



Freeze/Flash Point

QUESTION(S)

1. What are the freezing points of water/Methanol ; water/Ethylene Glycol; water/Propylene Glycol mixtures ?

Answer:

<u>Methanol \ Water Mixtures</u>		
Methanol Conc. Wt. % (Vol.%)	Freezing Point, F(C)	Flash Point, (TCC) F (C)
0 (0)	32 (0)	No Flash
10 (13)	20 (-7)	130 (54)
20 (24)	0 (-18)	110 (43)
30 (35)	-15 (-26)	95 (35)
40 (46)	-40 (-40)	85 (29)
50 (56)	-65 (-54)	75 (24)
60 (66)	-95 (-71)	70 (21)
70 (75)	-215 (<-73)	60 (16)
80 (83)	-225 (<-73)	55 (13)
90 (92)	-230 (<-73)	55 (13)
100 (100)	-145 (<-73)	55 (13)

<u>Ethylene Glycol / Water Mixtures</u>		
EG Conc Wt.% (Vol.%)	Freezing Point, F(C)	Boiling Point, F (C)
0 (0)	32 (0)	212 (100)
10 (9)	25 (-4)	215 (102)
20 (18)	20 (-7)	215 (102)
30 (28)	5 (-15)	220 (104)
40 (38)	-10 (-23)	220 (104)
50 (48)	-30 (-34)	225 (107)
60 (58)	-55 (-48)	230 (110)
70 (68)	<-60 (<-51)	240 (116)
80 (79)	-50 (-46)	255 (124)
90 (90)	-20 (-29)	285 (141)
100 (100)	10 (-12)	390 (199)

<u>Propylene Glycol / Water Mixtures</u>		
PG Conc. Wt.% (Vol.%)	Freezing Point, F(C)	Boiling Point, F (C)
0 (0)	32 (0)	212 (100)
10 (10)	25 (-4)	212 (100)
20 (19)	20 (-7)	215 (102)
30 (29)	10 (-12)	215 (102)
40 (40)	-5 (-21)	220 (104)
50 (50)	-30 (-34)	220 (104)
60 (60)	-60 (-51)	225 (107)
70 (70)	<-60 (<-51)	230 (110)
80 (80)	<-60 (<-51)	245 (118)
90 (90)	<-60 (<-51)	270 (132)
100 (100)	<-60 (<-51)	370 (188)

2. We have a problem with ethanolamines freezing in cold weather. Is there any solution available?

Answer:

Yes. If water can be tolerated in your process, low freezing grades of ethanolamines which contain 15 percent water can be supplied. The added water lowers the freezing point of the amines much more than might be expected. Some isopropanolamines are also available in low freezing grades. The following table shows the comparison:

Amine Product	Freezing Pt. (°F) Standard Grade	Freezing Pt (°F) Low Freeze Grade
Monoethanolamine	50	9
Diethanolamine	82	28
Triethanolamine 85%	70	14
Triethanolamine 99%	70	16
Monoisopropanolamine	37	LF Grade Not Available
Diisopropanolamine	111	55
Triisopropanolamine	111	approx. 41

3. What are the freezing and flash points of water / Isopropanol mixtures?

Answer:

Isopropanol / Water Mixtures

IPA Conc. Vol. % (Wt.)	Freezing Point, F(C)	Flash Point, (TCC) F (C)
0 (0)	32 (0)	No Flash
10 (8)	25 (- 4)	105 (41)

20 (17)	20 (- 7)	85 (29)
30 (26)	5 (- 15)	75 (24)
40 (34)	0 (- 18)	70 (21)
50 (44)	- 5 (- 21)	65 (18)
60 (54)	- 10 (- 23)	65 (18)
70 (65)	- 20 (- 29)	65 (18)
80 (76)	* - 35 (- 37)	65 (18)
90 (88)	* - 70 (- 57)	65 (18)
100 (100)	* -130 (<-73)	53 (12)

* Temperatures at which super cooling often occurs.

4. What are the freezing and flash points of water / Ethanol mixtures?

Answer:

Ethanol / Water Mixtures

EtOH Conc. Vol. % (Wt.)	Freezing Point, F(C)	Flash Point, (TCC) F (C)
0 (0)	32 (0)	No Flash
10 (8)	25 (- 4)	135 (57)
20 (17)	15 (- 9)	105 (41)
30 (26)	5 (- 15)	90 (32)
40 (34)	-10 (- 23)	80 (27)
50 (44)	- 25 (- 32)	80 (27)
60 (54)	- 35(- 37)	80 (27)
70 (65)	*- 55(- 48)	80 (27)
80 (76)	* - 75 (- 59)	75 (24)
90 (88)	* - 110 (<-73)	65 (18)
100 (100)	* -175 (<-73)	55 (13)

* Temperatures at which super cooling often occurs.

5. Should I be concerned about the freezing point of solvents?

Answer:

Most solvents have a low enough freezing point that storage is not a problem. However, there are those that are exceptions such as tert-Butanol with a freezing point of 79°F and Cyclohexane with a freezing point of 43°F.

6. We have freezing problems with Caustic Soda (Sodium Hydroxide) 50 percent liquid. Are there other alternatives?

Answer:

Caustic Soda liquid 50% has a freezing point of approximately 52-54°F, mixtures of

Caustic Potash 45% (Potassium Hydroxide) and Caustic Soda 50% (Sodium Hydroxide) liquid can be used to lower the freezing point without a large reduction in active alkalinity.

45 % Caustic Potash liquid, wt %	50 % Caustic Soda liquid, wt %	Freezing point °F	Reduction in Active Alkalinity %
0	100	52-54	0
5	95	30	1.8
10	90	15	3.6
20	80	10	7.2
25	75	5	9.0