Exam Conversion Sheet

Revised 6/2/2025

Unit	Definition
%	Percent
A	Area
Acre	Acre
AF	Acre Foot
C	Concentration
CCF	Hundred Cubic Feet
CFS	Cubic Feet Per Second
D	Diameter
DT	Detention Time
Eff	Efficiency
Ft	Feet
Ft/Sec	Feet Per Second
Ft^2	Square Feet
Ft^3	Cubic Feet
Gal	Gallon(s)
gm	Gram(s)
GPD	Gallons per Day
gpg	Grains Per Gallon
gpm	Gallons per Minute
gr	Grain(s)
HP	Horse Power
hrs	Hour(s)
HTH	High Test Hypochlorite
in^2	Square Inches
kWh	Kilowatt-Hour(s)
L	Liter(s)
lbs	Pound(s)
mA	Milliamps
MG	Million Gallons
mg/L	Milligrams Per Liter
MGD	Million Gallons Per Day
min	Minute(s)
mL	Milliliter(s)
°C	Degrees Celsius
°F	Degrees Fahrenheight
ppm	Parts Per Million
PSI	lbs/in^2
Q	Flow
sec	Second(s)
SG	Specific Gravity
SLR	Surface Loading Rate
UFRV	Unit Filter Run Volume
V	Velocity
WWE	Wire To Water Efficiency
yd	Yard(s)
yd^3	Cubic Yard(s)

Units and Conversion Factors

1	%	=	10,000	mg/L
1	%	=	10,000	ppm
1	Acre	=	43,560	Ft^2
1	AF	=	325,851	Gal
1	CCF	=	100	Ft^3
1	CCF	=	748	Gal
1	CFS	=	448.8	GPM
1	day	=	24	hrs
1	day	=	1440	min
1	day	=	86400	sec
1	Ft	=	0.305	Meter
1	Ft (H_2O)	=	0.433	PSI
1	Ft^3	=	7.48	Gal
1	Ft^3 (H_2O)	=	62.3832	lbs
1	Gal	=	3.79	L
1	Gal (H_2O)	=	8.34	lbs
1	gm	=	1000	mg/L
1	gpg	=	17.1	mg/L
1	HP	=	33000	Ft Lbs/Min
1	HP	=	0.746	kW
1	HP	=	746	Watts
1	L	=	1000	mL
1	L (H_2O)	=	1000	gm
1	lb	=	454	gm
1	lb	=	7000	gr
1	lb	=	0.454	kg
1	mg/L	=	1	ppm
1	MGD	=	1.55	CFS
1	MGD	=	694	GPM
1	Mile	=	5280	Ft
1	PSI	=	2.31	Ft
1	ton	=	2000	lbs
1	yd	=	3	Ft
1	yd^3	=	27	Ft^3

Area and Volume

Area of Circle = .785 X D^2

Area of Rectangle = Length x Width

Area of Right Triangle = (Base x Height)/2

Cylinder Volume (Gal) = .785 x D^2 x Height or Length (Ft) x 7.48

Rectangular Basin (Gal) = Length (Ft) x Width (Ft) x Height (Ft) x 7.48

Circumference of a Circle = 3.14 x D

$$\text{Slope (\%)} = \frac{\text{Rise}}{\text{Distance}} \times 100$$

Chlorination

Gas (lbs) = MG x mg/L x 8.34

$$\text{HTH Solid (lbs)} = \frac{\text{MG x mg/L x 8.34}}{\text{Strength (\%)/100}}$$

$$\text{Liquid (Gal)} = \frac{\text{MG x mg/L x 8.34}}{\text{Strength (\%)/100 x Chemical Weight (lbs/gal)}}$$

Dosage (mg/L) = Demand (mg/L) + Residual (mg/L)

Flow & Velocity

(Q) Flow (Ft^3/Sec) = (A)Area (Ft^2) x (V)Velocity (Ft/Sec)

$$A\ (Ft^2) = \frac{Q\ (Ft^3/Sec)}{V\ (Ft/Sec)} \qquad V\ (Ft/Sec) = \frac{Q\ (Ft^3/Sec)}{A\ (Ft^2)}$$

$$\text{GPM} = \frac{\text{Volume (Gal)}}{\text{Time (Min)}}$$

Dilution/ Blending

$C_1 \times V_1 = C_2 \times V_2$ $\qquad \frac{Q_1}{V_1} = \frac{Q_2}{V_2}$

$(C_1 \times V_1) + (C_2 \times V_2) = C_3 \times V_3$

Electrical/SCADA

$$\text{Process Units} = \frac{\text{(Live Signal (mA) - 4 mA) x Process Range}}{\text{16 mA}}$$

Other

Cost/Day ($) = Lbs/Day x Cost/lb ($)

$$\text{Removal (\%)} = \frac{\text{(In-Out)}}{\text{In}} \times 100$$

$$^{\circ}C = \frac{^{\circ}F - 32}{1.8}$$

$$\text{Gal/Capita/Day} = \frac{\text{GPD}}{\text{Population}}$$

$^{\circ}F = (^{\circ}C \times 1.8) + 32$

Solutions

$$\text{(lbs/Gal)} = \frac{\text{Solution (\%)}}{100} \times 8.34 \times \text{Specific Gravity (SG)}$$

(lbs) Chemical = SG x 8.34 x Solution (Gal) x Solution (%/100)

$$\text{Specific Gravity (SG)} = \frac{\text{Chemical Weight (Lbs/Gal)}}{8.34}$$

$$\text{Chemical in Solution (\%)} = \frac{\text{Dry Chemical (Lbs) x 100}}{\text{Solution Total Weight (lbs)}}$$

$$\text{GPD} = \frac{\text{MGD x mg/L x 8.34}}{\text{(\% purity/100) x Chemical Wt.(lbs/gal)}}$$

$$\text{GPD} = \frac{\text{(Feed, ml/min. x 1,440 min/day)}}{\text{(1,000 ml/L x 3.785 L/gal)}}$$

$$\text{mg/L} = \frac{\text{lbs}}{\text{MG x 8.34}}$$

Pumping

$$\text{Water HP} = \frac{\text{GPM x Head (Ft)}}{3960}$$

$$\text{Brake HP} = \frac{\text{GPM x Head (Ft)}}{\text{3960 x (Pump \% Eff/100)}}$$

$$\text{Motor HP} = \frac{\text{GPM x Head (Ft)}}{\text{3960 x (Pump \% Eff/100) x (Motor \% Eff/100)}}$$

WWE (%) = (Pump % Eff/100) x (Motor % Eff/100)

Cost ($) = HP x .746 x Operating Hours (hrs) x $/kWh

$$\text{Specific Capacity (GPM/Ft)} = \frac{\text{Well Yield (GPM)}}{\text{Drawdown (Ft)}}$$

Sedimentation

$$\text{DT (Min)} = \frac{\text{Volume (Gal)}}{\text{Flow (GPM)}} \qquad \text{DT (hrs)} = \frac{Ft^3 \times 7.48 \times 24}{\text{Gal/Day}}$$

$$\text{SLR (GPD/Ft}^2\text{)} = \frac{\text{Total Flow (GPD)}}{\text{Surface Area (Ft}^2\text{)}} \qquad \text{low} = \frac{\text{Volume}}{\text{Time}}$$

$$\text{Weir Overflow Rate (GPD/Ft)} = \frac{\text{Flow (GPD)}}{\text{Weir Length (Ft)}}$$

Pounds Force

lbs Force = PSI x Area (in^2)

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Chemical Dosage Calculations

Gas Feed Dry (Lbs) = MG x mg/L x 8.34

$$\text{Solid (Lbs)} = \frac{\text{MG x mg/L x 8.34}}{\text{Strength (\%)/100}}$$

$$\text{Liquid (Gal)} = \frac{\text{MG x mg/L x 8.34}}{\text{Strength (\%)/100 x Chemical Weight (Lbs/gal)}}$$

$$\text{Liquid (Gal)} = \frac{\text{MG x mg/L x 8.34}}{\text{Commercial Purity (\%)/100 x Ion Purity (\%)/100 x Chemical Weight (Lbs/gal)}}$$

$$\text{ppm or mg/L} = \frac{\text{lbs}}{\text{MG x 8.34}} \qquad \text{ppm or mg/L} = \frac{\text{gallons x \% purity x lbs/gal}}{\text{MG x 8.34}}$$

C x T Calculations

C x T = Chlorine Residual (mg/L) x Time (min)

$$\text{Time (min)} = \frac{\text{C x T}}{\text{Chlorine Residual (mg/L)}}$$

$$\text{Chlorine Residual (mg/L)} = \frac{\text{C x T}}{\text{Time (min)}}$$

$$\text{Inactivation Ratio} = \frac{\text{Actual C x T}}{\text{Table "E" C x T}}$$

C x T Calculated = T_{10} Value, min x Chlorine Residual (mg/L)

$$\text{Log Removal} = 1.0 - \frac{\text{\% Removal}}{100} \text{ x Log Key x (-1)}$$

Filtration

$$\text{Filtration Rate } \frac{\text{GPM}}{\text{Ft}^2} = \frac{\text{Filter Production (GPD)}}{\text{Filter Area (Ft}^2\text{) x 1440}}$$

$$\text{Loading Rate } \frac{\text{GPM}}{\text{Ft}^2} = \frac{\text{Flow Rate (GPM)}}{\text{Filter Area (Ft}^2\text{)}}$$

Daily Filter Production (GPD) = Filter Area (Ft^2) x (GPM/Ft^2) x 1440

Backwash Pumping Rate (GPM) = Filter Area (Ft^2) x Backwash Rate (GPM/Ft^2)

Backwash Volume (Gal) = Filter Area (Ft^2) x Backwash Rate (GPM/Ft^2) x Time (min)

$$\text{Backwash Rate } \frac{\text{GPM}}{\text{Ft}^2} = \frac{\text{Flow Rate (GPM)}}{\text{Filter Area (Ft}^2\text{)}}$$

$$\text{Rate of Rise } \frac{\text{Inches}}{\text{min}} = \frac{\text{Backwash Rate (GPM/Ft}^2\text{) x 12 (in/Ft)}}{\text{7.48 (gal/Ft}^3\text{)}}$$

$$\text{Unit Filter Run Volume (UFRV)} = \frac{\text{Volume Produced in a Filter Run (Gal)}}{\text{Filter Area (Ft}^2\text{)}}$$