ETİMADEN İŞLETMELERİ GENEL MÜDÜRLÜĞÜ

PRODUCT TECHNICAL DATA SHEET

ETİBOR-68

ETİMADEN ETİBOR-68

Disodium Tetraborate Anhydrous ($Na_2B_4O_7$)

CAS Number: 1330-43-4

Technical Grade: Granular

Packaging: 25 kg, 1000 kg, 1200 kg

(with or without pallet)

General Information:

Etibor-68 is produced as borate glass in large fusing furnaces as a result of the dehydration of aqueous sodium tetraborates. $Na_2B_4O_7$ (anhydrous sodium tetraborate) melts at 742.5°C and creates an amorphous glassy structure when cooled rapidly. Its form at the fusing point is the most stable. It is in white, odorless, solid crystal structure at 20°C temperature and atmospheric pressure. Anhydrous borax emits more heat by dissolving slower in water than its hydrate form.

Usage and Benefits:

Glass and ceramics: Etibor-68 is used for the production of high quality glass and ceramics. Etibor-68 is used as a B_2O_3 source in the manufacturing of borosilicate glass. It is superior to borax decahydrate and borax pentahydrate in terms of high bulk density and faster melting with less energy. Etibor-68 reduces furnace emission and increases production. Etibor-68 is a sodium source and can be used together with boric acid or boron oxide in order to keep the sodium oxide/boron oxide ratio under control. The objective for using it is to ensure the formation of a stable structure. Nowadays, due to the

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adverse effects of lead compounds against human health, particularly in kitchenware, borates which provide the same properties (transparency, fusibility) in the glaze are preferred. To this end, boron compounds such as anhydrous borax are preferred in the production of glaze. The anhydrous borax, used in the glazes and enamels of the ceramics industry, increases the chemical physical resistance of the final product, reduces the viscosity and surface tension of the glass, enables the glaze or the enamel to mature rapidly and provides surface smoothness.

Metallurgy and casting: Etibor-68 is used as a fusing agent. Due to its fusing properties, it dissolves metal oxide impurities by reducing the melting temperature in the production of ferrous steel and non-ferrous metals, thereby facilitating the removal of impurities from the slag. Etibor-68 is a very good solvent for metal oxides at high temperatures. It prevents the oxidation of the air and the surface by covering metals. Due to its hardening properties, even a small addition to steel increases the steel's hardness. Etibor-68 can change the properties and processing behaviors of steel materials. In metallurgy, anhydrous borax, which is primarily used as a protective slag in steel production, creates an alloy with steel at high temperatures and play the role of accelerating the fusing. Anhydrous borax, which has the effect of reducing the melting temperature of slag in gold refineries, increases the amount of fluid slag in the system at lower temperatures. Usually, anhydrous borax is used at a rate of 30-40% of the slag. It is also used to increase the strength refractory materials used in the glass, cement and aluminum industries.

Detergent and cleaning: Etibor-68 is used in cleaning products (laundry and surface cleaning) and in hand soaps containing borax. The use of anhydrous borax is common in the production of controlled-dissolution cleaning agents. Thanks to its slow dissolution qualities, it is used for disinfection and water purification purposes.

Refractory material: Borate compounds are used for creating a stable structure in fire-resistant bricks and concrete.

Petroleum/oil: The fact that borates are cross-linking agents enabled the increase of their use in the petroleum/oil industry. Etibor-68 is used for increasing the recovery of petroleum/oil from underground formations.

Miscellaneous: Anhydrous borax reacts with carbon at 1200°C in an oxygen-free environment to form boron carbide (B_4C_3) and sodium carbide (Na_2C_2). In addition, anhydrous borax reacts with metallic sodium to form elementel boron.

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Physical Properties:

Specific weight	: 2.367 g/cm^3
Pour (bulk) density[a]	: 1.27 g/cm^3
Molecular weight	: 201.27 g/mol
Melting point	: 741°C
Boiling point	: 1575°C
Heat capacity	: 6.3 J/g°C
Thermal conductivity	: 0.495 W/mK
Specific surface area	: < 1 m^2/g
Diffusion coefficient	: 1.1x10^{-5} cm^2/s
Surface tension	: 65.42 mN/m (1.0% aqueous solution by weight)
Colorimetry test	: 85.03 (average L value)

[a] Applies to a representative sample.

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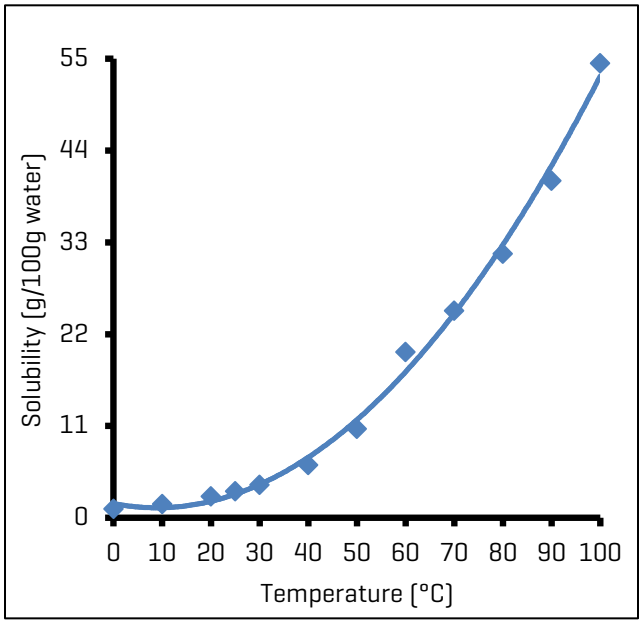
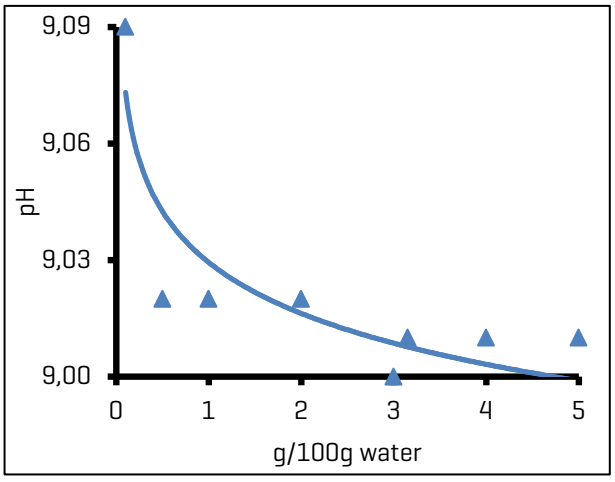
Solubility [b,c]:



Temperature (°C)	Solubility (g/100g water)
0	1.05
10	1.65
20	2.54
25	3.15
30	3.95
40	6.32
50	10.66
60	19.86
70	24.80
80	31.63
90	40.39
100	54.44

Solution pH values:



Solution (g/100g water)	pH (±0.1 / 25°C)
0,1	9.09
0,5	9.02
1	9.02
2	9.02
3	9.00
3.15[c]	9.01
4	9.01
5	9.01

[b] Factors affecting the dissolution rate, such as the particle size of material to be dissolved, the mixing speed of the solution are effective on the time to reach the saturation point. The values on the table should be evaluated by taking this into account.

[c] Saturation value of anhydrous borax at 25°C in 100g water is 3.15g.

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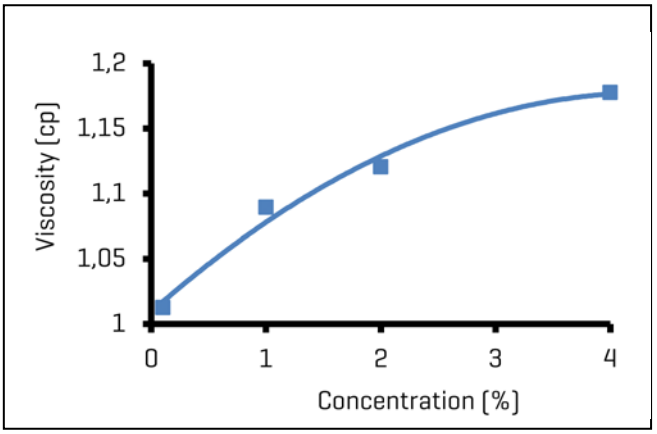
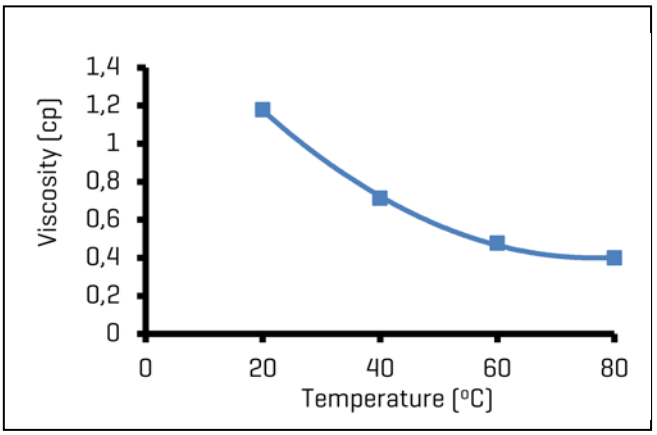
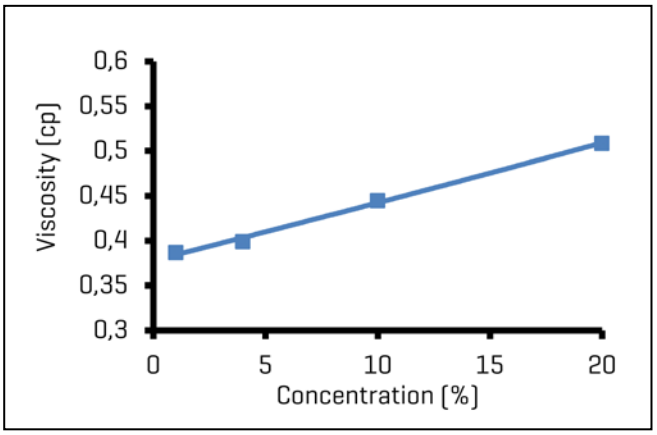
Solution viscosity values:



Temp. (°C)	Conc. (%)	Viscosity (cp)
20	0.1	1.01
20	1	1.09
20	2	1.12
20	4	1.18



Temp. (°C)	Conc. (%)	Viscosity (cp)
20	4	1.18
40	4	0.71
60	4	0.48
80	4	0.40



Temp. (°C)	Conc. (%)	Viscosity (cp)
80	1	0.39
80	4	0.40
80	10	0.44
80	20	0.51

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Chemical Content:

Component	Content
B_2O_3	68.30-69.40%
Na_2O	30.41-30.90%
SO_4	300 ppm max
Cl	105 ppm max
Fe	50 ppm max
Non-water solubles	920 ppm max

Heavy metal content:

Component	Concentration (mg/kg)
As	<0.010
Cd	<0.005
Pb	<0.010
Cr	<0.005
Hg	<0.010

Particle size:

Size	Content
+1.600mm	5% max
-0.075mm	5% max

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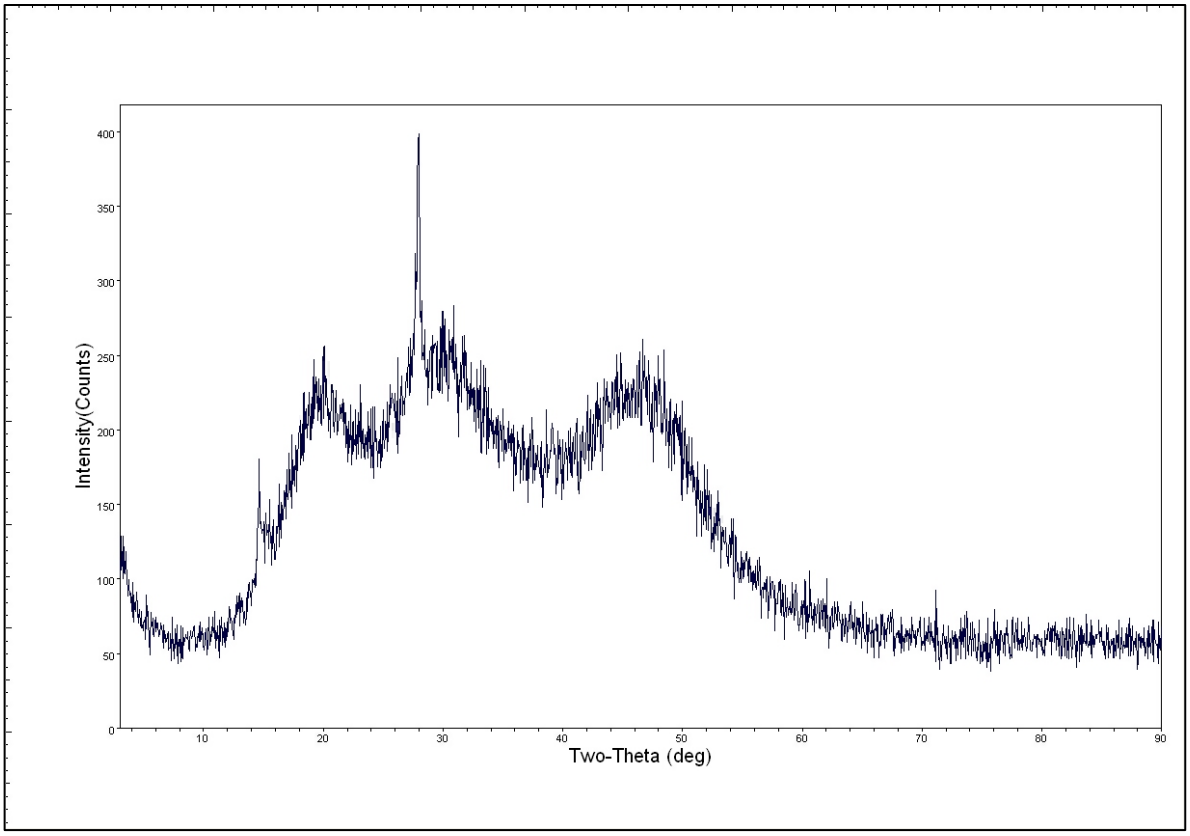
X-Ray Diffraction Analysis:



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