

CONVERSIONS AND EQUIVALENTS

AREA (s.=statute, n.=nautical)		
multiply	by	to derive
meters ²	10.76	feet ²
feet ²	0.0929	meters ²
kilometers ²	0.4	s. miles ²
s. miles ²	2.6	kilometers ²
s. miles ²	0.8	n. miles ²
n. miles ²	1.3	s. miles ²
kilometers ²	0.3	n. miles ²
n. miles ²	3.4	kilometers ²

TEMPERATURE	
calculate	to derive
$5/9(°F - 32°)$	°C
$(9/5 °C) + 32°$	°F

WEIGHT		
multiply	by	to derive
kilograms	2.2	pounds
metric tons	0.984	long tons
metric tons	1,000	kilograms
metric tons	2,204.6	pounds
long tons	1,016.05	kilograms
long tons	2240	pounds
short tons	907.2	kilograms
short tons	2,000	pounds

VOLUME		
multiply	by	to derive
barrels	42	gallons
barrels	5.6	feet ³
barrels	159	liters
barrels	0.2	meters ³
feet ³	7.5	gallons
gallons	3.8	liters

DENSITY ESTIMATIONS			
	Barrels/Long Ton		
Material	Range	Average	Notes
Crude Oils	6.7-8.1	7.4	1 long ton equals 2200 lbs
Aviation Gasolines	8.3-9.2	8.8	As a general approximation, use 7 bbl. (300 US gallons) per metric ton of oil.
Motor Gasolines	8.2-9.1	8.7	
Kerosenes	7.7-8.3	8.0	6.4 bbl/long ton is neutrally buoyant in fresh water.
Gas Oils	7.2-7.9	7.6	Open ocean neutral buoyancy values are generally in the 6.21-6.25 bbl/long ton range.
Diesel Oils	7.0-7.9	7.5	
Lubricating Oils	6.8-7.6	7.2	
Fuel Oils	6.6-7.0	6.8	
Asphaltic Bitumens	5.9-6.5	6.2	

Specific gravity of 1 or an API of 10 equals the density of fresh water.
 Specific Gravity < 1 or an API > 10 indicates product is lighter than fresh water.
 API Gravity = $(141.5 / \text{Specific Gravity}) - 131.5$
 Weight of Fresh Water: 8.3 pound/gallon Note: Exact weight depends on temperature and salinity
 Weight of Sea Water: 8.5 pounds/gallon

OIL THICKNESS ESTIMATIONS				
Standard Term	Approx. Film Thickness		Approx. Quantity of Oil in Film	
	inches	mm		
Barely Visible	0.0000015	0.00004	25 gals./mile ²	44 liters/km ²
Silvery	0.000003	0.00008	50 gals./mile ²	88 liters/km ²
Slightly Colored	0.000006	0.00015	100 gals./mile ²	176 liters/km ²
Brightly Colored	0.000012	0.0003	200 gals./mile ²	351 liters/km ²
Dull	0.00004	0.001	666 gals./mile ²	1,168 liters/km ²
Dark	0.00008	0.002	1,332 gals./mile ²	2,237 liters/km ²

Thickness of light oils: 0.0010 inches to 0.00010 inches
 Thickness of heavy oils: 0.10 inches to 0.010 inches

COMMONLY USED EQUATIONS	
Circle: Area = $3.14 \times \text{radius}^2$	Cylinder/Pipe/Tank: Volume = $3.14 \times \text{radius}^2 \times \text{length}$
Circumference = $3.14 \times \text{diameter}$	Rectangle/Square: Area = length x width
Sphere/Tank: Area = $4 \times 3.14 \times \text{radius}^2$	Cube/Block/Tank: Volume = length x width x height
Volume = $1.33 \times 3.14 \times \text{radius}^3$	

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