

- **this process results in better powder mixing and reduced chance for air bubbles**

Dental gypsum products are made up of hemihydrate particles whose **size, shape,** and porosity **differ** for each material. These gypsum-based powders require **different amounts of water** for mixing because the different particle shapes produce different packing efficiencies that affect the amount of excess water required for making a suitable mixture.

Mixing:

- **Water/powder ratio:** the water/powder ratio is an important factor in determining physical properties. When a **high proportion of water is used**, the powder particles are farther apart. This results in **more expansion** with a retarded setting time and a weaker product. Dental plasters generally require about twice as much water compared to stones. Plaster has a **higher setting expansion** than does stone.
- **Water temperature:** generally, the **colder** the water, the **longer** the setting time
- **Spatulation:** rapid spatulation for a time equal to normal hand mixing for 1 minute accelerates setting time and produces the greatest strength. Do not spatulate to the point where the mixture starts to harden. This will produce a cast that is much weaker.
- **Accelerators and retarders (modifiers):**
 - **Retarder:** borax, sodium citrate
 - **Accelerators:** gypsum, potassium sulfate, NaCl 28%

Remember: The **setting expansion** of any gypsum product is a function of calcium sulfate dihydrate crystal growth and the result of thermal expansion.