:276:PHE:CG	2.55	0.40
1:A:121:MET:HE2	1:A:126:TRP:CB	2.50	0.40
1:A:134:GLU:HB2	1:A:205:ARG:NH2	2.36	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	380/451 (84%)	341 (90%)	27 (7%)	12 (3%)	3 7

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	113	VAL

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Mol	Chain	Res	Type
1	A	253	GLN
1	A	483	GLU
1	A	115	THR
1	A	116	GLN
1	A	118	GLY
1	A	149	SER
1	A	117	LYS
1	A	155	ASN
1	A	322	ASN
1	A	508	LEU
1	A	479	PRO

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	351/413 (85%)	319 (91%)	32 (9%)	9	22

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	ARG
1	A	40	LEU
1	A	50	ASN
1	A	72	LEU
1	A	92	ASP
1	A	99	LYS
1	A	113	VAL
1	A	140	LEU
1	A	145	SER
1	A	153	LEU
1	A	156	MET
1	A	161	SER
1	A	164	ASP
1	A	166	ILE
1	A	175	ARG

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Mol	Chain	Res	Type
1	A	191	MET
1	A	193	TYR
1	A	201	LEU
1	A	215	PHE
1	A	221	TRP
1	A	237	THR
1	A	252	SER
1	A	258	LEU
1	A	357	GLU
1	A	361	MET
1	A	468	LEU
1	A	485	GLU
1	A	488	LEU
1	A	491	ASP
1	A	501	ASN
1	A	515	GLN
1	A	516	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	50	ASN
1	A	52	ASN
1	A	96	ASN
1	A	142	ASN
1	A	158	GLN
1	A	176	HIS
1	A	197	GLN
1	A	253	GLN
1	A	298	ASN
1	A	301	HIS
1	A	308	GLN
1	A	313	ASN
1	A	346	ASN
1	A	455	HIS
1	A	501	ASN
1	A	515	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 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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	AKG	A	701	2	9,9,9	1.31	2 (22%)	11,11,11	1.70	2 (18%)

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	AKG	A	701	2	-	1/9/9/9	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	701	AKG	C3-C2	2.23	1.53	1.51
3	A	701	AKG	O2-C1	-2.00	1.25	1.30

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	701	AKG	O1-C1-C2	-3.82	117.06	121.81
3	A	701	AKG	C3-C2-C1	2.64	120.34	115.86

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	701	AKG	C1-C2-C3-C4

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	701	AKG	3	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.