



## During the Mixing Phase, powder and liquid are blended into a homogeneous dough

### What happens during the Mixing Phase?

MMA liquid and PMMA powder are mechanically blended. The chemical reaction starts as soon as the monomer liquid penetrates the surface of the polymer beads of the PMMA powder. The mixing process leads to a uniform wetting of the powder with the liquid component so that a homogeneous, dough-like mass is produced. The homogeneity of the bone cement dough depends on the quality of the bone cement that is used and on the mixing technique. Vacuum mixing reduces entrapped air (macro-porosity) which is the prerequisite for a homogeneous and stable bone cement. For an ideal ratio of powder and liquid, both components should always be used completely, otherwise the mechanical properties might be compromised.



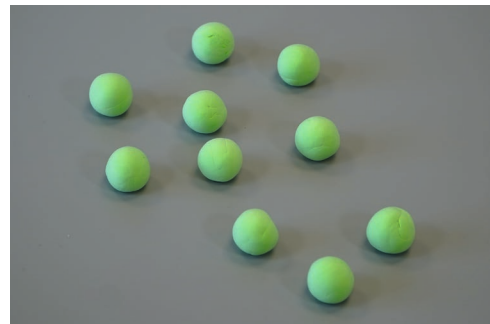
### End of the Mixing Phase

The mixing time is 30 seconds unless recommended otherwise. This phase ends when both components are well-mixed and a homogeneous dough is produced.

### The chemistry behind the Mixing Phase

Physically, the powder beads absorb the monomer liquid which results in the swelling and dissolution interaction.

The polymerisation reaction is initiated through BPO (Benzoyl peroxide) in the powder component and accelerated by DmpT (N, N-dimethyl-p-toluidine) in the liquid component. Radicals induce the formation of polymer chains as MMA is converted to PMMA, thus causing an increase of viscosity.



*PMMA powder beads before wetting with the monomer liquid (molecular model)*

### Mnemonic for PALACOS® bone cements: 'The snowflakes fall on the lake'

The liquid is first placed in the mixing device and then the entire package of powder is added. Both components immediately react with one another upon contact. The mixing process should therefore start immediately.



*Optical test: Homogeneous cement dough shows no powder nests*

## Literature

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