



wwPDB X-ray Structure Validation Summary Report ⓘ

May 17, 2020 – 05:59 am BST

PDB ID : 1EK2
Title : CRYSTAL STRUCTURE OF MURINE SOLUBLE EPOXIDE HYDROLASE
COMPLEXED WITH CDU INHIBITOR
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Deposited on : 2000-03-06
Resolution : 3.00 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

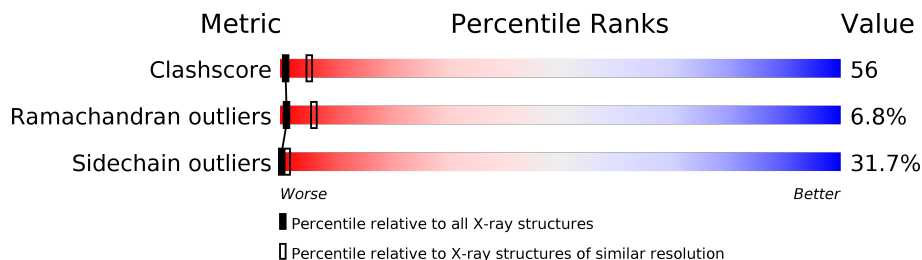
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	141614	2416 (3.00-3.00)
Ramachandran outliers	138981	2333 (3.00-3.00)
Sidechain outliers	138945	2336 (3.00-3.00)

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 on 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	554	
1	B	554	

2 Entry composition [i](#)

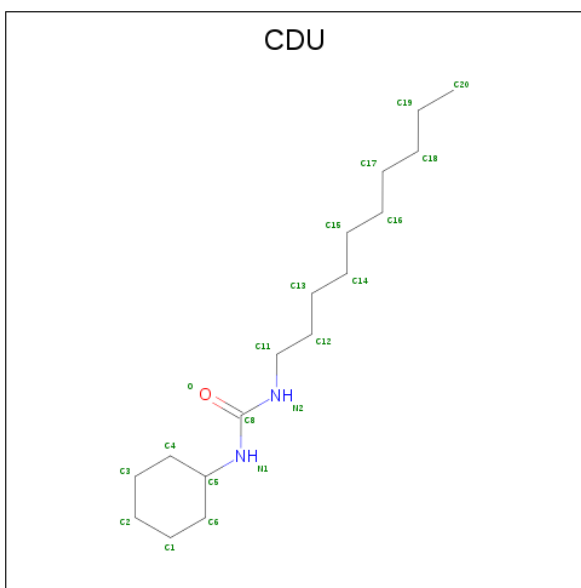
There are 3 unique types of molecules in this entry. The entry contains 8237 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 EPOXIDE HYDROLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	487	Total 3879	C 2501	N 648	O 701	S 29	61	0	0
1	B	541	Total 4299	C 2766	N 719	O 783	S 31	71	0	0

- Molecule 2 is N-CYCLOHEXYL-N'-DECYLUREA (three-letter code: CDU) (formula: $C_{17}H_{34}N_2O$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	Total 20	C 17	N 2	O 1	0	0
2	B	1	Total 20	C 17	N 2	O 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	10	Total 10	O 10	0	0
3	B	9	Total 9	O 9	0	0

E519	K455	G389	G323	L259	P192	G130	I66
D520	T486	V390	I324	C260		D131	M67
H523	G457	A391	P325	L261	G198	R132	D68
W524	F468	E392	Q326	C262	M198	R133	E69
T525	R469	L395	A327	H263	V199	D134	S70
Q526	G460	E396	V328	G264	T200	S135	Y71
L462	P461	R399	F329	F265	L201	L136	R72
M463	L462	I330	I330	P266	L202	K73	K73
M464	S400	G331	G331	E267	V203	Q138	S74
P530	R401	H332	H332	S268	R204	M139	S75
T531	T402	D333	D333	W269	N205	K76	S75
E532	Y465	F403	W334	F270	T206	A77	A77
V533	R466	K404	A335	S271	A207	S144	A77
M534	M467	S405	G336	W272	S208	Q145	C78
Q535	R470	F406	V337	R273	A209	H146	L82
I536	F407	F407	M338	Y274	L210	F147	P83
L537	W474	R408	V339	Q275	R211	D148	E84
I538	S475	A409	A342	I276	E212	F149	N85
K539	C476	S410	M342	P277	L213	L150	F86
W540	K477	D411	Y346	A278	E214	I151	S87
L541	G478	E412	P347	Q281	K215	E152	I88
Q542	L479	G413	E348	T217	V216	S153	S89
T543	G480	F415	R349	R265	C154	Q90	Q90
E544	R481	I416	V350	V266	G218	Y155	I91
VAL	K482	A417	G350	L287	T219	V156	I91
GLN	L483	V418	V353	A288	Q220	G157	Q94
ASN	L484	H419	A354	I289	F221	M158	A95
PRO	V485	K420	S355	D290	P222	I159	M96
SER	L488	A421	L356	M291	P225	K160	R99
VAL	M489	T422	M357	K292	L226	P161	S100
THR	V490	E423	T358	C293	P227	E162	I101
SER	T491	I424	G361	G295	V228	Q164	M102
LYS	A492	G426	M362	D296	P229	Y166	R103
ILE	E493	K494	P363	S297	C230	I165	P104
	D495	L428	D664	S298	M231	M167	M105
	I496	V429	V372	S299	P232	F168	L106
	V497	M430	I373	D294	M233	L169	Q107
	L498	T431	S374	P300	D234	L170	A108
	R499	P432	S375	P301	V235	D171	A109
	P500	E433	I376	E302	S236	T172	I110
	E501	E433	I376	I303	R237	L173	A111
	M502	L437	V371	E304	G238	K174	L112
	S603	S438	I373	E305	Y239	A175	K113
	K504	K439	E374	Y306	V240	K176	K114
	M505	I440	S375	A307	T241	P177	K115
	M506	T441	E309	M308	V242	M178	G116
	E507	T442	I376	E309	K243	E179	G116
	K508	E443	P377	L310	P244	V180	F117
	W509	E444	V378	L311	G245	V181	T119
	I510	E444	F379	E314	I246	F182	C120
	P511	E446	N380	M315	R247	L183	I121
	F512	I446	Y381	V316	L248	D184	V122
	L513	E447	Q382	V316	H249	D185	T123
	K514	I450	L383	T317	M253	F186	M124
	R515	Q451	Y384	F318	G254	G187	M125
	G516	F452	F385	L319	S255	S188	M126
	H517	F453	Q386	L320	E321	M189	L127
	I518	K454	P388	L322	G256	L190	D128

4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	151.90Å 143.00Å 60.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.00	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-3.00)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.211 , 0.290	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	8237	wwPDB-VP
Average B, all atoms (Å ²)	39.0	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: CDU

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	0.43	0/3981	0.64	0/5397
1	B	0.42	0/4413	0.61	0/5984
All	All	0.42	0/8394	0.62	0/11381

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	3879	0	3863	431	0
1	B	4299	0	4270	485	0
2	A	20	0	34	5	0
2	B	20	0	34	1	0
3	A	10	0	0	0	0
3	B	9	0	0	1	0
All	All	8237	0	8201	893	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 56.

The worst 5 of 893 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:16:LEU:HG	1:B:17:PRO:HA	1.29	1.10
1:A:484:LEU:HD13	1:B:61:SER:HB2	1.37	1.06
1:A:348:GLU:HA	1:B:133:ARG:HG3	1.37	1.01
1:A:122:VAL:HG22	1:A:151:ILE:HG13	1.44	1.00
1:B:122:VAL:HG22	1:B:151:ILE:HG13	1.46	0.95

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	481/554 (87%)	350 (73%)	98 (20%)	33 (7%)	1 6
1	B	539/554 (97%)	393 (73%)	110 (20%)	36 (7%)	1 6
All	All	1020/1108 (92%)	743 (73%)	208 (20%)	69 (7%)	1 6

5 of 69 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	18	SER
1	A	61	SER
1	A	207	ALA
1	A	231	ASN
1	A	232	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	424/480 (88%)	293 (69%)	131 (31%)	0	1
1	B	468/480 (98%)	316 (68%)	152 (32%)	0	1
All	All	892/960 (93%)	609 (68%)	283 (32%)	0	1

5 of 283 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	541	LEU
1	B	96	MET
1	B	481	ARG
1	B	4	ARG
1	B	53	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 31 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	517	HIS
1	B	107	GLN
1	B	419	HIS
1	B	85	ASN
1	B	146	HIS

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

2 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	CDU	B	1200	-	20,20,20	1.81	8 (40%)	22,22,22	2.10	4 (18%)
2	CDU	A	1100	-	20,20,20	1.81	7 (35%)	22,22,22	2.09	4 (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
2	CDU	B	1200	-	-	4/15/23/23	0/1/1/1
2	CDU	A	1100	-	-	2/15/23/23	0/1/1/1

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1100	CDU	C5-N1	3.23	1.53	1.46
2	B	1200	CDU	C6-C5	3.22	1.59	1.52
2	B	1200	CDU	C5-N1	3.20	1.53	1.46
2	A	1100	CDU	C6-C5	3.19	1.59	1.52
2	A	1100	CDU	C4-C5	2.88	1.58	1.52

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1200	CDU	N2-C8-N1	5.84	129.38	115.92
2	A	1100	CDU	N2-C8-N1	5.81	129.31	115.92
2	B	1200	CDU	O-C8-N2	-4.40	114.84	122.50
2	A	1100	CDU	O-C8-N2	-4.40	114.84	122.50
2	B	1200	CDU	C5-N1-C8	4.21	131.92	123.02

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

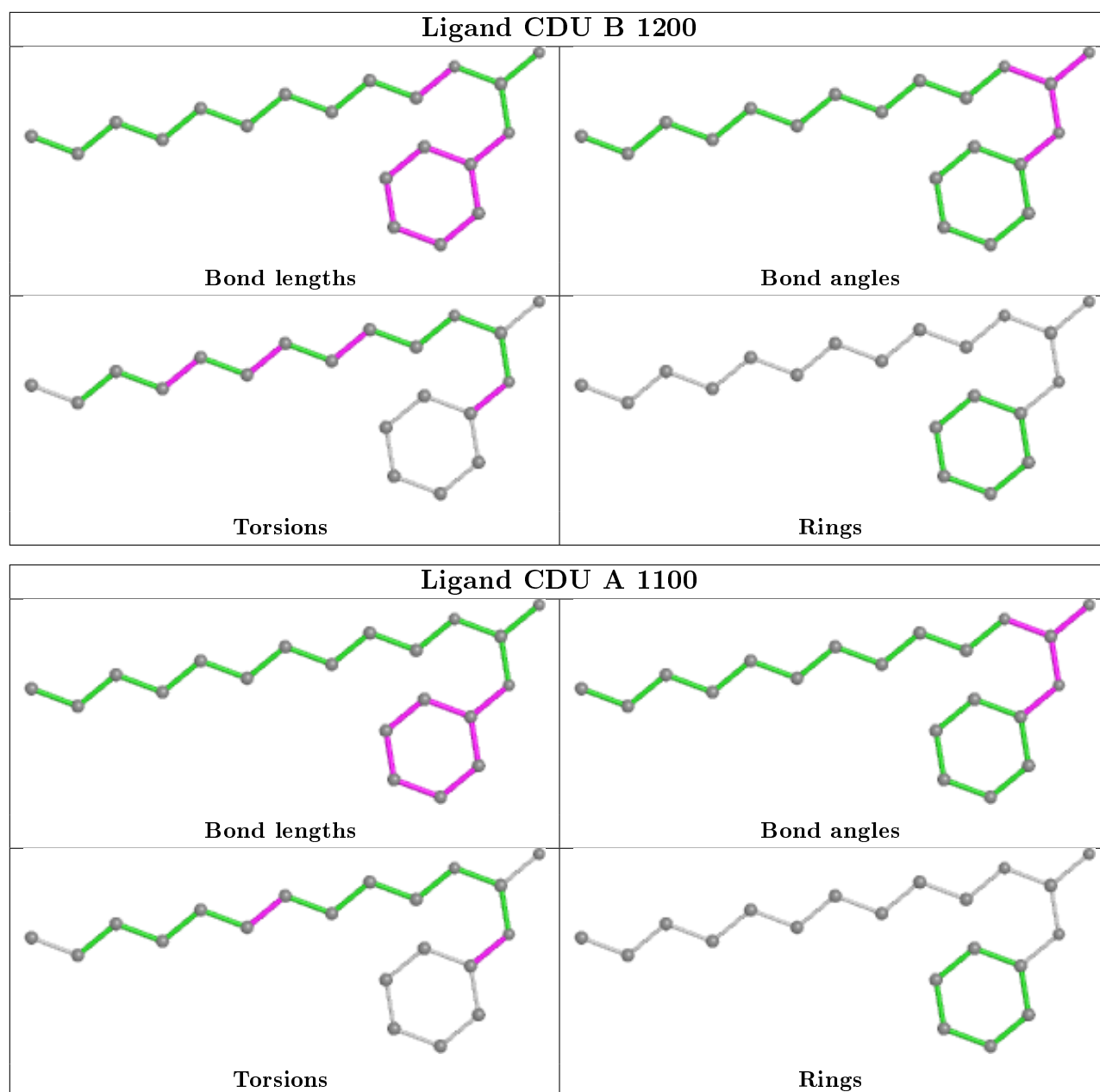
Mol	Chain	Res	Type	Atoms
2	B	1200	CDU	C4-C5-N1-C8
2	A	1100	CDU	C4-C5-N1-C8
2	B	1200	CDU	C15-C16-C17-C18
2	B	1200	CDU	C11-C12-C13-C14
2	B	1200	CDU	C13-C14-C15-C16

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1200	CDU	1	0
2	A	1100	CDU	5	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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.