Table 1: CBS-QB3 Energies

	reactants	\rightleftharpoons	products	$\Delta E_{\rm rxn}$ (kc	bar al/mo	rier l)
	9		$^{\rm HOOH}$ + $\rm O_2$ $^{\rm 1/jp066823d}$ it has a ZPVE-cy change of -39.5 kcal/mol	-38.5 corrected	_ I	
	ped the new way ng radical from ·CH ₃					
24	—————————————————————————————————————	\rightleftharpoons	, CH ₄	-11.1	_	
12	, CH ³	\rightleftharpoons	N + CH ₄	-11.2	8.1	8.1
25	H ₂ N + 'CH ₃	\rightleftharpoons	H ₂ N N CH ₄	-11.6	_	
3	+ .CH³	\rightleftharpoons	N + CH₄	-12.3	10.1	10.1
11	, CH3	\rightleftharpoons	√N . + CH₄	-12.4	10.2	10.2
4	+ .CH3	\rightleftharpoons	—, N _ + CH ₄	-13.5	8.4	8.4
26 Makii	H_2N H_2N H_2N H_3 H_2N H_3 H_2N H_3 H_2N H_3 H_4 H_2N H_3 H_4 H_5 H_5 H_6 H_7 H_8	\rightleftharpoons	H ₂ N + CH ₄	-14.4	_	
16	н ноо.	\rightleftharpoons	, N + HOOH	6.1	9.0	2.9
1		\rightleftharpoons	, ноон , ноон	6.2	7.0	0.8
27	H_2N H_2N H_3N H_4 H_4	\rightleftharpoons	H ₂ N HOOH	5.7	_	
15	Н N + ноо•	\rightleftharpoons	н м ноон	4.8	7.6	2.7

CBS-QB3 Energies (kcal/mol)	$\Delta E_{ m rxn}$	bar	rier
$_{6}$ $_{+}$ Hoo. \rightleftharpoons $_{\cdot}$ $_{+}$ Hooh	3.7	5.7	2.0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	2.8		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7.6	9.7	2.1
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7.2		
13 $\stackrel{H}{\nearrow}$ + $\stackrel{O}{\rightarrow}$ \rightleftharpoons $\stackrel{H}{\nearrow}$ $\stackrel{H}{\longrightarrow}$ $\stackrel{O}{\rightarrow}$ $\stackrel{O}{\rightarrow}$	6.3	8.2	1.8
5 — H о−о. → H о−он + о−он	5.2	6.4	1.1
$30 \qquad \stackrel{H_2N}{\longleftarrow} \qquad \stackrel{H}{\longleftarrow} \qquad \stackrel{H}{\longrightarrow} \qquad \stackrel{H}{\longleftarrow} \qquad \qquad \stackrel{H}{\longrightarrow} \qquad \stackrel{H}{\longleftarrow} \qquad \stackrel{H}{\longrightarrow} \qquad \longrightarrow \qquad$	4.3	_	
O ₂ addition to radical			
$ \begin{array}{cccc} & & & & & & & & & & & & \\ & & & & & &$	-6.9	_	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-31.8	_	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-32.0	_	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-32.4	_	

CBS-QB3 Energies (kcal/mol)		$\Delta E_{\rm rxn}$	barrie	er
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	H ₂ N H N	_	_	
$H_2N \longrightarrow H_2N \Leftrightarrow$	H ₂ N	_	_	
Intramolecular H-abstraction	H,			
9	O OH	5.0	13.2	8.2
2 .º .º ⇒ HN	HO O	7.3	14.1	6.8
10 .º · · · · · · · · · · · · · · · · · ·	HO O	8.4	15.9	7.5
8 β -scission of a radical	HO O	18.5	32.5 1	14.0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	H ₂ N + HN	17.9	21.8	3.9
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	·NH ₂ +	24.0	26.0	2.0
7	+ 'CH ₃	16.1	28.1 1	11.9
$17 \qquad \qquad \stackrel{H_2N}{\longrightarrow} \qquad \qquad \rightleftharpoons \qquad $	H ₂ N + CH ₃	18.0	29.9 1	11.9

CBS-QB3 Energies (kcal/mol)	$\Delta E_{ m rxn}$	bar	rier
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	34.7	37.5	2.8
Grouped by radical type Making C1 radical			
$3 \qquad \qquad \stackrel{\text{H}}{\longrightarrow} \qquad \stackrel{\text{CH}_3}{\rightleftharpoons} \qquad \stackrel{\text{H}}{\longrightarrow} \qquad \stackrel{\text{LH}_4}{\longrightarrow} \qquad \stackrel{\text{CH}_4}{\longrightarrow} \qquad \stackrel{\text{CH}_4}{\longrightarrow$	-12.3	10.1	10.1
11 $\stackrel{\text{CH}_3}{\longrightarrow}$ \rightleftharpoons $\stackrel{\text{CH}_4}{\longrightarrow}$ $\stackrel{\text{CH}_4}{\longrightarrow}$	-12.4	10.2	10.2
15 $\stackrel{\text{N}}{\longrightarrow}$ + HOO· \rightleftharpoons $\stackrel{\text{N}}{\longrightarrow}$ + HOOH	4.8	7.6	2.7
13 $\stackrel{\text{H}}{\longrightarrow}$ + о-о. \rightleftharpoons $\stackrel{\text{H}}{\longrightarrow}$ 0-он Making C2 radical	6.3	8.2	1.8
$4 \qquad \stackrel{H}{\longrightarrow} \qquad \overset{CH_3}{\rightleftharpoons} \qquad \stackrel{H}{\rightleftharpoons} \qquad \overset{H}{\longrightarrow} \qquad \overset{H}{\longrightarrow} \qquad \overset{CH_4}{\longleftarrow} \qquad \overset{H}{\longrightarrow} \qquad H$	-13.5	8.4	8.4
$_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$ $_{0}$	3.7	5.7	2.0
$\frac{H}{5}$ + 0-0. \rightleftharpoons $\frac{H}{1}$ + 0-0H Making C(N1) radical	5.2	6.4	1.1
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-11.6		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	5.7	_	
29 H_2N $+$ $O-O. \rightleftharpoons H_2N + O-OH Making C(N2) radical$	7.2	_	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-14.4		

CBS-QB3 Energies (kcal/mol)	$\Delta E_{\rm rxn}$	bar	rier
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.8	_	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	4.3	_	
Making N radical			
$12 \qquad \stackrel{\text{N}}{\longrightarrow} + \text{CH}_3 \qquad \rightleftharpoons \qquad \stackrel{\text{N}}{\longrightarrow} + \text{CH}_4$	-11.2	8.1	8.1
16 → HOO· ⇌ N + HOOH	6.1	9.0	2.9
$14 \qquad \stackrel{N}{\longrightarrow} \qquad + \qquad O - O \cdot \qquad \rightleftharpoons \qquad \stackrel{N}{\longrightarrow} \qquad + \qquad O - O H$	7.6	9.7	2.1
C1 radical reacting			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-32.0	_	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-31.8	_	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7.3	14.1	6.8
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	8.4	15.9	7.5
7 → H → CH ₃ H NN.	16.1	28.1	11.9
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-32.4		

CBS-QB3 Energies (kcal/mol)			$\Delta E_{\rm rxn}$	bar	rier
HN		H _N .			
9 °°.	\rightleftharpoons	ООН	5.0	13.2	8.2
0.	,	- N	10.5	22.5	140
8 N radical reacting	\rightleftharpoons	HO	18.5	32.5	14.0
$ \begin{array}{c} $	\rightleftharpoons	O	-6.9	_	
19 H ₂ N H	\rightleftharpoons	HJ +	34.7	37.5	2.8
20 H ₂ N H	\rightleftharpoons	H ₂ N + HN	17.9	21.8	3.9
H_2N H_2N H	$\stackrel{\rightharpoonup}{\longleftarrow}$	H ₂ N H N	_		
H_2N	\rightleftharpoons	.NH ₂ +	24.0	26.0	2.0
H_2N	\rightleftharpoons	H ₂ N + 'CH ₃	18.0	29.9	11.9
H_2N H_2N H	≓ made	earlier:	_	_	
$^{\text{H}}_{\text{N}}$ + $^{^{\text{CH}}_{3}}$ + $^{\text{CH}_{3}}$ + $^{\text{CH}_{3}}$	$t \rightleftharpoons$	O CH ₄	-46.7	_	

CBS-QB3 Energies (kcal/mol)		$\Delta E_{\rm rxn}$	barrier
$^{\text{H}}_{\text{N}}$ + $^{\text{CH}_3}$ + $^{\text{CH}_3}$ + $^{\text{C}}_{\text{2}}$ singlet \rightleftharpoons	,0 CH ₄	-73.0	_