

**Chemical Formula:**

Zeoclere 30 has the following formula:  
 $(\text{MgCaNa}_2\text{K}_2)_{2.5}(\text{AlO}_2)_7(\text{SiO}_2)_{30}21\text{H}_2\text{O}$

The idealised chemical formula of Clinoptilolite is:  
 $\text{Ca Na}_4(\text{AlO}_2)_6(\text{SiO}_2)_{30}24\text{H}_2\text{O}$

Note: The relatively high silica content.  
 Molecular ratio Si:Al = 3.85.

**1 Elemental Analysis:**

Element	%		
SiO <sub>2</sub>	71.52	Cu	trace
Al <sub>2</sub> O <sub>3</sub>	12.10	Co	nil
Na <sub>2</sub> O	1.40	P	0.009
K <sub>2</sub> O	3.85	Ni	trace
MgO	0.86	Cr	trace
CaO	1.53	Ba	trace
Fe <sub>2</sub> O <sub>3</sub>	1.21	Sr	trace
TiO <sub>2</sub>	0.13	Total Water	7.30
MnO	0.07	(Free Water	5.7%).

**2 Cation Exchange Capacity [CEC]:**

Theoretical MAXIMUM CEC is 2.2 meq/g. Practical MAXIMUM CEC is 1.8 meq/g. Very little change in CEC is given by Clinoptilolite below 1.0 mm in size, but CEC rapidly decreases when size is increased above 1.0 mm. Typical CEC's vary from 1.2 - 1.5 meq/g i.e. 22 - 27 grams of Ammonium ion per kg. of Clinoptilolite.

**3 Gases Absorbed: @ 25°C**

NH<sub>3</sub>: Clino, 7.8g/100g.

SO<sub>2</sub>: Clino, 15.3g/100g.

It also absorbs Ar, N<sub>2</sub>.

**4 Major Exchangeable Ions:**

The selectivity series for ions is:

Cs>Rb>K>NH<sub>4</sub>>Ba>Sr>Pb>Zn>Cu>Co>Ni>Hg>Na  
 >Ca>F e>Al>Mg>Li.

**5 Dessiccant Ability:**

Clino absorbs 14.4 grams of water per 100 g of Clino.

**6 Physical Properties:**

A MSDS is available on request but Zeoclere 30 is not a hazardous material.

Main Phase: 80-85% Clinoptilolite [XRD, BET & Analysis]

Main Impurities: Opaline Cristobalite, K-Feldspar & trace of Sanidine (Montmorillonite and Quartz)

Refractive Index: 1.484

Density or Specific Gravity: 2.2 g/cm<sup>3</sup>

Bulk Density of the ore: 1.92 g/cm<sup>3</sup>

Packing Density of -20+ 60 Tyler mesh: 990 kg/m<sup>3</sup>

Thermal Stability: It can be heated to over 700 °C before the aluminosilicate framework collapses.

Calcium-exchanged Clinoptilolite, however, collapses at temperatures over 400°C.

**7 Acid and Alkaline Stability:**

Zeoclere 30 is stable from pH 3 to pH 12.

**8 Colour**

Reflection Whiteness: 80% [MgO = 85%]

**9 Hardness:**

Hardness is 3.5 - 4.0 MOH.

This is significantly harder than any other Zeolite we have examined.

**10 Pore Size:**

Clinoptilolite structure has not been fully elucidated but it is thought that the number of 8-membered rings approaches that of the 10-membered rings with a pore structure of 3.5 - 6 angstroms. [3.5 Å]

**11 Pore Volume:**

Approximately 5-10%, the bulk density of the rock as determined by immersion in mercury is 1.92 g/m<sup>3</sup>.

**12 Ammonia Ion Exchange:**

We do not use an ion specific electrode for ammonia determination, we use a direct Kjeldahl distillation method. Ammonia ion exchange [Static]  
 10% Ammonium chloride: 1.2 - 1.5 meq/g.

**13 Method of Regeneration:**

Use 10% Sodium Chloride solution and soak for 12 hours at ambient temperatures.

**14 Ion Exchanged Clino Available:**

Sodium exchanged/Calcium exchanged.  
 Two sizes: -4 mm +2 mm & -4 mm + 60 Tyler Mesh.  
 Other sizes are available on request.

**15 Water Absorption:**

When dried at 200°C, up to 15%.

**16 Amount of Na released for amount of target ion:**

All of the available sodium will be released to compensate for the absorbed ion.