ETiMADEN İŞLETMELERİ GENEL MÜDÜRLÜĞÜ

PRODUCT TECHNICAL DATA SHEET

# BORAX DECAHYDRATE

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ETiMADEN

## Sodium Tetraborate Decahydrate ($Na_2B_4O_7.10H_2O$)

CAS Number: 1303-96-4

Technical Grade: Granular and Powder

Packaging: 25 kg, 50 kg, 1000 kg

(with or without pallet)


## General Information:

Borax Decahydrate ($Na_2B_4O_7.10H_2O$) is refined in powder or crystal form from Tincal ($Na_2B_4O_7.10H_2O$) ore. It is a soft, alkaline salt with excellent buffering and flow properties and has a white and crystal form. Production process includes dissolving, precipitation with various flocculants, centrifugation, filtration, crystallization and drying stages.

## Usage and Benefits:

**Glass:** Borax decahydrate is added to glass products used for heat insulation as it increases viscosity, surface hardness and durability when added to molten glass intermediates. Borax decahydrate is also used in the production of isolation glass fiber.



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Rev. 2019/01

**Agriculture:** Borax decahydrate is used to increase agricultural productivity and to obtain higher quality products. It can be used in solid or liquid state as fertilizer or foliar fertilizer.

**Soap and detergent:** Borax decahydrate is used in soap and detergents due to its germs and water softening properties.

**Surface preparation:** It is used for cleaning of various surfaces, disposal of heavy contamination, removal of oil stains on fabrics and fibers.

**Cosmetics:** Borax decahydrate is used in cosmetic products (foundation, concealer, lipstick, nail polish, etc.) as it provides extra features such as softness, tackiness and durability to mentioned cosmetic products. It is preferred as a cross-linker in the emulsion of paraffin-based materials in cosmetic, medicinal and personal care products.

**Fire retardant:** Borates are used as fire retardants in various materials. Borates cover the material by melting and prevent the material from catching fire by severing the contact between the oxygen and the flame. Soluble borates, such as borax decahydrate, are used as fire retardants by processing them into cellulosic materials.

**Ceramics:** In the ceramics industry, borax decahydrate is particularly used as enamel raw material.

**Metallurgy:** The solubility of borax decahydrate in metal oxides is utilized in metallurgy. Surface oxidation is prevented by covering ferrous surfaces with borax decahydrate (as flux). Furthermore, it is used for the production of pure metals.

**Miscellaneous:** It is used for water softening, water purification, regulation of the pH in aqueous environments and it is also used as peptizer and viscosity controller in the production of starch-based adhesives obtained from natural polymers.







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## Physical Properties:

| | |
|---|---|
| **Specific weight** | : 1.73 g/cm$^3$ |
| **Pour (bulk) density**[a] | : 0.835 g/cm$^3$ (Granular) |
| | 0.882 g/cm$^3$ (Powder) |
| **Molecular weight** | : 381.37 g/mol |
| **Melting point** | : 741°C |
| **Boiling point** | : 1575°C |
| **Heat capacity** | : 4.0 J/g°C |
| **Thermal conductivity** | : 0.740 W/mK |
| **Specific surface area** | : 13.55 m$^2$/g |
| **Diffusion coefficient** | : 0.6x10$^{-5}$ cm$^2$/s |
| **Surface tension** | : 67.19 mN/m |
| | (1.0% aqueous solution by weight) |
| **Colorimetry test** | : 91.92 (average L value) |

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[a] Applies to a representative sample.

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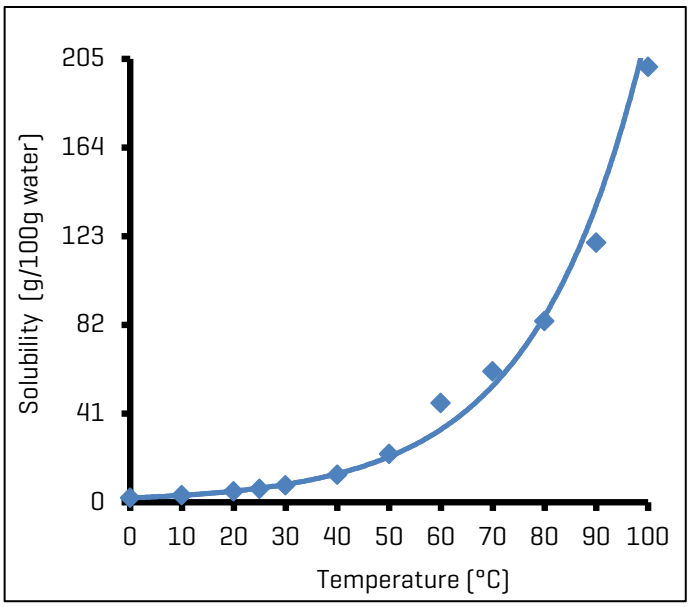
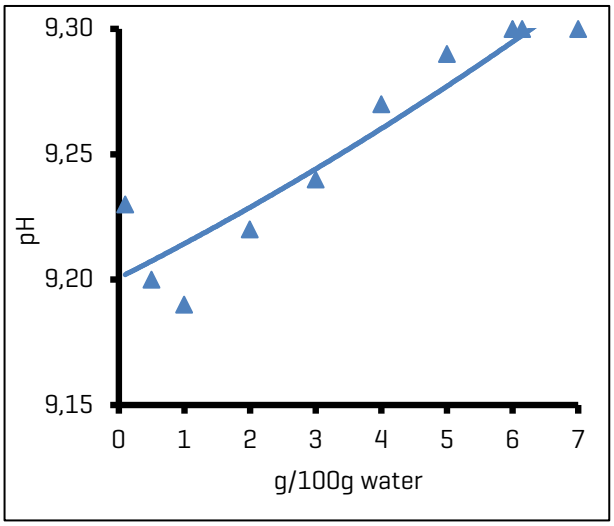
## Solubility[b,c]:




| Temperature (°C) | Solubility (g/100g water) |
|---|---|
| 0 | 2.02 |
| 10 | 3.18 |
| 20 | 4.94 |
| 25 | 6.15 |
| 30 | 7.78 |
| 40 | 12.70 |
| 50 | 22.34 |
| 60 | 45.80 |
| 70 | 60.44 |
| 80 | 83.66 |
| 90 | 119.95 |
| 100 | 201.30 |

## Solution pH values:




| Solution (g/100g water) | pH (±0.03 / 25°C) |
|---|---|
| 0.1 | 9.23 |
| 0.5 | 9.20 |
| 1 | 9.19 |
| 2 | 9.22 |
| 3 | 9.24 |
| 4 | 9.27 |
| 5 | 9.29 |
| 6 | 9.30 |
| 6.15[c] | 9.30 |
| 7 | 9.30 |

[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 borax decahydrate at 25°C in 100g water is 6.15g.



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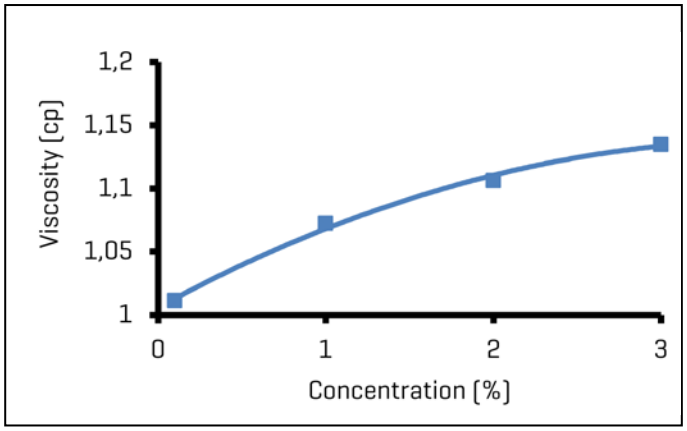
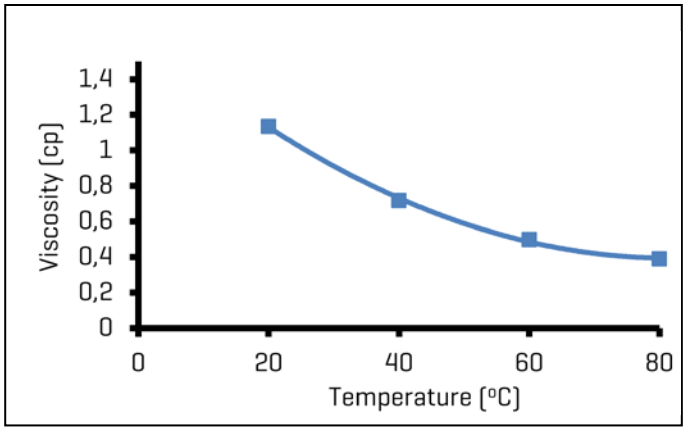
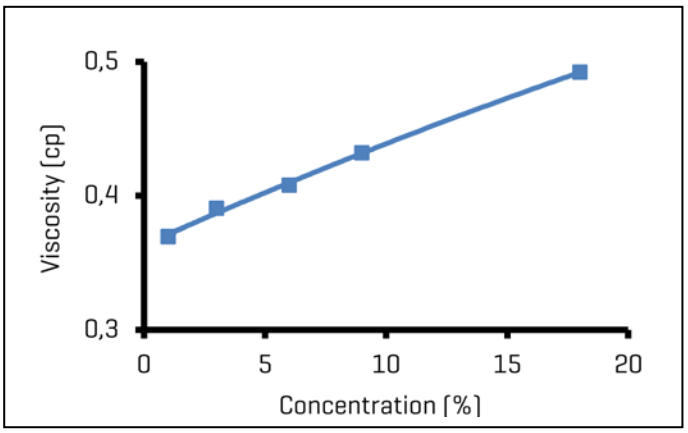
## Solution viscosity values:




| Temp. (°C) | Conc. (%) | Viscosity (cp) |
|---|---|---|
| 20 | 0,1 | 1,01 |
| 20 | 1 | 1,07 |
| 20 | 2 | 1,11 |
| 20 | 3 | 1,13 |




| Temp. (°C) | Conc. (%) | Viscosity (cp) |
|---|---|---|
| 20 | 3 | 1.13 |
| 40 | 3 | 0.72 |
| 60 | 3 | 0.50 |
| 80 | 3 | 0.39 |




| Temp. (°C) | Conc. (%) | Viscosity (cp) |
|---|---|---|
| 80 | 1 | 0.37 |
| 80 | 3 | 0.39 |
| 80 | 6 | 0.41 |
| 80 | 9 | 0.43 |
| 80 | 18 | 0.49 |



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## Chemical Content:

| Component | Content | |
|---|---|---|
| | Granular | Powder |
| Equivalent $Na_2B_4O_7.10H_2O$ | 99.90-105.45% | 99.90-105.45% |
| $B_2O_3$ | 36.47-38.50% | 36.47-38.50% |
| $Na_2O$ | 16.24-17.14% | 16.24-17.14% |
| $SO_4$ | 135 ppm max | 200 ppm max |
| Cl | 70 ppm max | 70 ppm max |
| Fe | 10 ppm max | 15 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 | |
|---|---|---|
| | Granular | Powder |
| +1.180mm | 4% max | 0% max |
| -0.063mm | 4% max | 30% min |



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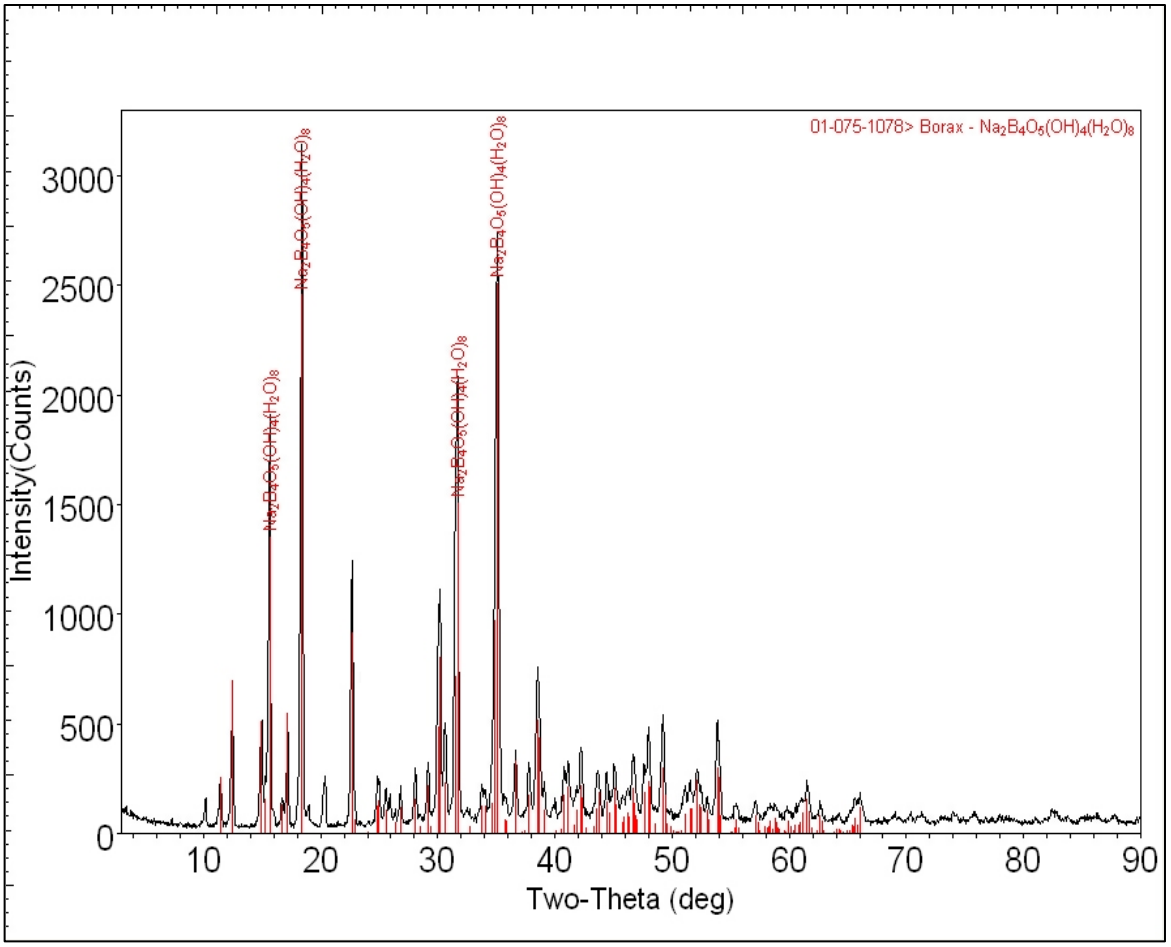
## X-Ray Diffraction Analysis:





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