

# **Software**

## **JBertrand Calculer**

**You are invited to visit our website to purchase our software, artwork, technical calligraphy, scientific or engineering consultations, and company promotional items.**

**Software JBertrand Calculer  
JBertrand Calculer Gallery de Art**

# Software JBertrandCalculer & Software JBertrandCalculate

Mr. Joseph Bertrand, PMP MBA Engineering Management  
BS Computer Science  
BS Chemistry  
Tennessee State University

Handbook of Chemistry and Physics  
French Système International d'Unités

---

## Sample calculations for applications in science and information technology

---

PPM = Parts Per Million      PPB = Parts Per Billion      1 PPM = 1000 PPB

1 ppm = 1 mg/L      2.2 lbs = 1 Kg      1 000 000 ug = 1 gram  
1000 mg = 1 gram      1 ppb = 1 µg /L      3.79 Liter = US Gallon

1000 gram = 1 Kg      1000 ml = 1 Liter      1000 ug = 1 mg  
5280 feet = 1 mile      1 cm = 2.54 inch      mile = 1.15 Nautical mile

$\text{pH} = \text{pKa} + \text{Log} [ \text{Base/ Acid} ], \text{pH} + \text{pOH} = 14$

Molarity = Moles / L , Liter = 0.265 US Gals  
Mole = Atoms in 12 grams of Carbon - 12  
=  $6.02214076 \times 10^{23}$  atoms  
= Physicist Amedeo Avogadro ( 1811 )

# JBertrandCalculator

## Analysis for Hydrogen ( L ) @ STP - (H2)

### Analysis Results

Analyzer #	Test/Units	Specs	Analysis Results	Limit of Detection
Organoleptic	Odor	None	None	
Note 1	PPM O2	<= 2.00	1.26	0.10
Note 1	PPM CO	<= 1.00	0.21	0.10
Lab	PPM CO2	<= 1.00	0.10	0.00
Batch	PPM H2O	<= 1.00	0.10	0.10
Lab	PPM THC	<= 1.00	0.10	0.10
Lab	PPM Nitrogen	<= 1.00	0.20	0.20
Assay Results (by difference)	Hydrogen Min %	≥ 99.0%	99.99980	

PPM O2 Method Used : Note 1  
 PPM CO Method Used :

Manufacturer/Model# : Note 1  
 Manufacturer/Model# :

Note 1 :

Free with the purchase of a copy of Software JBertrandCalculator.

Free with the purchase of scientific or engineering consultations.

# Software JBertrandCalculer

## Software JBertrandCalculer Hydrogen Thermodynamics

A joint venture among The State of Denmark and a Manhattan Energy Producer plus a Picardie Software Company bid to supply electricity in United States Virgin Islands as a reasonable rate near the current price in Denmark at 0.487\$ per KWH.

The State, New York Producer, and The French Software Company plans to secure the energy using small scale nuclear reactions. If possible, portable plants might be employed on uninhabited keys near St. Thomas, St. Croix, and St. John.

The French Software Company from Picardie was asked to calculate the revenues produced in 1 hour if one mole of  $3/1$  Hydrogen (Tritium) is combined with one mole of  $2/1$  Hydrogen (Deuterium) to produce 1 mole of Helium (He).

At - negative 320 F, The New York Energy Producer from Manhattan plans to use Nitrogen ( $N_2$ ) to immediately cool down the reactions in an emergency. Again, The Picardie Software Company was asked to calculate the cost to cool down the reactions using mole of Nitrogen ( $N_2$ ) if Nitrogen sells for \$ 1.78 USDollars /L in Denmark.

### Solution

The State, New York Producer, and The French Software Company purchased a certified copy of The Software JBertrandCalculer. Software JBertrandCalculer was also available as a consultant for business, scientific and engineering concerns with this project in New York, France, Denmark, and US Virgin Islands.

# Software

# JBertrandCalculer

## & Software JBertrandCalculate

Estimated thermodynamics masses for Hydrogen , Helium , and Neutrons <sup>1</sup>

3/1 H Tritium = 3.02 gm / mol      2/1 H Deuterium = 2.01 gm / mol  
4/1 H Helium = 4.00 gm / mol      1/0 N Neutron = 1.01 gm / mol

<sup>1</sup> For use in small scale scientific and engineering research to produce only clean energy for small communities.

$$\text{Energy} = MC^2$$

Force = (Mass) (Acceleration) , Acceleration = Velocity <sup>2</sup> , lbs = 453.59 gm  
= Newton = 1 kg ( m/s <sup>2</sup> ) , lbs = 4.45 Newton = 32.2 ft/s<sup>2</sup>  
= Gravity = 9.8 m/s<sup>2</sup>

Velocity = meter/s = 2.24 miles/ hour = 3.6 km/hr = 3.28 feet/ second  
= miles /hr = 0.450 meters /second

C = Speed of light = 2.998 x 10 E10 cm/sec

Energy = MC<sup>2</sup> = Joules = Newton (meter )  
= 1 BTU/ lbs = 2.32 Kilojoules / Kilogram  
= 1 BTU = 1055 Joules = 252.16 Calories = 778.16 ft/lbs  
= 4.184 Joules = 1 Calories

1 kilowatt hour = 3 600 000 Joules

Power = 1 Watt = Joules / second = 3.41 BTU / hour = 860.42 Cal/hr  
= horsepower = 746 Watts = 550 ft.lbs/seconds = 2545 BTU/hr

Velocity = meter/s = 2.24 miles/ hour = 3.6 km/hr = 3.28 feet/ second  
= miles /hr = 0.450 meters /second

C = Speed of light =  $2.998 \times 10^{10}$  cm/sec

Energy =  $MC^2$  = Joules = Newton (meter)  
= 1 BTU/ lbs = 2.32 Kilojoules / Kilogram  
= 1 BTU = 1055 Joules = 252.16 Calories = 778.16 ft/lbs  
= 4.184 Joules = 1 Calories

Universal Gas Constant = 8.31 Joules/( ( gm) (mole)(K) )

Power = 1 Watt = Joules / second = 3.41 BTU / hour = 860.42 Cal/hr  
= horsepower = 746 Watts = 550 ft.lbs/seconds = 2545 BTU/hr

# Software

# JBertrandCalculer

Based on the volume of 1 US Gallon @ STP

LIQUID	SCF	LBS	Latent Heat BTU/LB	SCF/LB
Oxygen	115.10	9.527	91.7	12.08
Nitrogen	93.11	6.745	85.6	13.80
Argon	112.50	11.628	69.7	9.67
Hydrogen	113.66	0.592	192.7	191.99
Helium	100.87	1.043	8.8	96.71
Carbon Dioxide	74.03	8.470	113.0	8.74

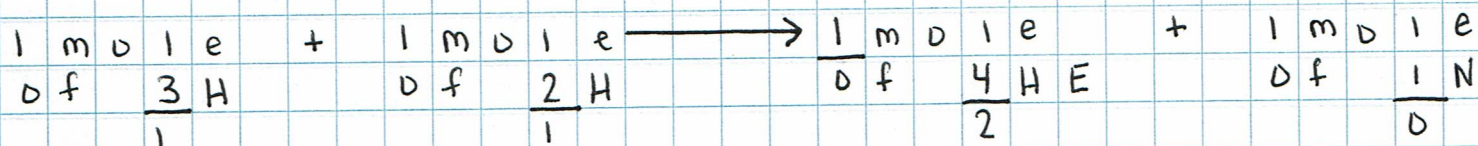
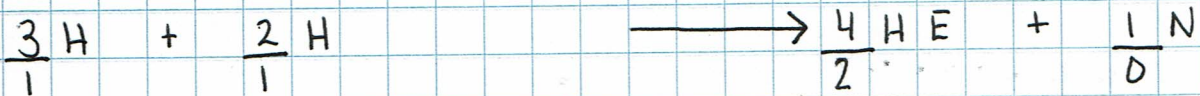
&

# Software

# JBertrandCalculate

# SOLUTION

SOFTWARE JBERTRAND CALCULATOR



mass of mole = grams

$$1 \text{ mole } \frac{3\text{H}}{1} = 3.02 \text{ grams/mole}$$

$$1 \text{ mole } \frac{2\text{H}}{1} = 2.01 \text{ grams/mole}$$

$$1 \text{ mole } \frac{4\text{HE}}{2} = 4.00 \text{ grams/mole}$$

$$1 \text{ mole } \frac{1}{0} = 1.01 \text{ grams/mole}$$

$$\boxed{\frac{3\text{H}}{1} + \frac{2\text{H}}{1}} = 5.03 \text{ grams/mole}$$

$$- \boxed{\frac{4\text{HE}}{2} + \frac{1\text{N}}{0}} = -5.01 \text{ grams/mole}$$

$$\boxed{\frac{3\text{H}}{1} + \frac{2\text{H}}{1}} - \boxed{\frac{4\text{HE}}{2} + \frac{1\text{N}}{0}} = 0.02 \frac{\text{grams}}{\text{mole}}$$

$$5.03 \text{ grams} - 5.01 \text{ grams} = 0.02 \frac{\text{grams}}{\text{mole}}$$

$$\text{Decrease in mass} = 0.02 \frac{\text{grams}}{\text{mole}}$$

$$\boxed{\text{Decrease in mass} = 0.02 \frac{\text{grams}}{\text{mole}}}$$

# SOLUTION (cont)

## SOFTWARE JBERTRAND CALCULATOR

$$X \frac{\text{Kg}}{\text{mole}} = 0.02 \frac{\text{grams}}{\text{mole}} = \text{mass decrease}$$

$$X \text{ Kg of decrease mass} = \left(\frac{\cancel{\text{mole}}}{1}\right) \left(\frac{0.02 \cancel{\text{grams}}}{\cancel{\text{mole}}}\right) \left(\frac{1 \text{ Kg}}{1000 \cancel{\text{grams}}}\right)$$

$$M = X \text{ Kg of mass} = 2.00 * 10^{-5} \text{ Kg}$$

$$E = MC^2 = (\text{mass decrease})(\text{speed of light})^2$$

$$E = (2.00 * 10^{-5} \text{ Kg})(3.00 * 10^8 \frac{\text{m}}{\text{s}})^2$$

$$E = 1.08 * 10^{12} \text{ Joules}$$

$$\text{French} = \text{Kilowatt Hour} = 3600000 \text{ Joules}$$

SI Unit

$$\text{Unit Cost Code} = \text{Cost of Electricity} = 0.487 \text{ USD}$$

Denmark in Denmark Kilowatt Hour

Revenue made if energy is produced and sold in one hour using hydrogen nuclear fusion

$$X \$ = \frac{0.487 \text{ USD}}{\text{Kilowatt Hour}} \left(\frac{\text{Kilowatt Hour}}{3600000}\right) \left(\frac{1.08 * 10^{12} \text{ Joules}}{1}\right)$$

$$X \$ = 243500 \text{ USD dollars per hour}$$

$$X \$ = 243,500 \text{ USD dollars per hour}$$



## SOLUTION (cont)

### SOFTWARE JBERTRAND CALCULATOR

-320F° = cool down with nitrogen (N<sub>2</sub>)

-320F° = nitrogen (N<sub>2</sub>)

-320F° = temperature

Price of (N<sub>2</sub>) = 1.78 USDollars / Liter

STP Chart (Nitrogen in liquid form)

1 Gallon of Nitrogen (N<sub>2</sub>) = 6.78 lbs

Calculate the cost of a cool down of the nuclear reactions using only one mole of N<sub>2</sub> in liquid form at -320F°

$$X \$ = \left( \frac{1 \text{ mole } N_2}{1} \right) \left( \frac{28.02 \text{ grams}}{1 \text{ mole } N_2} \right) \left( \frac{Kg}{1000 \text{ grams}} \right) \left( \frac{2.2 \text{ lbs}}{1 \text{ Kg}} \right) \left( \frac{1 \text{ gal}}{6.75 \text{ lbs}} \right) \left( \frac{3.79 \text{ gal}}{1 \text{ gal}} \right) \left( \frac{1.78 \text{ USD}}{\text{gal}} \right)$$

$$X \$ = \frac{(28.02)(2.2)(3.79)(1.78 \text{ USD})}{(1000)(6.75)}$$

$$X \$ = \frac{415.86 \text{ USD}}{6750}$$

$$X \$ = 0.062 \text{ USD per mole of Nitrogen (N}_2\text{)}$$

Cost of a cool down of nitrogen (N<sub>2</sub>) = 0.062 USD per mole

Cost of a cool down of nitrogen (N<sub>2</sub>) = 0.062 USD per mole

# **Software**

## **JBertrand Calculer**

**You are invited to visit our website to purchase our software, artwork, technical calligraphy, scientific or engineering consultations, and company promotional items.**

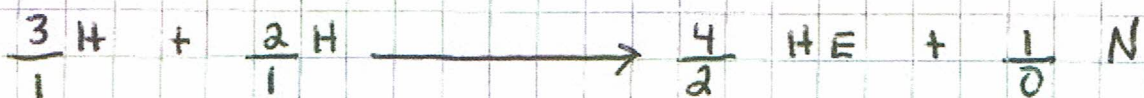
**Software JBertrand Calculer**  
**JBertrand Calculer Gallery de Art**

**CALCULATION  
SOFTWARE JBERTRAND CALCULER**

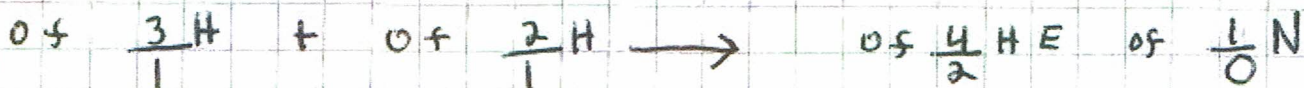
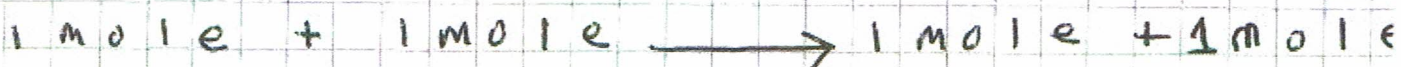
**BEFORE: DRAFT**

# SOLUTION

SOFTWARE JBERTRANO CALCULATOR



one mole



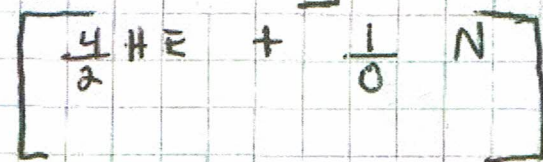
mass of mole = grams

$$1 \text{ mole } \frac{3}{1} \text{H} = 3.02 \text{ grams/mole}$$

$$1 \text{ mole } \frac{2}{1} \text{H} = 2.01 \text{ grams/mole}$$

$$1 \text{ mole } \frac{4}{2} \text{HE} = 4.00 \text{ grams/mole}$$

Replace



$$= 5.03 \text{ grams/mole}$$

$$= 5.01 \text{ grams/mole}$$

$$= 1.01 \text{ grams/mole}$$

$$\left[ \frac{3}{1} \text{H} + \frac{2}{1} \text{H} \right] - \left[ \frac{4}{2} \text{HE} + \frac{1}{0} \text{N} \right] = 0.02 \frac{\text{grams}}{\text{mole}}$$

$$5.03 \text{ gm} - 5.01 \text{ gm} = 0.02 \frac{\text{grams}}{\text{mole}}$$

$\frac{1}{2}$  Decrease in mass = 0.02 grams/mole

# SOLUTION (CONT)

SOFTWARE THERMOCALCULATOR

$$X \frac{\text{kg}}{\text{mole}} = 0.02 \frac{\text{grams}}{\text{mole}} = \text{Mass decrease}$$

remove

$$X \text{ kg of decrease mass} = \frac{\cancel{\text{mole}}}{1} \left( \frac{0.02 \text{ gm}}{\cancel{\text{mole}}} \right) \left( \frac{1 \text{ kg}}{1000 \text{ gm}} \right)$$

$$M = X \text{ kg of mass} = 2.00 \times 10^{-5} \text{ kg}$$

$$E = MC^2 = (\text{mass decrease}) (\text{speed of light})^2$$
$$E = (2.00 \times 10^{-5} \text{ kg}) (3.00 \times 10^8 \frac{\text{m}}{\text{s}})^2$$

$$E = 1.08 \times 10^{12} \text{ Joules}$$

2 lines between

NO BOX

French SI unit = ~~Kilowatt Hour~~ = 3 600 000 Joules

Unit Cost = Cost of Electricity

Code Denmark IN DENMARK = 0.487 \$ US Dollars / Kilowatt Hour

and sold Revenues produced if produce Energy in 1 hour using Nuclear Fusion ~~on and on population key~~

$$X \$ = \frac{0.487 \text{ US Dollars}}{\text{Kilowatt Hour}} \left( \frac{\text{Kilowatt Hour}}{3 600 000 \text{ Joules}} \right) (1.08 \times 10^{12} \text{ Joules})$$

$$X \$ = \$243 500 \text{ dollars US Dollars} / \text{per hour}$$

## SOLUTION (cont)

SOFTWARE THERMOCALCULATOR

-320 F - COOL DOWN WITH NITROGEN (N<sub>2</sub>)

At -320 F NITROGEN (N<sub>2</sub>)  
Negative 320 F below zero = Temperature

PRICE OF N<sub>2</sub> = \$1.78 US DOLLAR / L

lbs per gallon of N<sub>2</sub> in liquid = ~~6.75~~ <sup>STP chart</sup>

Based on 1 gallon = 6.75 lbs

Calculate Cost of a Cool down  
For 1 mole of (N<sub>2</sub>) Nitrogen

$$X \$ = \frac{(1 \text{ mole } N_2) (28.02 \text{ gm}) (1 \text{ kg}) (2.2 \text{ lbs}) (3.79 \text{ gal})}{1 (1 \text{ mole } N_2) (1000 \text{ gm}) (1 \text{ kg}) (6.75 \text{ lbs}) (1 \text{ gal})}$$

$$X \$ = \frac{(28.02)(2.2)(3.79)(1.78 \text{ US DOLLARS})}{(1000)(6.75)}$$

$$X \$ = \frac{415.86 \text{ USD}}{6750}$$

$$X \$ = 0.062 \text{ US Dollars per mole of } N_2$$