

Liquid Fuel Measurements and Conversions

Liquid fuel measurements and conversions Gasoline

1 gallon = 125,000 Btu - HHV *

1 gallon = 131.9 megajoules – HHV *

1 gallon = 115,400 Btu - LHV *

1 gallon = 121.7 megajoules – LHV *

1 gallon = .002791 metric tons

1 barrel = 5,250,000 Btu - HHV *

1 barrel = 5,539 megajoules – HHV *

1 barrel = 4,846,800 Btu - LHV *

1 barrel = 5,113 megajoules – LHV *

1 barrel = .1172 metric tons

1 liter = 33,025 Btu – HHV *

1 liter = 30,489 Btu – LHV *

1 liter = 34.8 megajoules – HHV *

1 liter = 32.2 megajoules – LHV *

1 metric ton = 8.5 barrels

1 metric ton = 1.351 kiloliters

1 kiloliter = .740 metric tons

Diesel fuel

1 gallon = 138,700 Btu - HHV *

1 gallon = 146.3 megajoules – HHV *

1 gallon = 128,700 Btu - LHV *

1 gallon = 135.8 megajoules – LHV *

1 gallon = .003192 metric tons

1 barrel = 5,825,400 Btu – HHV *

1 barrel = 6,146 megajoules – HHV *

1 barrel = 5,405,400 Btu – LHV *

1 barrel = 5,703 megajoules LHV *

1 barrel = .1341 metric tons

1 metric ton = 7.5 barrels

1 kiloliter = .839 metric tons

1 metric ton = 1.192 kiloliters

1 liter = 36,645 Btu – HHV *

1 liter = 38.7 megajoules – HHV *

1 liter = 34,003 Btu – LHV *

1 liter = 35.9 megajoules – LHV *

Ethanol

1 gallon = 84,600 Btu - HHV *

1 gallon = 89.3 megajoules – HHV *

1 gallon = 75,670 Btu – LHV *

1 gallon = 79.8 megajoules – LHV *

1 barrel = 3,553,200 Btu - HHV *

1 barrel = 3,749 megajoules -- HHV *

1 barrel = 3,178,140 Btu - LHV *

1 barrel = 3,353 megajoules – LHV *

1 liter = 22,351 Btu - HHV *

1 liter = 23.6 megajoules – HHV *

1 liter = 19.992 Btu - LHV *

1 liter = 21.1 megajoules – LHV *

Ethanol average density = .79 grams per milliliter Ethanol average density = .79 metric tons per cubic

meter

Bio-diesel

1 gallon = 126,206 Btu – HHV *

1 gallon = 133.1 megajoules – HHV *

1 gallon = 117,093 Btu - LHV *

1 gallon = 123.5 megajoules – LHV *

1 barrel = 5,300,652 Btu - HHV *

1 barrel = 5,592 megajoules – HHV *

1 barrel = 4,917,906 Btu – LHV *

1 barrel = 5,188 megajoules – LHV *

1 liter = 33,344 Btu – HHV *

1 liter = 35.2 megajoules – HHV *

1 liter = 30,936 Btu – LHV *

1 liter = 32.6 megajoules – LHV *

1 metric ton of biodiesel = 37.8 gigajoules

Bio-diesel average density = .88 grams per milliliter

Bio-diesel average density = .88 metric tons per

cubic meter

Residual Fuel

1 gallon = 149,700 Btu - HHV *

1 gallon = 157.9 megajoules – HHV *

1 gallon = 138,400 Btu – LHV *

1 gallon = 146.0 megajoules – LHV *

1 barrel = 6,287,400 Btu – HHV *

1 barrel = 6,633 megajoules – HHV *

1 barrel = 5,812,800 Btu - LHV *

1 barrel = 6,133 megajoules – LHV *

1 liter = 39,551 Btu - HHV *

1 liter = 41.7 megajoules – HHV *

1 liter = 36,565 Btu – LHV *

1 liter = 38.6 megajoules – LHV *

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LP Gas (liquefied petroleum gas – propane)

1 gallon = 91,300 Btu - HHV *

1 gallon = 96.3 megajoules – HHV *

1 gallon = 83,500 Btu - LHV *

1 gallon = 88.1 megajoules – LHV *

1 barrel = 3,834,600 Btu - HHV *

1 barrel = 4,046 megajoules – HHV *

1 barrel = 3,507,000 Btu - LHV *

1 barrel = 3,700 megajoules – LHV *

1 liter = 24,121 Btu – HHV *

1 liter = 25.4 megajoules – HHV *

1 liter = 22,061 Btu - LHV *

1 liter = 23.3 megajoules – LHV *

1 barrel = .086 metric tons

1 metric ton = 11.6 barrels

1 kiloliter = .542 metric tons

1 metric ton = 1.844 kiloliters

Methanol

1 gallon = 64,600 Btu - HHV *

1 gallon = 68.2 megajoules – HHV *

1 gallon = 56,560 Btu -LHV *

1 gallon = 59.7 megajoules – LHV *

1 barrel = 2,713,200 Btu - HHV *

1 barrel = 2,862 megajoules – HHV *

1 barrel = 2,375,520 Btu -- LHV *

1 barrel = 2,506 megajoules – LHV *

1 liter = 17,067 Btu - HHV *

1 liter = 18.0 megajoules – HHV *

1 liter = 14,943 Btu - LHV *

1 liter = 15.8 megajoules – LHV *

Butane

1 gallon = 103,000 Btu - HHV *

1 gallon = 108.7 megajoules – HHV *

1 gallon = 93,000 Btu - LHV *

1 gallon = 98.1 megajoules – LHV *

1 barrel = 4,326,000 Btu - HHV *

1 barrel = 4,564 megajoules – HHV *

1 barrel = 3,906,000 Btu -- LHV *

1 barrel = 4,121 megajoules – LHV *

1 liter = 27,213 Btu - HHV *

1 liter = 28.7 megajoules – HHV *

1 liter = 24,571 Btu - LHV *

1 liter = 25.9 megajoules – LHV *

Barrels of petroleum or related products (bbl) measurements and conversions

Crude Oil (based on worldwide average gravity)

1 barrel = 42 gallons

1 drum = 55 gallons

1 metric drum = 52.8 gallon

1 gallon = .0182 drum

1 gallon = .0189 metric drum

1 gallon = 138,100 Btu - HHV *

1 gallon = 145.7 megajoules – HHV *

1 gallon = 131,800 Btu – LHV *

1 gallon = 139.0 megajoules – LHV *

1 gallon = .003247 metric tons

1 gallon = .0038 kiloliters

1 gallon = .0238 barrels

1 barrel = 5,800,200 Btu - HHV *

1 barrel = 6,119 megajoules – HHV *

1 barrel = 5,535,600 Btu - LHV *

1 barrel = 5,840 megajoules – LHV *

1 barrel = .13637 metric tons

1 barrel = .159 kiloliters

1 liter = 36,486 Btu – HHV *

1 liter = 38.5 megajoules – HHV *

1 liter = 34,822 Btu - LHV *

1 liter = 36.7 megajoules – LHV *

1 kiloliter = .8581 metric tons

1 kiloliter = 6.2898 barrels

1 kiloliter = 264.17 gallons

1 kiloliter = 1 cubic meter

1 metric ton = 1.165 kiloliters

1 metric ton = 7.33 barrels

1 metric ton = 307.86 gallons

1 barrel of crude oil = 44.60 gallons of petroleum products

	<u>Gallons</u>	<u>Percent</u>
Finished motor gasoline 19.40		44
Distillate fuel oil	10.50	24
Kero-type jet fuel	4.12	9
Petroleum coke	2.23	5
Still gas	1.81	4
Residual fuel oil	1.68	4
Liquefied refiner gas	1.51	3
Asphalt and road oil	1.34	3
Other	2.01	4

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Oil Equivalents

A barrel (metric ton) of oil equivalent is a unit of energy based on the approximate energy released by burning one barrel (metric ton) of crude oil.

- 1 barrel oil equivalent (bboe) = .1364 metric tons oil equivalent
- 1 barrel oil equivalent = approximately 1.364 million kilocalories
- 1 barrel oil equivalent = approximately 5.73 gigajoules
- 1 barrel oil equivalent = approximately .20 metric tons of hard coal
- 1 barrel oil equivalent = approximately .41 metric tons of lignite coal
- 1 barrel oil equivalent = approximately 1.64 metawatt-hours
- 1 million barrels oil equivalent = .16 billion cubic meters natural gas
- 1 million barrels oil equivalent = 5.61 billion cubic feet natural gas
- 1 million barrels oil equivalent = .12 million metric tons of liquefied natural gas
- 1 million barrels oil equivalent = 5.8 trillion Btus
- 1 million barrels oil equivalent = .14 million metric tons oil equivalent
- 1 metric ton oil equivalent (toe) = 7.33 barrels oil equivalent
- 1 metric ton oil equivalent = approximately 10 million kilocalories
- 1 metric ton oil equivalent = approximately 42 gigajoules
- 1 metric ton oil equivalent = approximately 1.5 metric tons of hard coal
- 1 metric ton oil equivalent = approximately 3 metric tons of lignite coal
- 1 metric ton oil equivalent = approximately 12 megawatt-hours
- 1 million metric tons oil equivalent = 1.111 billion cubic meters natural gas
- 1 million metric tons oil equivalent = 39.2 billion cubic feet natural gas
- 1 million metric tons oil equivalent = .805 million tons liquefied natural gas
- 1 million metric tons oil equivalent = 7.33 million barrels oil equivalent

Refined petroleum products

- 1 metric ton motor gasoline = 8.53 barrels
- 1 metric ton LP-gas (liquefied petroleum gas) (propane) = 11.6 barrels
- 1 metric ton natural gas = 10 barrels
- 1 metric ton NGL (natural gas liquids) = 10.4 barrels

Liquid fuels

- 1 cubic meter = 6.289 barrels
- 1 barrel = 159 liters
- 1 barrel = 42 US gallons
- 1 U.S. gallon = 231 cubic inches
- 1 U.S. gallon = .1337 cubic feet
- 1 U.S. gallon = 3.785 liters
- 1 U.S. gallon = .8321 imperial gallons
- 1 U.S. gallon = .0238 barrels
- 1 U.S. gallon = .003785 cubic meters
- 1 liter = 61.02 cubic inches
- 1 liter = .03531 cubic feet
- 1 liter = .2642 U.S. gallons
- 1 liter = .22 imperial gallons
- 1 liter = .00629 barrels
- 1 liter = .001 cubic meters

Flow Rate

- 1 barrel per hour = 137.8 cubic feet per day
- 1 barrel per hour = 49,187 cubic feet per year
- 1 barrel per hour = 1,008 U.S. gallons per day
- 1 barrel per hour = 367,920 U.S. gallons per year
- 1 barrel per hour = 839.3 imperial gallons per day
- 1 barrel per hour = 306,345 imperial gallons per year
- 1 barrel per hour = 3,815 liters per day
- 1 barrel per hour = 1,392,475 liters per year
- 1 gallon per hour = .5712 barrels per day
- 1 gallon per hour = 207.92 barrels per year
- 1 liter per hour = .1510 barrels per day
- 1 liter per hour = 55.10 barrels per year

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Fuel usage measurements and conversions

1 mile per gallon = .264 miles per liter

1 mile per gallon = .425 kilometers per liter

1 mile per gallon = 235 liters per 100 kilometers

1 mile per gallon = 100 gallons per 100 miles

1 mile per liter = 3.79 miles per gallon

1 mile per liter = 1.609 kilometers per liter

1 mile per liter = 62.15 liters per 100 kilometers

1 kilometer per liter = 2.35 miles per gallon

1 kilometer per liter = .6215 miles per liter

1 kilometer per liter = 100 liters per 100 kilometers

1 kilometer per liter = 42.5 gallons per 100 miles

* Energy contents are expressed as either High (gross) Heating Value (HHV) or Lower (net) Heating Value (LHV). LHV is closest to the actual energy yield in most cases. HHV (including condensation of combustion products) is greater by between 5% (in the case of coal) and 10% (for natural gas), depending mainly on the hydrogen content of the fuel. For most biomass feed-stocks this difference appears to be 6-7%. The appropriateness of using LHV or HHV when comparing fuels, calculating thermal efficiencies, etc. really depends upon the application. For stationary combustion where exhaust gases are cooled before discharging (e.g. power stations), HHV is more appropriate. Where no attempt is made to extract useful work from hot exhaust gases (e.g. motor vehicles), the LHV is more suitable. In practice, many European publications report LHV, whereas North American publications use HHV (Source: Bioenergy Feedstock Network -- http://bioenergy.ornl.gov/)

References

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