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function [s2D, CStarBasis, OScBasis, dHvapBasis] =
aPineneCYields2DNew

% [stoich2D, CStarBasis, OScBasis, dHvapBasis] = aPineneCYields
%
% Gives the carbon yields in the 2D VBS for a-pinene + ozone
%
% stoich2D is the 2D matrix of carbon yields
% CStarBasis is the C* value for each column
% OScBasis is the OSc value for each row
% dHvapBasis is a heat of vaporization for each column
%
% note that sum(stoich2D) gives the 1D CARBON yields
% sum(sum(stoich2D)) gives 1.0, showing that I can add

% Here are the basis parameters for the two dimensions
CStarBasis = [1e-5 1e-4 1e-3 1e-2 1e-1 1e0 1e1 1e2 1e3 1e4 1e5 1e6
1e7 1e8 1e9];
O2CBasis = [1; .9; .8; .7; .6; .5; .4; .3; .2; .1; 0];
OScBasis = O2CBasis*3-2;

% At present the dH is only a function of C*. That could
change... This is kJ/mole.
dHvapBasis = [120 114 108 102 96 90 84 78 72 66 60 54
48 42 36 ];

% This is built from the original a-pinene mass yields (COM, not
COC) in Presto 2006 and Donahue 2009.
%
% -2 -1 0 1 2 3 4 5 6
% alpha = [0.004 0.000 0.051 0.086 0.120 0.183 0.400 0.350
0.200];

% This is a carbon stoichiometry matrix spread very wide...
% The log10 C* are given across the top, while the O:C and OSc are
to the right after the comments.
% -5 -4 -3 -2 -1 0 1 2 3 4
5 6 7 8 9
s2D = [ ...
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 ; ... % 1 +1.0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 ; ... % .9 +0.7
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 ; ... % .8 +0.4
0 0 0 0 0 0.001 0 0 0 0
0 0 0 0 0 ; ... % .7 +0.1

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0      0      0      0      0      0.002 0.010 0.005 0      0      0
0      0      0      0      0 ; ... % .6   -0.2
0      0      0      0      0      0      0.017 0.015 0.003 0.000 0.000
0      0      0      0      0 ; ... % .5   -0.5
0      0      0      0      0      0      0.004 0.025 0.025 0.021 0.043
0.033 0      0      0      0 ; ... % .4   -0.8
0      0      0      0      0      0      0      0.011 0.046 0.060 0.136
0.124 0.061 0      0      0 ; ... % .3   -1.1
0      0      0      0      0      0      0      0      0.021 0.045 0.084
0.106 0.102 0      0      0 ; ... % .2   -1.4
0      0      0      0      0      0      0      0      0      0      0
0      0      0      0      0 ; ... % .1   -1.7
0      0      0      0      0      0      0      0      0      0      0
0      0      0      0      0 ; ... % 0      -2
];

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