Software JBertrandCalculer

& Software JBertrandCalculate

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

Software JBertrandCalculer

JBertrandCalculer 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

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

Molarity = Moles / L , Liter = 0.265 US Gals
Mole = Atoms in 12 grams of Carbon - 12
= 6.02214076 × 10 E23 atoms
= Physicist Amedeo Avogadro (1811)

JBertrandCalculer

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 :
PPM CO Method Used : Note 1

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

Note 1 :

Free with the purchase of a copy of Software JBertrandCalculer.

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 unhibited keys near St. Thomas, St. Croix , and St. John.

The French Software Company from Picardie was asked to calculate the revenues produces 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 (N2) to immediately cool down the reactions if an emergency. Again, The Picardie Software Company was asked to calculate the cost to cool down the reactions using mole of Nitrogen (N2) 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 1

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

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

Energy = MC^2

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

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^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

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 x 10 E10 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 CALCULER

$$\overset{3}{\underset{1}{}}H + \overset{2}{\underset{1}{}}H \longrightarrow \overset{4}{\underset{2}{}}HE + \overset{1}{\underset{0}{}}N$$

1 mole of $\overset{3}{\underset{1}{}}H$ + 1 mole of $\overset{2}{\underset{1}{}}H$ ⟶ 1 mole of $\overset{4}{\underset{2}{}}HE$ + 1 mole of $\overset{1}{\underset{0}{}}N$

mass of mole = grams

1 mole $\overset{3}{\underset{1}{}}H$ = 3.02 grams / mole

1 mole $\overset{2}{\underset{1}{}}H$ = 2.01 grams / mole

1 mole $\overset{4}{\underset{2}{}}HE$ = 4.00 grams / mole

1 mole $\overset{1}{\underset{0}{}}N$ = 1.01 grams / mole

$\left[\overset{3}{\underset{1}{}}H + \overset{2}{\underset{1}{}}H\right]$ = 5.03 grams / mole

$-\left[\overset{4}{\underset{2}{}}HE + \overset{1}{\underset{0}{}}N\right]$ = -5.01 grams / mole

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

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

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

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

SOLUTION (con't)

SOFTWARE JBERTRAND CALCULER

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

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

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

$E = MC^2 =$ (mass decrease)(speed of light)^2

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

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

French SI Unit = Kilowatt Hour = 3600000 Joules

Unit Cost Code Denmark = Cost of Electricity in Denmark $= \frac{0.487\ USD}{Kilowatt\ Hour}$

Revenue made if energy is produced and sold in 1 hour using hydrogen nuclear fusion

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

$X\$ = 243500$ USD / per hour

$\boxed{X\$ = 243{,}500\ USD / per\ hour}$

SOLUTION (cont)

SOFTWARE JBERTRAND CALCULER

$-320°F$ = cool down with nitrogen (N_2)

At $-320°F$ nitrogen (N_2)
negative $320°F$ below zero = temperature

Price of N_2 = 1.78 USD / Liter

lbs per gallon of N_2 in liquid form = STP chart
Based on 1 gallon = 6.75 lbs

Calculate cost of a cool down for 1 mole of nitrogen (N_2)

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

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

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

$X\$ = 0.062$ USD per mole of nitrogen (N_2)

Cost of a cool down = 0.062 USD per mole of nitrogen (N_2)

Cost of a cool down = 0.062 USD per mole of nitrogen (N_2)

Software JBertrandCalculer

& Software JBertrandCalculate

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

Software JBertrandCalculer

JBertrandCalculer Gallery de Art