

WINE SPIRITS ADDITION

Materials: Grapes @ 24-26° Brix, Ferment to 6-7% alcohol (Ebulliometer)
 4 tons → 640 gallons (i.e. 160 gal/ton)

Specifications of Port: High Proof = 191° (95.5%)
 Desired Alcohol = 18.5-19.0%
 Desired Residual Sugar = 8-9%

Calculations: $V_s = V_j \{X_f - X_j\} / \{X_s - X_f\}$
 V_s = Volume of Spirit
 V_j = Volume of Juice (Wine)
 X = Alcohol Concentration in Vol %
 f = Final Wine (Port)
 j = Wine to be Fortified
 s = Spirit Used

Example #1	(Using 6% Alc. in Wine)	(Using 7%Alc. In Wine)
V_s is Unknown	$640 \{18.5 - 6\} / \{95.5 - 18.5\}$	
$V_j = 640$	$640 \{12.5 / 77\}$	$640 \{11.5 / 77\}$
$X_f = 18.5 \%$	$640 \{.1623\}$	$640 \{.14935\}$
$X_j = 6 - 7\%$	$V_s = 103.87$ gallons	$= 95.58$ gals
$X_s = 95.5\%$		

Example #2		
V_s is Unknown	$640 \{19 - 6\} / \{95.5 - 19\}$	
$V_j = 640$	$640 \{13 / 76.5\}$	$640 \{12 / 76.5\}$
$X_f = 19 \%$	$640 \{.16993\}$	$640 \{.15686\}$
$X_j = 6 - 7\%$	$V_s = 108.76$ gallons	$= 100.39$ gals
$X_s = 95.5\%$		

Note: These calculations are based on a volume basis NOT a weight basis. There is a volumetric contraction associated with these fortifications.

Example #3	$V_j = 100$ gals, $X_f = 18.5\%$, $X_j = 6 - 7\%$	
$V_s = 100 \{.1623\} = 16.23$	(Where Wine = 6% Alc)	
$V_s = 100 \{.14935\} = 14.935$	(Where Wine = 7% Alc)	

Example #4	$V_j = 100$ gals, $X_f = 19\%$, $X_j = 6 - 7\%$	
$V_s = 100 \{.16993\} = 16.99$	(Where Wine = 6% Alc)	
$V_s = 100 \{.15686\} = 15.69$	(Where Wine = 7% Alc)	