



wwPDB X-ray Structure Validation Summary Report ⓘ

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PDB ID : 1KWP
Title : Crystal Structure of MAPKAP2
Authors : Meng, W.; Swenson, L.L.; Fitzgibbon, M.J.; Hayakawa, K.; ter Haar, E.;
Behrens, A.E.; Fulghum, J.R.; Lippke, J.A.
Deposited on : 2002-01-30
Resolution : 2.80 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

<http://wwpdb.org/validation/2016/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
Xtriage (Phenix)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

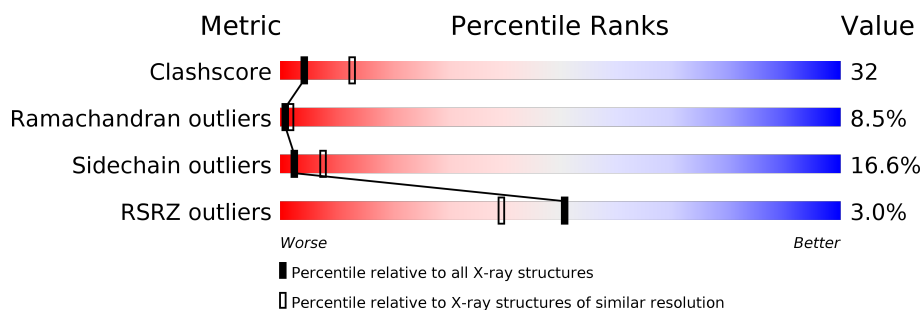
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	112137	3033 (2.80-2.80)
Ramachandran outliers	110173	2983 (2.80-2.80)
Sidechain outliers	110143	2985 (2.80-2.80)
RSRZ outliers	101464	2610 (2.80-2.80)

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. 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	400	 2% 33% 31% 14% • 20%
1	B	400	 3% 30% 32% 13% • 22%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4899 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 MAP Kinase Activated Protein Kinase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	319	Total	C	N	O	S	0	0	0
			2420	1544	419	440	17			
1	B	313	Total	C	N	O	S	0	0	0
			2331	1480	405	428	18			

- Molecule 2 is MERCURY (II) ION (three-letter code: HG) (formula: Hg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	7	Total	Hg	0	0
			7	7		
2	A	7	Total	Hg	0	0
			7	7		

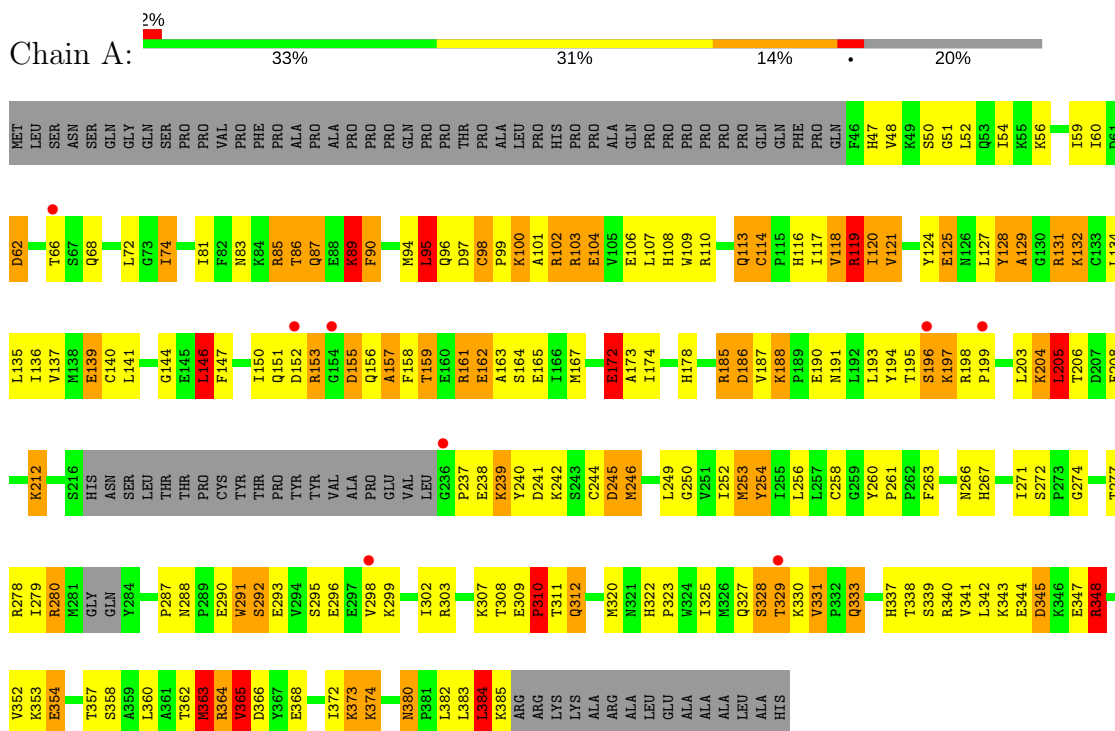
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	62	Total	O	0	0
			62	62		
3	B	72	Total	O	0	0
			72	72		

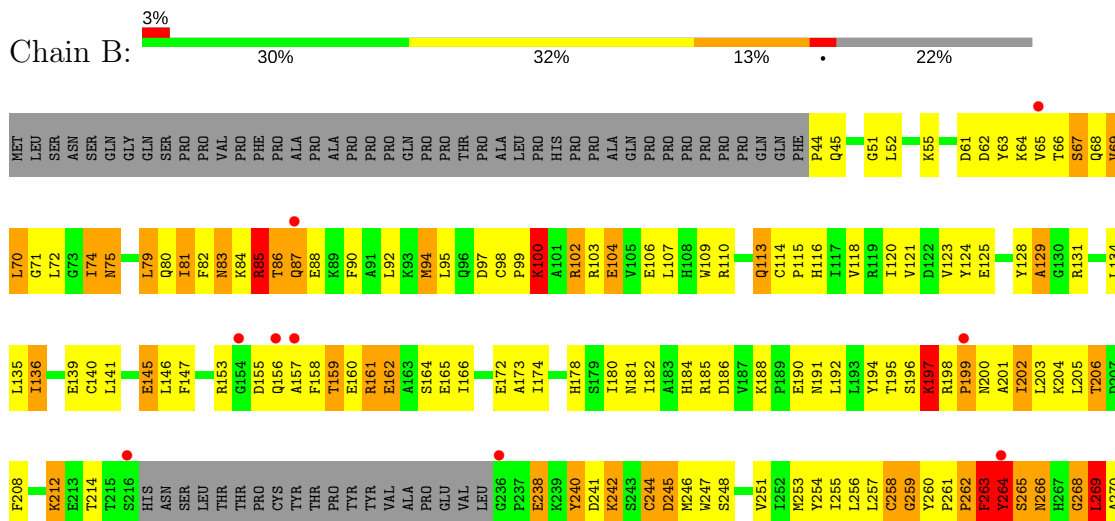
3 Residue-property plots

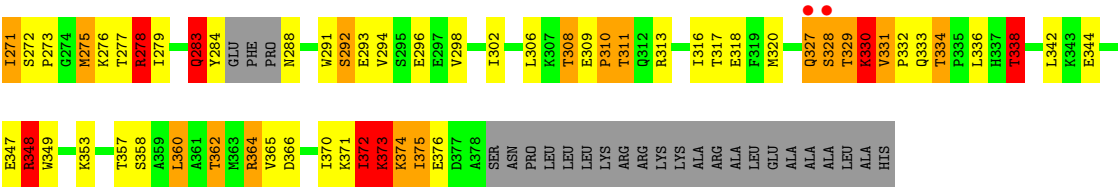
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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: MAP Kinase Activated Protein Kinase 2



• Molecule 1: MAP Kinase Activated Protein Kinase 2





4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	143.94Å 143.94Å 90.27Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	32.60 – 2.80 32.59 – 2.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (32.60-2.80) 100.0 (32.59-2.80)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.27 (at 2.81Å)	Xtriage
Refinement program	CNX, REFMAC	Depositor
R, R_{free}	0.233 , 0.245 0.241 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	DCC
Wilson B-factor (Å ²)	50.4	Xtriage
Anisotropy	0.054	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 90.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.009 for $-1/3^*h+1/3^*k+4/3^*l, -k, 2/3^*h+1/3^*k+1/3^*l$ 0.014 for $-2/3^*h-1/3^*k-4/3^*l, -1/3^*h-2/3^*k+4/3^*l, -1/3^*h+1/3^*k+1/3^*l$ 0.005 for $-h, 1/3^*h-1/3^*k-4/3^*l, -1/3^*h-2/3^*k+1/3^*l$ 0.020 for $-1/3^*h-2/3^*k+4/3^*l, -2/3^*h-1/3^*k-4/3^*l, 1/3^*h-1/3^*k-1/3^*l$ 0.011 for $-h, 2/3^*h+1/3^*k+4/3^*l, 1/3^*h+2/3^*k-1/3^*l$ 0.012 for $1/3^*h+2/3^*k-4/3^*l, -k, -2/3^*h-1/3^*k-1/3^*l$ 0.026 for $h, -h-k, -l$	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	4899	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.44% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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: HG

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	0.63	0/2468	1.80	58/3344 (1.7%)
1	B	0.69	1/2372 (0.0%)	1.91	65/3212 (2.0%)
All	All	0.66	1/4840 (0.0%)	1.86	123/6556 (1.9%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	8
1	B	0	2
All	All	0	10

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	244	CYS	CB-SG	5.79	1.92	1.82

The worst 5 of 123 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	278	ARG	NE-CZ-NH2	-21.91	109.35	120.30
1	A	278	ARG	NE-CZ-NH1	15.72	128.16	120.30
1	B	245	ASP	CB-CG-OD2	-15.05	104.75	118.30
1	B	103	ARG	CD-NE-CZ	13.96	143.15	123.60
1	B	244	CYS	CB-CA-C	11.88	134.15	110.40

There are no chirality outliers.

5 of 10 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	134	LEU	Mainchain
1	A	146	LEU	Mainchain
1	A	162	GLU	Mainchain
1	A	204	LYS	Mainchain
1	A	51	GLY	Mainchain

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	2420	0	2307	142	0
1	B	2331	0	2173	151	0
2	A	7	0	0	0	0
2	B	7	0	0	2	0
3	A	62	0	0	5	0
3	B	72	0	0	10	1
All	All	4899	0	4480	293	1

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 32.

The worst 5 of 293 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:140:CYS:HG	2:B:405:HG:HG	1.00	1.01
1:A:104:GLU:HA	1:A:107:LEU:HD12	1.43	0.99
1:A:309:GLU:N	1:A:310:PRO:HD2	1.80	0.96
1:A:302:ILE:HD11	1:A:325:ILE:HD11	1.50	0.92
1:B:129:ALA:HB2	3:B:439:HOH:O	1.72	0.88

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:475:HOH:O	3:B:475:HOH:O[2_555]	1.85	0.35

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 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	313/400 (78%)	245 (78%)	46 (15%)	22 (7%)	1	3
1	B	307/400 (77%)	231 (75%)	45 (15%)	31 (10%)	1	1
All	All	620/800 (78%)	476 (77%)	91 (15%)	53 (8%)	1	2

5 of 53 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	89	LYS
1	A	100	LYS
1	A	197	LYS
1	A	267	HIS
1	A	279	ILE

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 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	241/357 (68%)	200 (83%)	41 (17%)	2	7
1	B	224/357 (63%)	188 (84%)	36 (16%)	3	8
All	All	465/714 (65%)	388 (83%)	77 (17%)	2	8

5 of 77 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	365	VAL

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Mol	Chain	Res	Type
1	B	79	LEU
1	B	338	THR
1	A	368	GLU
1	A	383	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	266	ASN
1	A	312	GLN
1	B	175	GLN
1	A	191	ASN
1	B	184	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 [i](#)

Of 14 ligands modelled in this entry, 14 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	319/400 (79%)	0.19	8 (2%) 58 47	24, 43, 58, 69	0
1	B	313/400 (78%)	0.07	11 (3%) 44 33	18, 38, 57, 64	0
All	All	632/800 (79%)	0.13	19 (3%) 51 39	18, 41, 58, 69	0

The worst 5 of 19 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	157	ALA	6.9
1	B	236	GLY	4.4
1	A	154	GLY	4.0
1	A	66	THR	3.9
1	A	236	GLY	3.5

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	HG	A	407	1/1	0.99	0.04	-2.23	56,56,56,56	0
2	HG	B	406	1/1	0.99	0.03	-2.66	67,67,67,67	0
2	HG	B	407	1/1	1.00	0.03	-2.78	70,70,70,70	0
2	HG	A	403	1/1	0.97	0.04	-3.26	78,78,78,78	0
2	HG	A	404	1/1	0.98	0.02	-3.68	75,75,75,75	0
2	HG	B	403	1/1	0.97	0.04	-9.22	70,70,70,70	0
2	HG	B	402	1/1	0.99	0.02	-	60,60,60,60	0
2	HG	A	402	1/1	0.99	0.03	-	78,78,78,78	0
2	HG	B	405	1/1	0.99	0.05	-	76,76,76,76	0
2	HG	A	405	1/1	0.98	0.03	-	81,81,81,81	0
2	HG	A	406	1/1	1.00	0.03	-	60,60,60,60	0
2	HG	A	401	1/1	0.98	0.04	-	106,106,106,106	0
2	HG	B	404	1/1	0.99	0.02	-	66,66,66,66	0
2	HG	B	401	1/1	0.98	0.03	-	100,100,100,100	0

6.5 Other polymers [i](#)

There are no such residues in this entry.