AMProp_Calc
Version 0
User Guide

INSTALLATION

Before installing please read the License Agreement and agree to its terms and conditions.

To install expand the zipped file AMProp_Calc.zip in drive "C:". The folder AMProp_Calc and its content MUST BE in the root of drive C:

The folder **C:\AMProp_Calc** will be accessed by the Excel Add-in.

Add –in can be installed trough the Excel Add-In manager or by opening directly the file "AMProp_Calc.xla." in the folder C:\AMProp_Calc

Note: The macros from this file must be enabled for the Add-in to function.

FUNCTIONS

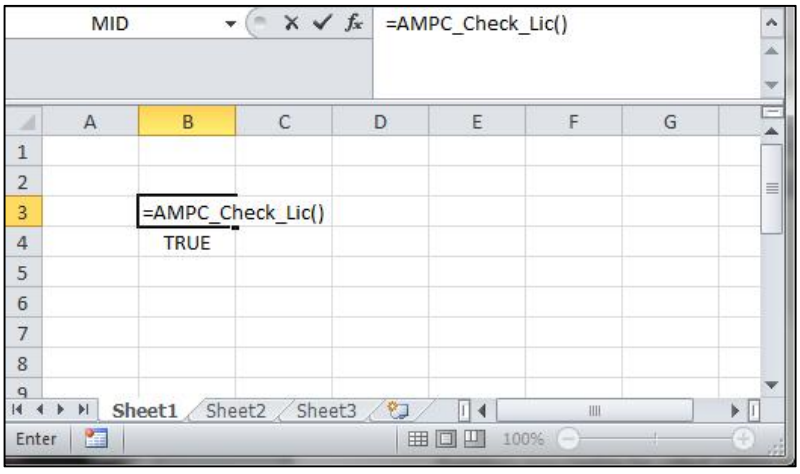
AMPC_Check_Lic()

Function required to be called within the Excel Sheet. This function will check the Validity of the License and activate the rest of function within the Add-in.

Returns:

True	If license IS VALID
False	If license IS NOT VALID or there are missing files to be used by the Add-in. The Add-in AMPro_Calc will not work. Contact the licensor to purchase or renew the license

Example:



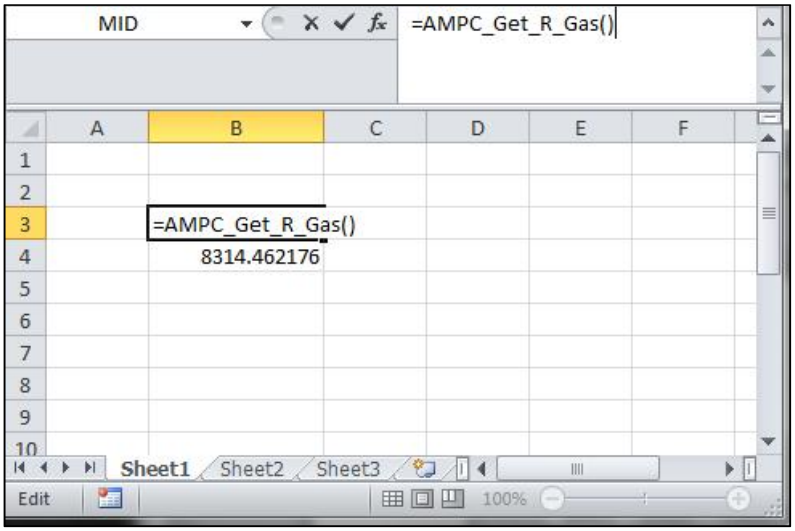
AMPC_Get_R_Gas()

Function returns the Ideal Gas Constant R

Returns:

8314.462176 Joule/(Kmol-K)

Example:



AMPC_Get_CompList()

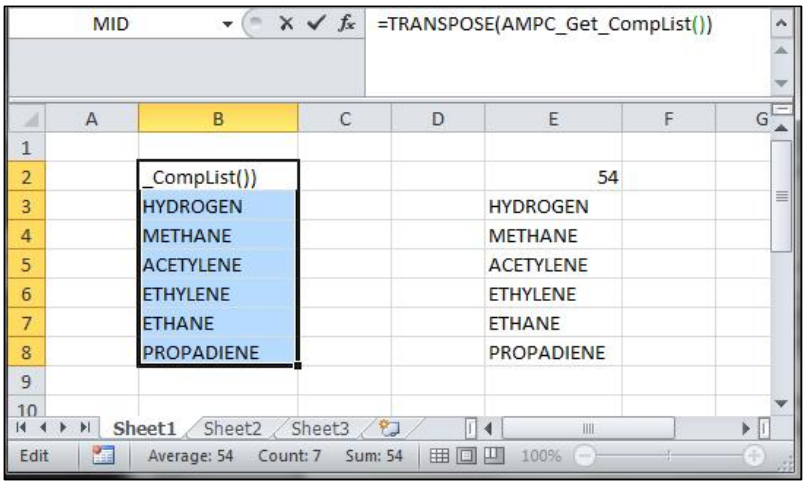
Function returns the list of compound available in the AMProp_Calc library.

Returns:
An array containing:

Index	Value
1	Number of compounds in the Library
2 to Value of Index 1	Name of available compound

Note: The values are return column wise. In order to list the in Row wise the excel function "TRANSPOSE()" must be used to modify the orientation of the array

Example:



Note: To display the results in the various cells, select the range of cells (various rows) and after typing the formula =TRANSPOSE(AMPC_Get_CompList() press <CTRL> <SHIFT> <ENTER>

The range of cell will show the formula {=TRANSPOSE(AMPC_Get_CompList())}

AMPC_Get_CASNO(CompName)

Function gets the CAS Registry Number. CAS Registry Number, is a unique numerical identifier assigned by Chemical Abstracts Service. Most of the functions in the Add-in use the CAS Number (instead of the Compound Name) to access the information required for property estimation.

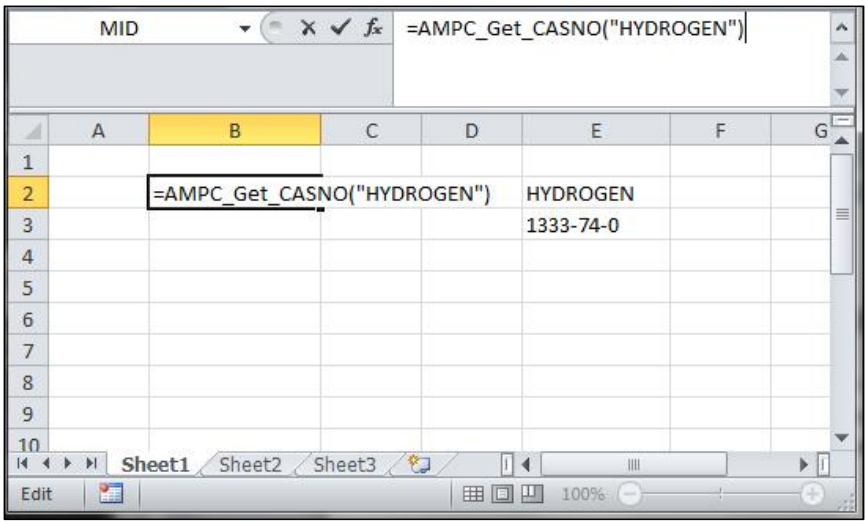
Input:

CompName: Name of the compound as appears in the available library. The Input can be the name of the compound in “ ”, of a reference to a cell containing the name of the compound

Returns:

String containing the CAS Registry Number of the compound.

Example:



AMPC_Read_Pure_Info(CASNO)

The function reads the available information of the compound with CAS registry number CASNO in the library.

Input:

CASNO: The compound's CAS Number. The Input can be the name of the compound in " ", of a reference to a cell containing the name of the compound

Returns:

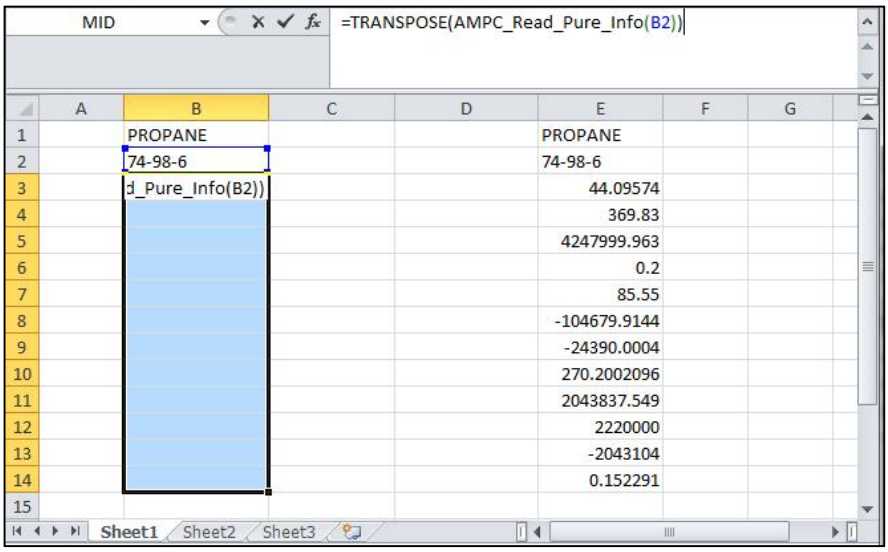
If CASNO is available in library function returns an array containing

Index	Value
1	MW: Molecular Weight
2	Tc: Critical Temperature in K
3	Pc: Critical Pressure in Pa
4	Vc: Critical Specific Volume in m3/Kmol
5	Tm: Melting Temperature in K
6	Hf: Enthalpy of formation in KJ/Kmol
7	Gibb free energy in KJ/Kmol
8	Entropy of Ideal gas @ 25oC and 1 atm in KJ/Kmol-K
9	LHV: Low Heat Value in KJ/Kmol
10	HHV: High Heat Value in KJ/Kmol
11	HComb: heat of combustion in KJ/Kmol
12	acenf (w) : Acentric factor

Otherwise returns an array of Zeros

Note: The values are return column wise. In order to list the in Row wise the excel function "TRANSPOSE()" must be used to modify the orientation of the array

Example:



Note: To display the results in the various cells, select the range of 12 cells (12 rows) and after typing the formula =TRANSPOSE(AMPC_Read_Pure_Info(B2)) press <CTRL> <SHIFT> <ENTER>

AMPC_Get_Pure_Property(CASNO, Prop)

The function gets a particular property for an available compound.

Input:

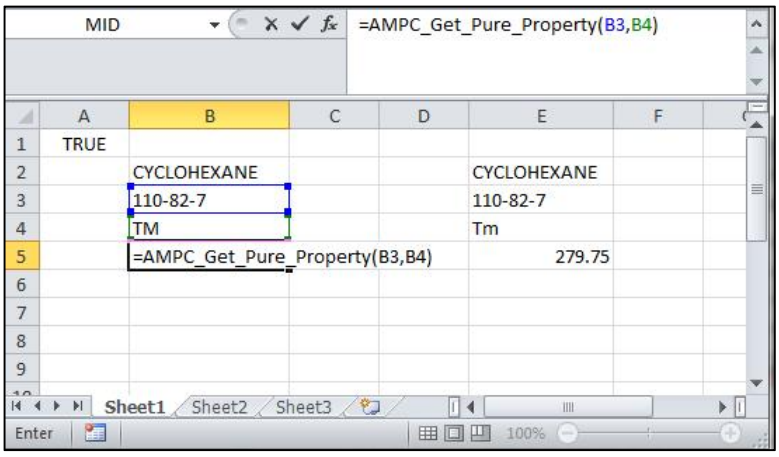
CASNO: String, CAS Registry number
Prop: String. Property to be get. The Value can be:

Prop	To Get
"MW"	Molecular Weight
"Tc"	Critical Temperature in K
"Pc"	Critical Pressure in Pa
"Vc"	Critical Specific Volume in m3/Kmol
"Tm"	Melting Temperature in K
"Hf"	Enthalpy of formation in KJ/Kmol
"Gf"	Gibb free energy in KJ/Kmol
"LHV"	Entropy of Ideal gas @ 25oC and 1 atm in KJ/Kmol-K
"HHV"	Low Heat Value in KJ/Kmol
"HComb"	High Heat Value in KJ/Kmol
"acenf"	heat of combustion in KJ/Kmol

Returns:

The value of the selected property
If CASNO or Prop are a not valid entry, returns Zero

Example:



AMPC_Pure_Z(w, Pr, Tr)

Calculates the Gas Compressibility Factor (Z)

Input:

w: Acentric Factor
Pr: Reduced Pressure (Pr = P/Pc)
Tr: Reduced Temperature(Tr = T/Tc)

Where P = Pressure, Pc = Critical Pressure, T = Temperature, Tc = Critical Temperature

w, Pc and Tc can be obtained using AMPC_Get_Pure_Property(CASNO, Prop) or AMPC_Read_Pure_Info(CASNO)

Returns:

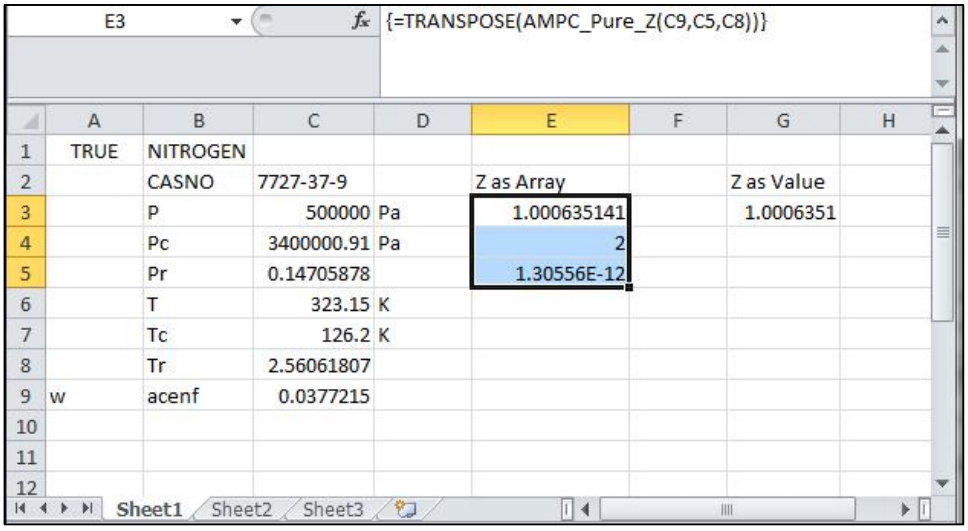
The function returns an array of 3 elements

Index	Value
1	Compressibility Factor
2	Number of iteration made to achieve the solution
3	Value of the Converging Function (ideally Zero)

Note: If value of Index 2 is 100 the maximum iterations have been reached. Value of Z may not be correct.

The function can be used as an array or as a value. To display the results in the various cells, select the range of 3 cells (3 rows) and after typing the formula =TRANSPOSE(AMPC_Read_Pure_Z(C9,C5,C8)) press <CTRL> <SHIFT> <ENTER>

Example:



AMPC_Pure_PSat(CASNO, T)

The function calculates the Vapor Pressure or the Saturation Pressure at a given temperature.

Input:

CASNO: String, CAS Registry number
T: Temperature in Kelvin (K)

Returns:

The function returns an array of 5 elements

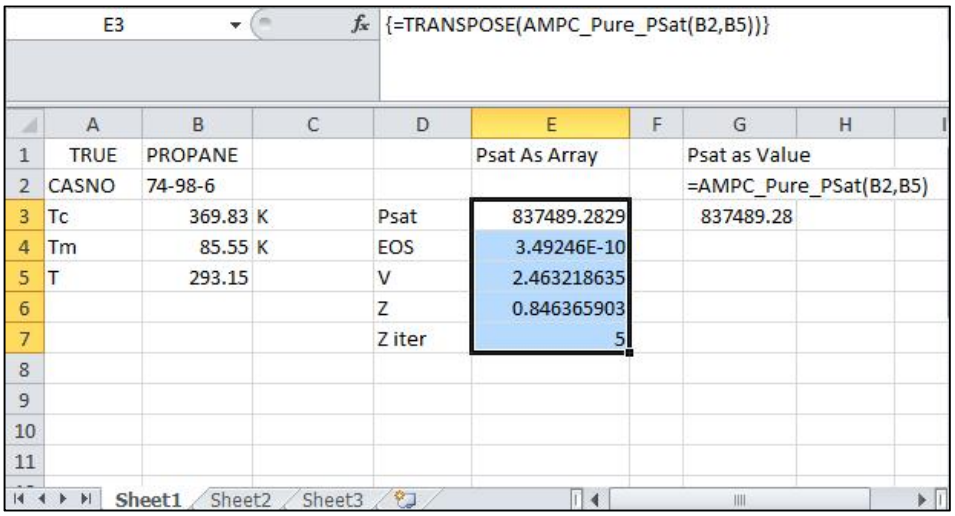
Index	Value
1	Vapor Pressure in Pa
2	Value of the Equation of State at T and Psat (Ideally Zero)
3	Vapor Specific Volume @ T and Psat in m3/Kmol
4	Compressibility Factor (Z)
5	Number of Iterations to get the Z

T must be in the range Tm < T < Tc. If not Function returns Zero
Tm = Melting Temperature, Tc = Critical Temperature

Note: If value of Index 5 is 100 the maximum iterations have been reached. Value of Z may not be correct.

The function can be used as an array or as a value. To display the results in the various cells, select the range of 5 cells (5 rows) and after typing the formula =TRANSPOSE(AMPC_ Pure_PSat(CASNO,T)) press <CTRL> <SHIFT> <ENTER>

Example:



AMPC_Pure_TSat(CASNO, P)

The function calculates the Saturated Temperature at a given Pressure.

Input:

CASNO: String, CAS Registry number
P: Pressure in Pa

Returns:

The function returns an array of 6 elements

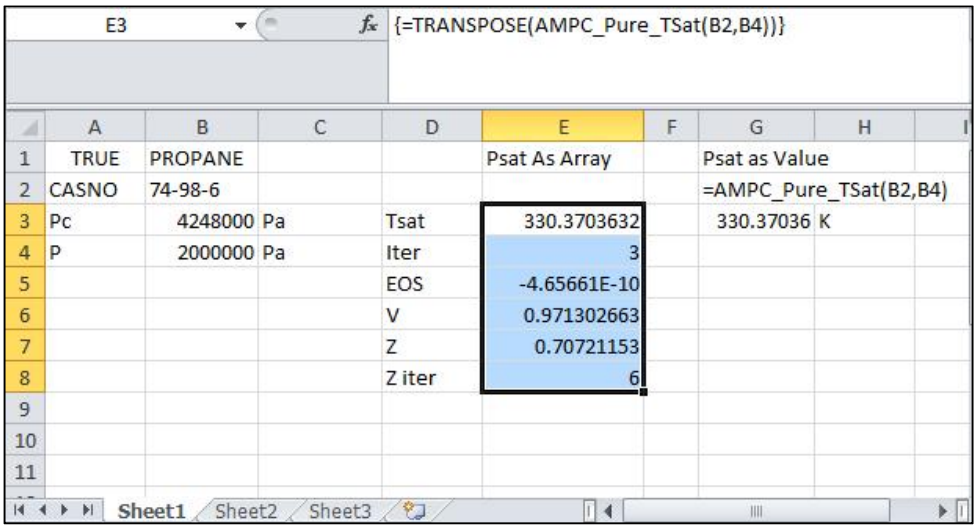
Index	Value
1	Saturation Temperature in Kelvin (K)
2	Number of Iteration to get the TSat
3	Value of the Equation of State at P and Tsat (Ideally Zero)
4	Vapor Specific Volume @ T and Psat in m3/Kmol
5	Compressibility Factor (Z)
6	Number of Iterations to get the Z

P must be in the range P < Pc. If not Function returns Zero
Pc = Critical Pressure

Note: If value of Index 2 or 6 is 100 the maximum iterations have been reached. Value of TSat or Z may not be correct.

The function can be used as an array or as a value. To display the results in the various cells, select the range of 6 cells (6 rows) and after typing the formula =TRANSPOSE(AMPC_Pure_TSat(CASNO,T)) press <CTRL> <SHIFT> <ENTER>

Example:



AMPC_Pure_LMolarDens(CASNO, T)

The function calculates the Liquid Molar Density at a given Temperature.

Input:

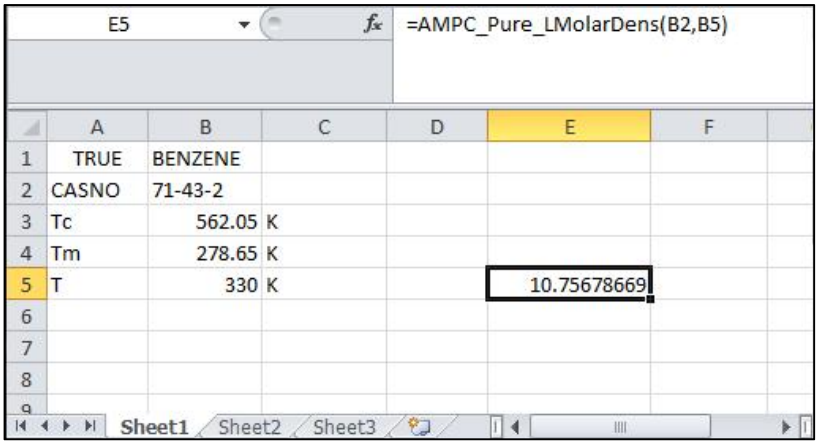
CASNO: String, CAS Registry number
T: Temperature in Kelvin (K)

Returns:

The Liquid Molar density in Kmol/m3

T must be in the range Tm < T < Tc. If not Function returns Zero
Tm = Melting Temperature, Tc = Critical Temperature

Example:



AMPC_Pure_DHVapmol(CASNO, Tr)

The function calculates the specific molar Heat of Vaporization at a given Temperature

Input:

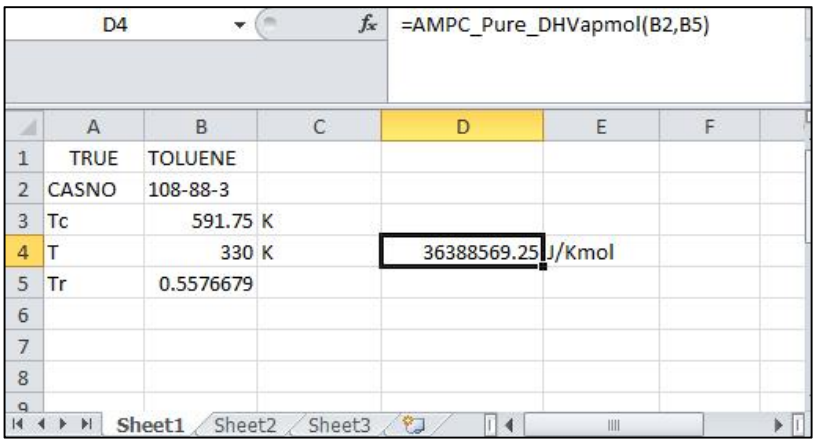
CASNO: String, CAS Registry number
Tr: Reduced Temperature

Returns:

The Heat of Vaporization in Joule/Kmol

Tr must be in the range Tr < 1. If not Function returns Zero
Tr = Reduced Temperature, Tr = T/Tc; Tc = Critical Temperature

Example:



AMPC_Pure_LiqMolCp(CASNO, T)

The function calculates the specific molar Calorific Value for liquid phase at constant Pressure (Cp) at a given Temperature

Input:

CASNO: String, CAS Registry number
T: Temperature in Kelvin (K)

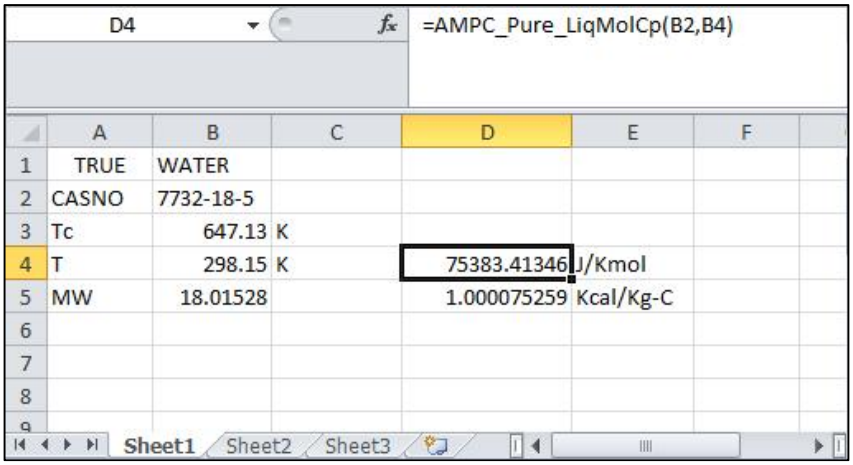
Returns:

The Liquid molar Calorific Value (Cp) in Joule/Kmol-K

T must be in the range Tm < T < Tc. If not Function returns Zero

Tm = Melting Temperature, Tc = Critical Temperature

Example:



AMPC_Pure_VapMolCp(CASNO, T)

The function calculates the specific molar Calorific Value of gas or vapor at constant Pressure (Cp) at a given Temperature

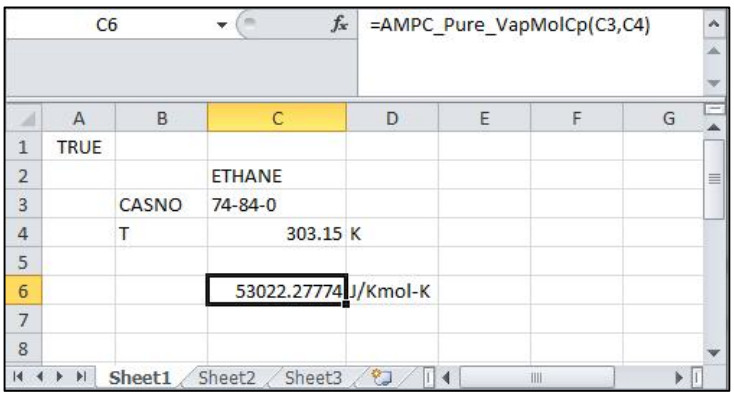
Input:

CASNO: String, CAS Registry number
T: Temperature in Kelvin (K)

Returns:

The Gas molar Calorific Value (Cp) in Joule/Kmol-K

Example:



AMPC_Pure_LiqVis(CASNO, T)

The function calculates the Dynamic Viscosity of a liquid at a given Temperature

Input:

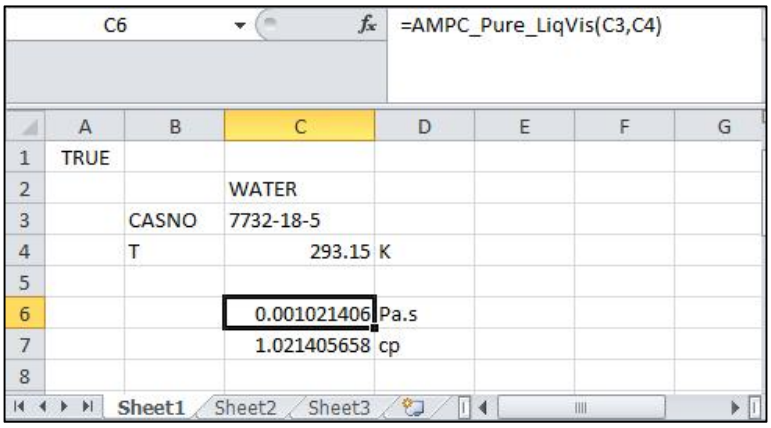
CASNO: String, CAS Registry number
T: Temperature in Kelvin (K)

Returns:

The Liquid Dynamic Viscosity in Pa.s

T must be in the range Tm < T < Tc. If not Function returns Zero
Tm = Melting Temperature, Tc = Critical Temperature

Example:



AMPC_Pure_GasVis(CASNO, T)

The function calculates the Dynamic Viscosity of gas or vapor at a given Temperature

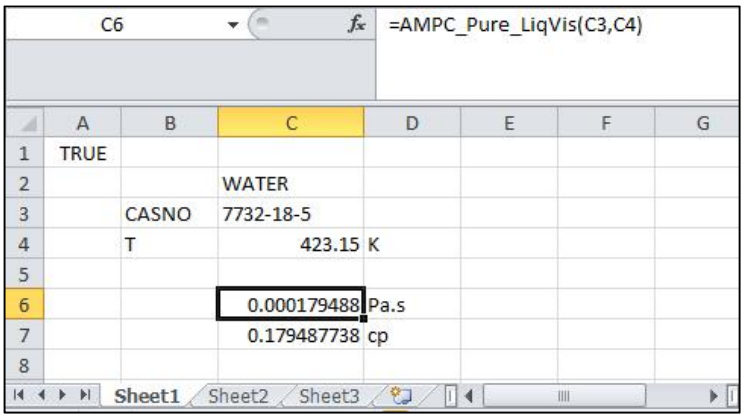
Input:

CASNO: String, CAS Registry number
T: Temperature in Kelvin (K)

Returns:

The Dynamic Viscosity Pa.s

Example:



AMPC_Pure_State(CASNO, P, T)

The function finds the state of a compound at a given Pressure and Temperature

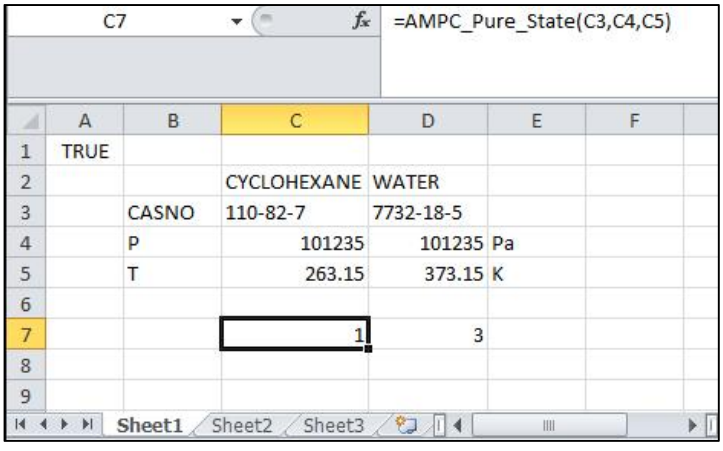
Input:

CASNO: String, CAS Registry number
P: Pressure in Pa
T: Temperature in Kelvin (K)

Returns:

Value	Condition
1	Solid
2	Liquid
3	Liquid – Vapor Equilibrium
4	Vapor
5	Gas
6	Super Critical

Example:



AMPC_Pure_Enthalpy(CASNO, P, T)

Calculates the specific molar Enthalpy (H) at a given Pressure and Temperature

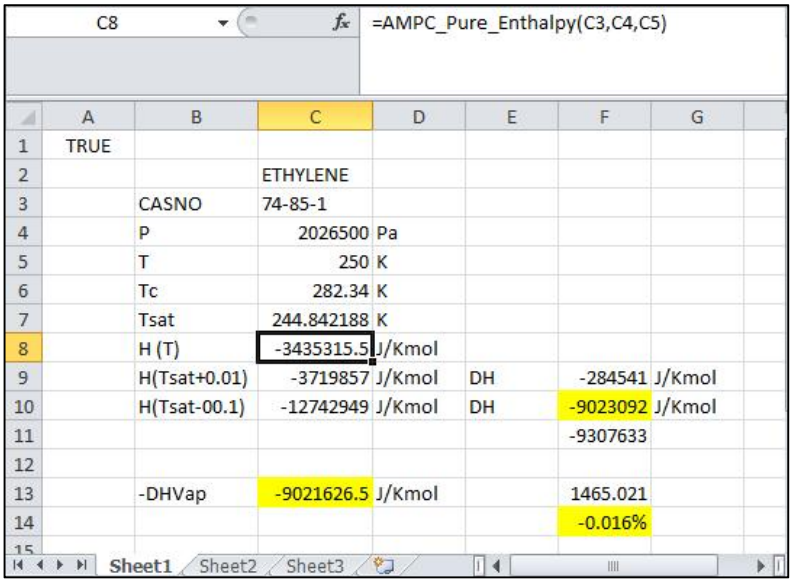
Input:

CASNO: String, CAS Registry number
P: Pressure in Pa
T: Temperature in Kelvin (K)

Returns:

The specific molar Enthalpy in J/Kmol
As reference H = 0 for ideal gas at 1amt and 25 oC.

Example:



	A	B	C	D	E	F	G
1	TRUE						
2			ETHYLENE				
3		CASNO	74-85-1				
4		P	2026500	Pa			
5		T	250	K			
6		Tc	282.34	K			
7		Tsat	244.842188	K			
8		H (T)	-3435315.5	J/Kmol			
9		H(Tsat+0.01)	-3719857	J/Kmol	DH	-284541	J/Kmol
10		H(Tsat-00.1)	-12742949	J/Kmol	DH	-9023092	J/Kmol
11						-9307633	
12							
13		-DHVap	-9021626.5	J/Kmol		1465.021	
14						-0.016%	

AMPC_Pure_Entropy(CASNO, P, T)

Calculates the specific molar Entropy (S) at a given Pressure and Temperature

Input:

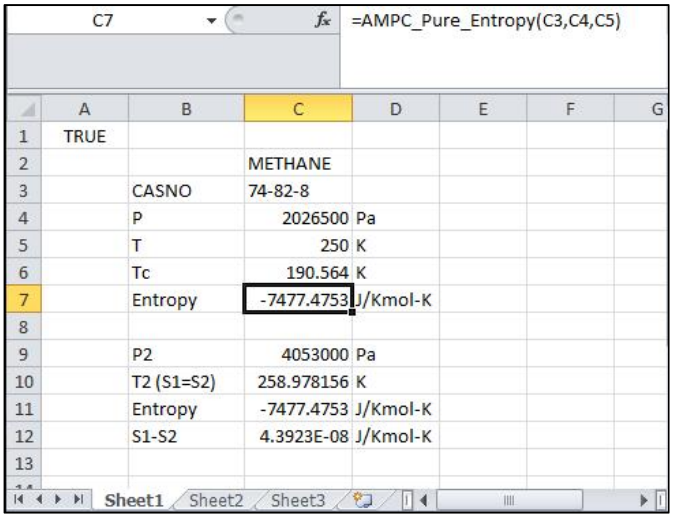
CASNO: String, CAS Registry number
P: Pressure in Pa
T: Temperature in Kelvin (K)

Returns:

The specific molar Entropy in J/Kmol-K

As reference S = 0 for ideal gas at 1amt and 25 oC.

Example:



	A	B	C	D
1	TRUE			
2			METHANE	
3		CASNO	74-82-8	
4		P	2026500	Pa
5		T	250	K
6		Tc	190.564	K
7		Entropy	-7477.4753	J/Kmol-K
8				
9		P2	4053000	Pa
10		T2 (S1=S2)	258.978156	K
11		Entropy	-7477.4753	J/Kmol-K
12		S1-S2	4.3923E-08	J/Kmol-K
13				

AMPC_Read_ComputerInfo()

Function reads information from the host local computer

Returns:

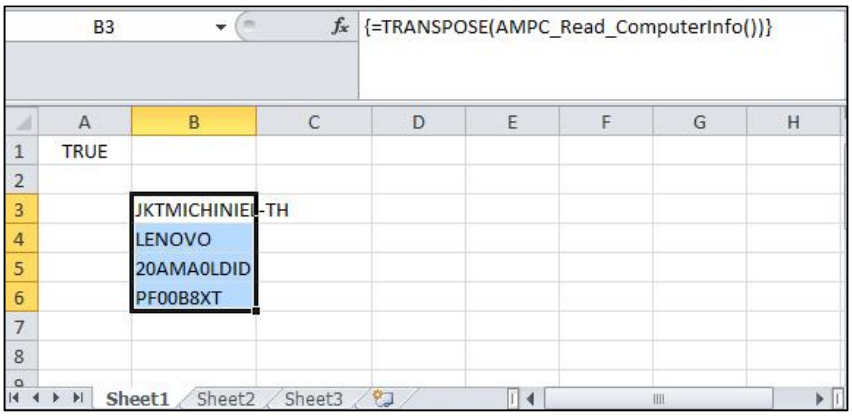
Returns an array with 4 elements containing the following information

Index	Description
1	Computer Name
2	Manufacturer
3	Model
4	Serial Number

This information will be required by Licensor to issue a valid license

The function must be entered as an array. To display the results in the various cells, select the range of 4 cells (4 rows) and after typing the formula =TRANSPOSE(AMPC_Read_ComputerInfo() press <CTRL> <SHIFT> <ENTER>

Example:


B3
{=TRANSPOSE(AMPC_Read_ComputerInfo())}
A
B
C
D
E
F
G
H
1
TRUE
2
3
JKTMICHINIEL-TH
4
LENOVO
5
20AMA0LDID
6
PF00B8XT
7
8
Sheet1
Sheet2
Sheet3