Bubble and dew points

Psat_Antoine_databank.m

(See posted code.)

Psat_Antoine.m

```
function Psat = Psat_Antoine( i, T )
%saturated vapor pressures from Antoine's equation for pure substances

%components
%i =  1: n-octane
%i =  2: n-nonane

if i == 1
    ii = 6;
else
    ii = 7;
end

Psat = Psat_Antoine_databank( ii , T );

end
```

f_bubble.m

```
function [ T, y ] = f_bubble( P, x )
%outputs: bubble point temperature (degC),   vapor-phase mole fractions
%inputs:  pressure                 (mm Hg), liquid-phase mole fractions

T = fsolve(@bubble,100.0);

for i = 1 : length(x)
    y(i) = x(i) * Psat_Antoine(i,T) / P;
end

    function [ lhs ] = bubble( T )

    lhs = -1;
    for ii = 1 : length(x)
        lhs = lhs + x(ii) * Psat_Antoine(ii,T) / P;
    end

    end

end
```

f_dew.m

```
function [ T, x ] = f_dew( P, y )
%outputs: dew point temperature (degC),  liquid-phase mole fractions
%inputs:  pressure              (mm Hg),  vapor-phase mole fractions

T = fsolve(@dew,100.0);

for i = 1 : length(y)
    x(i) = y(i) * P /  Psat_Antoine(i,T);
end

    function [ lhs ] = dew( T )

    lhs = -1;
    for ii = 1 : length(y)
        lhs = lhs + y(ii) * P / Psat_Antoine(ii,T);
    end

    end

end
```

Session

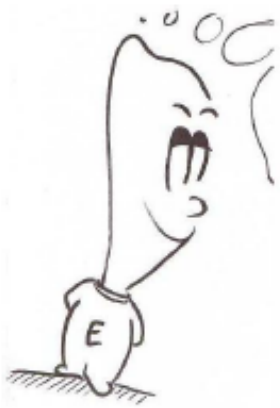
```
>> [ T, y ] = f_bubble( 760, [0.4, 0.6] )

Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.

<stopping criteria details>

T =

  138.8025


y =

    0.5683    0.4317
```

```
>> [ T, x ] = f_dew( 760, [0.7, 0.3] )

Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.

<stopping criteria details>
```

```
T =

  135.3227


x =

    0.5393    0.4607
```

```
>>
```

Comments



How can life be so good?