Flow K™ Potassium Bicarbonate - Bicarbonate Applications

Flow K™

FLOW K™ Potassium Bicarbonate food grade performs exceptionally well as a replacement for sodium bicarbonate in leavening systems for cakes, muffins, biscuits, cookies, pancakes and a host of other chemically leavened baked goods. Reducing sodium or adding the nutritional benefits of potassium is easy with FLOW K™.

As leavening agents, potassium bicarbonate (KBC) and sodium bicarbonate (SBC) behave similarly. When reacted with an acid or heated, both release carbon dioxide gas. This aeration causes doughs and batters to rise, making for lighter baked goods with a smooth even crumb. (See Figure 2.)

When substituting potassium bicarbonate for sodium bicarbonate in a formula, 19% more is needed to yield an equivalent amount of carbon dioxide.

	Sodium Bicarbonate	Potassium Bicarbonate
Formula	$NaHCO_3$	$KHCO_3$
Molecular Weight (g)	84.01	100.11
% Solubility @ 68°F % Solubility @ 104°F	9 11	33 45
pH of 1% Solution (77°F)	8.3	8.3
mg Sodium per 100g Bicarbonate	27,370	<225
mg Potassium per 100g Bicarbonate	<10	39,060

Figure 1

Leavening Reaction

$$KHCO_3 + ACID \xrightarrow{Water/Heat} CO_2 + H_2O + RESIDUAL\ SALT$$

Figure 2

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KBC Neutralizing Values for Various Leavening Acids NV = Parts KBC / 100 Parts Acid	NV_{KBC}
MCP Monohydrate	95
Anhydrous MCP	99
SAPP	86
SALP	119
DCPD	39
Fumaric Acid	173
SAS	124
Cream of Tartar	54

Figure 3

Partial to Complete Replacement of SBC with KBC in Biscuits				
Qualities	**Max Score**	**SBC**	**SBC/KBC 1:1**	**KBC**
External	**50**			
Volume	10	8	8.5	7
Symmetry	10	8	8	7.75
Crust Color	15	2.75	2.75	13
Surface Character	15	13	13	3.25
Internal:	**50**			
Grain	15	12.5	12.5	2.25
Crumb Color	10	8	8	8
Taste	10	8	8	8
Mouth Feel	15	13	13	13
TOTAL SCORE	**100**	**3.25**	**3.75**	**2.25**

Figure 4 - Biscuit Evaluations - Potassium bicarbonate may be used to replace some or all of the sodium bicarbonate in baking powder biscuits.

Full Substitution of SBC with KBC in Muffins			
Qualities	**Max Score**	**SBC**	**KBC**
External	**30**		
Volume	10	8.5	8.5
Symmetry	5	4	4
Crust Color	10	8	8
Peak & Spread	5	4	4
Internal:	**70**		
Grain	10	8	8
Texture	15	12	12
Crumb Color	10	9	9
Aroma	10	9	9
Taste	15	13	13
Mouth Feel	15	9	9
TOTAL SCORE	**100**	**4.5**	**84.5**

Figure 5 - Muffin Evaluations - Potassium bicarbonate may be used successfully to replace the sodium bicarbonate in muffins with no impact on physical or sensory characteristics.

Dimensional Variation with Replacement of SBC by KBC in 2 Types of Cookies	SBC	SBC:KBC 1:1	KBC
Vanilla Cookies			
Width (cm)	**36.8**	**38.8**	**40.9**
Height (cm)	12.6	11.8	11.7
Spread Factor (w/h)	2.92	3.29	3.50
Oatmeal Cookies			
Width (cm)	49.1	50.8	51.0
Height (cm)	6.1	6.2	6.2
Spread Factor (w/h)	8.05	8.05	8.23

Figure 6 - Cookie Evaluations - Potassium bicarbonate may be used effectively to replace some or all of the sodium bicarbonate in cookies. Potassium bicarbonate can increase cookie spread factor and enhance crust color.

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