

Potassium Pentaborate Aqueous Solubility



Equivalent Formulas:

Common formula: $\text{KB}_5\text{O}_8 \cdot 4\text{H}_2\text{O}$

Oxide formula: $\text{K}_2\text{O} \cdot 5\text{B}_2\text{O}_3 \cdot 8\text{H}_2\text{O}$

Structural formula: $\text{K}[\text{B}_5\text{O}_6(\text{OH})_4] \cdot 2\text{H}_2\text{O}$ (Formula weight, 293.21, 59.4% B_2O_3 equivalent)

Potassium pentaborate dissolves in water to give a slightly alkaline solution. The solution contains K^+ cations and $[\text{B}_5\text{O}_6(\text{OH})_4]^-$ anions that exist in rapid equilibrium with other polyborate anions, including the $[\text{B}_3\text{O}_3(\text{OH})_4]^-$, $[\text{B}_4\text{O}_5(\text{OH})_4]^{2-}$ and $[\text{B}_3\text{O}_3(\text{OH})_5]^{2-}$ anions. The pH of potassium pentaborate solutions increases slightly upon dilution. A 0.25 wt% solution has a pH value of about 8.5 whereas a 3.0 wt% solution has a pH value of about 8.0.

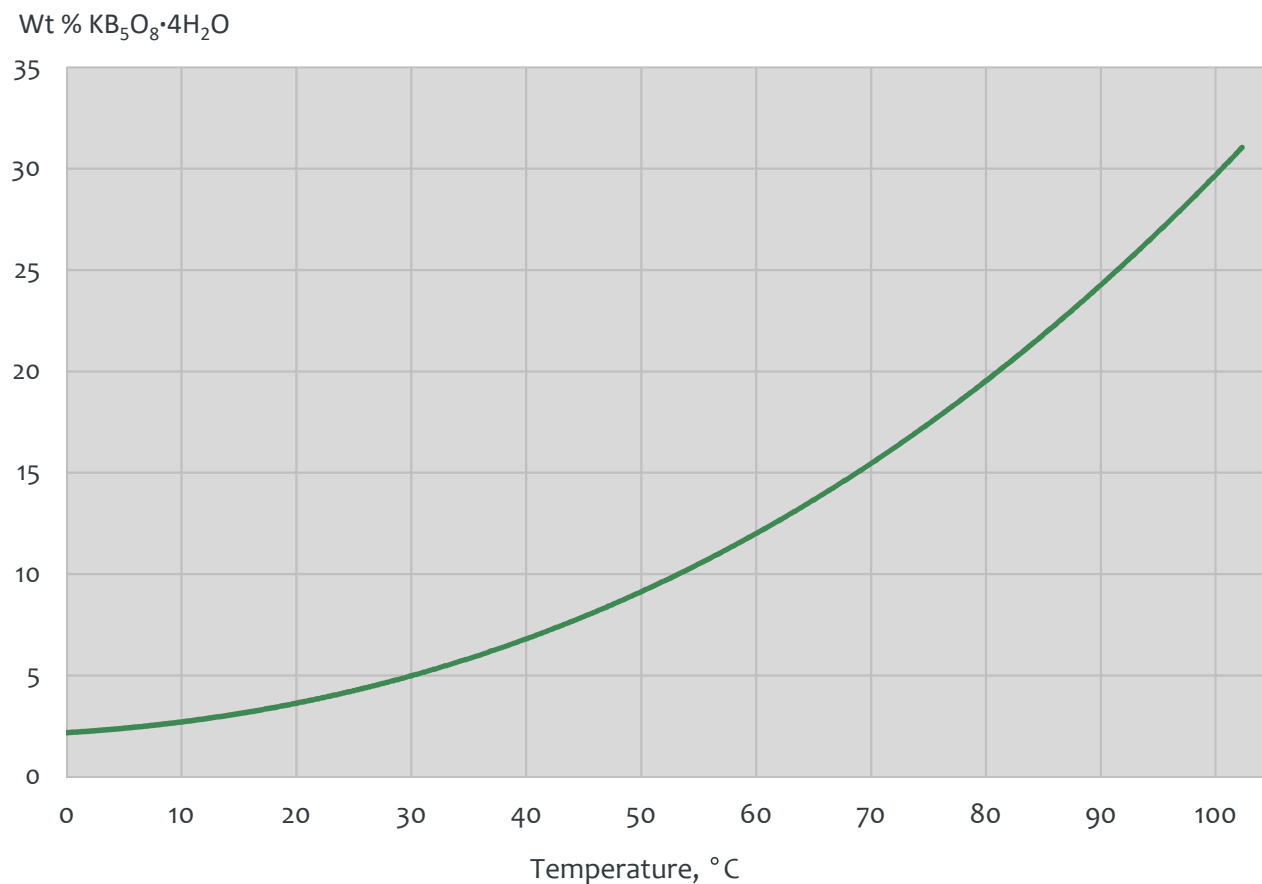
Table 1. Solubility of potassium pentaborate in pure water.

°C	°F	grams dissolved per 100 grams solution	grams that will dissolve in 100 grams water	Equivalent % B_2O_3 in solution
-0.52 ^a	31.1	2.0	2.0	1.2
0	32	2.2	2.2	1.3
5	41	2.4	2.5	1.4
10	50	2.8	2.9	1.7
15	59	3.2	3.3	1.9
20	68	3.7	3.8	2.2
25	77	4.3	4.5	2.6
30	86	5.0	5.3	3.0
35	95	5.8	6.2	3.4
40	104	6.8	7.3	4.0
45	113	7.7	8.3	4.6
50	122	9.0	9.9	5.3
55	131	10.4	11.6	6.2
60	140	12.0	13.6	7.1
65	149	13.7	15.9	8.1
70	158	15.5	18.3	9.2
75	167	17.5	21.2	10.4
80	176	19.6	24.4	11.6
85	185	21.8	27.9	12.9
90	194	24.3	32.1	14.4
95	203	27.0	37.0	16.0
100	212	29.6	42.0	17.6
102.3 ^b	216.1	31.0	44.9	18.4

a. cryohydric point

b. boiling point

Figure 1. Solubility of potassium pentaborate in grams dissolved per 100 grams solution vs. temperature.



References

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