LIVIU GAVRILA-ARDELEAN

”Vasile Goldiș” Western University of Arad, Romania, ROMANIA

NEW MATERIALS USED IN CREATING BASES OF POLYMER PROSTHESIS

Abstract:

Even in times when oral implantology (increasingly precise and accepted) is consolidated its position within the prosthetic restorations, materials for prostheses bases remained however a component which cannot be waived. Their comparison provides an overview about all variations of modern materials and also about their role in a system .

Topical material in case of mobile prostheses is dominated by polymethilmethacrylate (PMMA). Most of these materials are thermo-polymerizable . An optimal polymerization is very important because it proved that the residual monomer has toxic effects on the tissues with which it comes into contact . Increased residual monomer content can be considered definitely a disadvantage in terms of allergic reactions that may cause patients. All materials accepted today to restore must meet ISO 1567-2000, yet still cannot exclude a certain risk.

The monocomponent materials are available, which can be processed by a process of thermoplastic injection, so that the residual monomer disappears.

The decision to use should be taken into account to the economic factor . A system that at first time may seem expensive, offers a good alternative in their own environment, contribute to a good restoration and quality in the near future.

Over the period we have indexed the most important documentary material from the literature consulted, and finally to have an overview of the progress in this area. We considered useful to present the collected data that may be out of reach of practitioners as a true handbook of materials.

Keywords:

New prosthesis materials, polymer prosthesis, bases, polymethilmethacrylate (PMMA)

JEL Classification: I19

Problem statement

Materials for prostheses bases remained however a component which cannot be waived even in times when oral implantology (increasingly precise and accepted) is consolidated its position within the prosthetic restorations.

Methodology:

Over the period we have indexed the most important documentary material from the literature consulted, and finally to have an overview of the progress in this area. We considered useful to present the collected data that may be out of reach of practitioners as a true handbook of materials.

Topical material in case of mobile prostheses is dominated by polymethilmethacrylate (PMMA). Most of these materials are thermo-polimerizabile. An optimal polymerization is very important because it proved that the residual monomer has toxic effects on the tissues with which it comes into contact. Increased residual monomer content can be considered definitely a disadvantage in terms of allergic reactions that may cause patients. All materials accepted today to restore must meet ISO 1567-2000, yet still cannot exclude a certain risk.

Results and discussions:

When choosing a material matter the color lines, veins (capillaries) for individualization, since the emphasis is not only a functional but also the aesthetic. The decision to purchase should be considered and the economic factor. A system that at first glance may seem expensive, offers a good alternative in the own activity contributes to a quality restoration and can absorb in the near future.

Next we play a few tables, the physical, chemical characteristics of new materials and their usefulness in making dental prostheses bases.

Table 1.

Physical, chemical characteristics and ways to use the prosthesis materials, for Creabase, Flexiplast, Dentaplast Opti-Press and Candulor Aesthetic Autopolymerisat[1]

Manufacturer	AmannGirrbach	Bredent	Bredent	Candulor AG
Commercial / **Distribution year**	**Creabase** 2003	**Flexiplast** 2001	**Dentaplast Opti-Press** 2005	**Candulor Aesthetic Autopolymerisat** 1996
System / Chemical reaction	- Barbituric acid - By cooling the material	- -	Polymethylmeth Acrylate PMMA Thermic polymeriz.	- Barbituric acid - By cooling the material
Components proportion / UV stability	- 15g polymer, 10ml monomer - ISO 1567	- monocomponen t - yes	- 20 g polymer, 9 ml monomer - yes	- 15g polymer, 10ml monomer -According standards
Indications /	- Total and partial prosthesis, hibrid implants systems, repairs	- New prosthesis bases maerial	Overdentures and telescope prosthesis, complete dentures,	- Total, partial and cominated prosthesis, implant supported prosthesis, lining, repairs

[1]. www.bredent.de

Contraindications	- Avoid uncured material contact direct to the mouth	-	combinated prosthesis -	- Avoid uncured material contact direct to the mouth
Use and storage conditions	- Cold, dark, airy, temp. 12-28°C / 3 years	- 2 yeas protect from light, dry	3 years la max. 25° C, protect from light, dry, closed	- 3 years in similar previous conditions
Operating procedures / **Repair, lining**	- Cast:ing, tamping (dozing, mixing, pressing, polymeriz.) - Posibil	- Thermoplastic mat. injection - Laser welding repair, no lining	- Tamping-compressing technique -Opti-Cast repairs, Dentiplast	- Casting-tamping technique -
Own sistems / **Polymerization type**	- radicalic	- Termopress 400 -	-Hidraulic presses and metalic cuvettes - Hot polymeriz.	- Jst cuvette - Radicalic polymerization
Polymerization time / **Temperature**	- Constant pressing tamping 30 min. cast: press 15 min. - 40° C	-	- Rapid, medium and long polymerization	- Casting: 15 min./ 40°C in pressure unit - Tamping: 30 min./ 23°C under pressure
Polymerization contraction / **Residual monomers**	- 6,4 % linear - 4,2 % ISO 1567	-aprox. 1,6% -	- 0,18 %	- 6,4% linear - 4,5% ISO 1567
Colors/ **Marmoration**	- 6 intensive basic colors - Color 34	- 5 colors - no	- 3, transp., opaque pink, marmoration - yes	- 0,1,2,3,34 - Depend by color
Bonding system tooth / metal	- DIN 3336 - Mechanical retention, primer silan	- Mechanical retention, conector adhesion - Microretention	- Mechanical retention, conector adhesion - Mechanical	- Check contact DIN 3336 - Over retentions
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural resistance**	2300-2500 N/mm² - 21-23 µg/mm³ - water 2.9 µg/mm³ - Tamping-casting: 76-2300 N/mm²	- 1000 Mpa - 1.02 g/cm² - 1.8-2-2 % - water insoluble -	- 2935,61 N/ mm² - 24 µg/mm³ - water insoluble - 97,73 N/mm²	- Tamping: 2700 - Casting: 2500 - 20-22 µg/mm³ - Water 2,7 µg/mm³ - Tamping-casting: 74-78 N/mm²

(N/mm²)				

Table 2.

Physical, chemical characteristics and ways to use the prosthesis materials, for Candulor Aesthetic High Impact Candulor Autoplast, Selectaplus H, Selectaplus[2]

Manufacturer	Candulor AG	Candulor AG	DeguDent GmbH	DeguDent GmbH
Commercial / **Distribution year**	**Candulor Aesthetic High Impact** 2005	**Candulor Autoplast** 2005	**Selectaplus H** 1991	**Selectaplus** 1990
System / Chemical reaction	- Thermal decomposition of peroxides	- Amino-peroxides - selfcuring, cold temp.polymeriz.	Methylmethacrylat buthylmethacrilate -cold polymeriz.	Methylmethacrilate butandyoldimethacril - hot polymeriz.
Components proportion / UV stability	- 21 g power, 10 ml liquid -According standard	- 13 g polymer, 10 ml monomer - yes	- 24 g : 10 ml sau free dosing - yes	- 5 g : 3,5 ml or free dosing - According standard
Indications / **Contraindications**	- Total , partial prosthesis, hybrid implanted systems, lining, repairs - Avoid uncured material contact direct to the mouth	- Total , partial prosthesis, hybrid implanted systems, lining, repairs - Avoid uncured material contact direct to mouth	- Prosthesis bases plastic material Allergy to the one of the material components	- Prosthesis bases plastic material Allergy to the one of the material components
Use and storage conditions	- Semiopaque colors, high processing time	- Semiopaque colors, long working time	- Selectaplus color compatible	- 2 liquids for 2 processing units, Selectaplus H color compatible
Operating procedures / **Repair, lining**	- Tamping - Rough surface is covered with monomer, repairs	- Casting - Rough surface is covered with monomer, repairs	- Tamping /compressing, injection technique, - Yes	- Casting technique - Yes
Own sistems / **Polymerization type**	- Cuvette - Radicalic polymerization	- - Radicalic polymerization	- Injection systems - Radicalic hot polymerization	- - Radicalic cold polymerization
Polymerization time /	- Water in cuvette at 70ºC	- Casting technique: 15	- 30 min in water	- Liquid CN: 10 min./ 40ºC

[2] www.degudent.de

Temperature	- At boiling temp.	min at 40º C under pressure cuvette	- At boiling temp.	- Liquid CE: 10 min./50ºC
Polymerization contraction / Residual monomers	- 5,4 % linear - 2,2 % ISO 1567	-6,6 % linear -4,5% ISO 1567	- - 0,4 %	- - 0,98 %
Colors/ Marmoration	- Pink-V - Candulor 34 (opaque dark pink)	- Pink-V, Pink-K - Candulor 34 (marmoration)	- 3 colors: pink, natural pink and marmotation pink	- 3 colors: pink, natural pink and marmotation pink
Bonding system tooth / metal	- DIN 3336, depend by color - Over retentions	- DIN 3336, depend by color - Over retention	- - By itself	- - By itself
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural resistance (N/mm²)**	- 2300 N/mm² - 22 µg/mm³ - water 0,2 µg/mm³ - 57 N/mm²	- 2300 N/mm² - 22 µg/mm³ - water 2,2 µg/mm³ - 57 N/mm²	- 2589 N/ mm² - 5,97 µg/mm³ - 0,49 µg/mm³ - 74 N/mm²	- 2393 N/ mm² - 8,1 µg/mm³ - 1,25 µg/mm³ - 63 N/mm²

Table 3.

Physical, chemical characteristics and ways to use the prosthesis materials, for ISK Press Uni, ISK Pres L, ISK Press Hot 1, PERform pourable plastic

Manufacturer	DeltaMed GmbH	DeltaMed GmbH	DeltaMed GmbH	Hedent GmbH
Commercial / Distribution year	**ISK Press Uni 2004**	**ISK Press L 2004**	**ISK Press Hot 1 2004**	**PERform pourable plastic 1985**
System / Chemical reaction	- PMMA - Cold selfcuring	- PMMA - Cold selfcuring	-PMMA - Radicalic polymerization	- PMMA - Cold selfcuring
Components proportion / UV stability	- 10/5 weight raport, 10/4 volume - Unchanged	- 10g powder with 7 ml liquid - Unchanged	- 10/5 free dosage also possible - Unchanged	- 10/5,5 weight proportion - DIN EN ISO 1567
Indications /	- Prosthesis bases and lining material, artificial teeht attachment	- Skeleton finishing, partial and total lining, extentions,	- Taping-compressing technique, prosthesis	- Partial prosthesis bases material, lining, repairs, special for syst.

Contraindications	methylmethacrilate allergy	repairs methylmethacrilate allergy	plastic material methylmethacrilate allergy	PERform-Inkovac - Allergy to the one of the material components
Use and storage conditions	- Avoid direct sun exposing, 2 years ≤ 25ºC	-2 years ≤ 25ºC, avoid direct sun exposing	-2 years ≤ 25ºC, avoid direct sun exposing	- Max 25ºC, min 5ºC
Operating procedures / **Repair, lining**	- Tamping-compressing, injection, casting technique - No identic material penetration	- Tamping-compressing, casting technique - Cold polymeriz. material combination	- Tamping-compressing, casting technique - Cold polymeriz. material combination	- Casting, injection technique - Surface is burn, no specific system needed
Own sistems / **Polymerization type**	- no - radicalic	- no - radicalic	- no -	- - Under pressure cuvette polymeriz.
Polymerization time / **Temperature**	- At least 20 min/ 30-37ºC (cuvette temp.)	-Under pressure in polymerization unit 6-7 min, water temp.40-50ºC	- 20 min in boiling water, wait 15 min, than polymeriz again 10 min.	- 30-40 min/45ºC, 15-20 min/55ºC (smaller prosthesis)
Polymerization contraction / Residual monomers	- 6-8 % (10:5 weight proportion) - 2 %	- -2,7 %	-5-7 % (mix 10:4 weight proportion) - 0,8 %	- 3%, ≤ 6,8% linear - ≤ 3%, after hours ≤ 1 %
Colors/ **Marmoration**	- 4: pink, opaque pink, light, neutral - No	- 4 colors - No	- Pink - No	- pink, marmoration, transparent, opaque, etc - at choice
Bonding system tooth / metal	- Macroretentions - ex. DeltaLink conection system	- Macroretentions - ex. DeltaLink conection system	- Macroretentions - ex. DeltaLink conection system	- By itself, Hedent bur - Over retentions
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural**	- 2600 N/mm² - 1.02 g/cm² - 22 µg/mm³ - 2 µg/mm³ - 78 N/mm²	- 2500Mpa - 1.02 g/cm² - 22µg /mm³ -2,3µg/mm³ - 77 N/mm²	- 2200-2300 - 1,02 g/cm² - 21 µg/mm³ - 0,3 µg/mm³ - 70-75 N/mm²	> 1500 N/ mm² < 25 µg/mm³ < 6,8 µg/mm³ > 60 N/mm²

resistance (N/mm²)				

Table 4.

Physical, chemical characteristics and ways to use the prosthesis materials, for Inkotherm 85, Inkotherm Press, Inkodur, ProBase Hot[3]

Manufacturer	Hedent GmbH	Hedent GmbH	Hedent GmbH	Ivoclar Vivadent
Commercial / **Distribution year**	**Inkotherm 85** **1985**	**Inkotherm Press** **1983**	**Inkodur** **1983**	**ProBase Hot** **1991**
System / Chemical reaction	- PMMA - Cold selfcuring	- PMMA - Cold selfcuring	- PMMA - Cold selfcuring	- PMMA - Peroxides thermal decomposer
Components proportion / UV stability	- 10/5,5 weight proportion - DIN EN ISO 1567	- 10/7 weight proportion -DIN EN ISO 1567	- 10/6 weight proportion -DIN EN ISO 1567	- 22,5g power: 10 ml monomer - DIN EN ISO 1567
Indications / **Contraindications**	- Partial prosthesis bases material, lining, repairs, special for syst. PERform-Inkovac - Allergy to the one of the material components	- Partial skeletal prosthesis bases material, lining, repairs - Allergy to the one of the material components	- Partial skeletal prosthesis bases material, lining, repairs - Allergy to the one of the material components	- Partial and total prosthesis, hybrid systems, lining - Avoid uncured material contact direct to the mouth
Use and storage conditions	- Max 25ºC, min 5ºC	- Max 25ºC, min 5ºC	- Max 25ºC, min 5ºC	- Dark, cool place to store temp. 12-18°C
Operating procedures / **Repair, lining**	- Casting, injection technique - Surface is burn, no specific system needed	- Casting, injection technique - Surface is burn, no specific system needed	- Various repairing techniques - Surface is burn, no specific system needed	- tamping technique - Repairing material, monomer treated previous burning
Own sistems / Polymerization type	- - Under pressure cuvette polymeriz.	- - Pressure cuvette polymeriz.	- - Pressure cuvette polymeriz.	- - Hot polymerization
Polymerization time /	- 30-40 min/45ºC, 15-20 min/55ºC (smaller	- 30-40 min/45ºC, 15-20 min/55ºC (smaller	- 30-40 min/45ºC, 15-20 min/55ºC (smaller	-

[3] www.ivoclar-vivadent.de

Temperature	prosthesis)	prosthesis)	prosthesis)	
Polymerization contraction / Residual monomers	- 3% ≤ 6,8% linear - ≤ 3%, after hours ≤ 1 %	- ≤ 7,8% linear - ≤ 4%, after polymeriz. ≤ 1 %	- ≤ 7,1% linear - ≤ 4,5%	- - ≤ 2,2%
Colors/ Marmoration	- Pink, marmoration pink, transparent, opaque - at choice	- Pink, marmoration pink, transparent, opaque - at choice	- Pink, marmoration pink, transparent, opaque - at choice	- 3 colors: pink, pink-V, clear - Pink-V
Bonding system tooth / metal	- By itself, Hedent bur - Over retentions	- By itself, Hedent bur - Over retentions	- By itself, Hedent bur - Over retentions	- DIN 3336 rules - SR Link adhesive, retentions additional
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural resistance (N/mm²)**	> 1500 N/ mm² < 25 µg/mm³ < 6,8 µg/mm³ > 60 N/mm²	> 1500 N/ mm² < 25 µg/mm³ < 3,5 µg/mm³ > 60 N/mm²	> 1500 N/ mm² < 22 µg/mm³ < 1,4 µg/mm³ > 60 N/mm²	2600 N/ mm² < 23,4 µg/mm³ < 0,5 µg/mm³ > 83 N/mm²

Table 5.

Physical, chemical characteristics and ways to use the prosthesis materials, for Paladon, Palapress, PalaXPress and ProBase Cold

Manufacturer	Heraeus Kulzer	Heareus Kulzer	Heareus Kulzer	Ivoclar Vivadent
Commercial /	**Paladon**	**Palapress**	**PalaXPress**	**ProBase Cold**
Distribution year	**1936**	**1968**	**1994**	**1991**
System / Chemical reaction	- PMMA - Polymerization	- PMMA - Polymerization	- PMMA - Polymerization	- PMMA - Based on barbituric acid
Components proportion / UV stability	- 10g powder: 4ml liquid - Yes	- 10g powder: 7ml liquid - Yes	- Liquid/powder 7:10; 1:2 - Yes	- casting: 15g:10 ml, taping: 20,5g:10ml - Standard obligatory
Indications /	- Tamping-compressing technique, injection	- Casting, lining, repairs	- all indications including casting, injection, repairs	- Partial and total prosthesis bases, hybrid systems, lining, repairs

Contraindications	-	-	-	- Avoid contact direct to the mouth
Use and storage conditions	- 3 years, dark, cool	- 3 years, dark, cool	- 3 years, dark, cool	- Dark, cool, airy, 12-28ºC
Operating procedures / **Repair, lining**	- Tamping, injection technique - Yes unlimited	- casting, tamping technique - Yes unlimited	- Tamping, casting, injection technique - Yes unlimited	- Casting, tamping technique - Monomer treated rough previous
Own sistems / **Polymerization type**	-Palmat elite, Palajet - Hot polymerization	-Palmat elite, Palajet - selfcuring	-Palmat elite, Palajet - selfcuring	- - selfcuring
Polymerization time / **Temperature**	- quickly boiling/ 90°C, water cuvette polymerization 70/90° C, long term 10h/90°C	-Under pressure cuvette polymerization 20/55ºC	- 20-30 min/ 55°C	- taping technique: 30 min, casting technique: 15 min
Polymerization contraction / **Residual monomers**	-4-7 % - 1 %	-4-7 % - 0,9 %	-4-7 % - 0,8 %	- - ≤ 4,5% (ISO 1567) casting technique
Colors/ **Marmoration**	- Pink, opaque, marmoration, R50, clear - those who had	- Pink, opaque, marmoration, R50, clear	- Pink, opaque, marmoration, R50, clear	- 6 colors - at choice
Bonding system tooth / **metal**	- Palabond - Opaker roz	- Palabond - Opaker roz	- Palabond - Opaker roz	- DIN 3336 - SR Link adhesion, more retentions
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural resistance (N/mm²)**	- 2200 N/mm² - ≤ 32 µg/mm³ - ≤ 8 µg/mm³ - 75 N/mm²	- 2400 N/mm² - ≤ 32µg /mm³ - ≤ 8µg/mm³ - 75 N/mm²	- 2300-2400 N/mm² - ≤ 32µg /mm³ - ≤ 8µg/mm³ - 75 N/mm²	> 2600N/ mm² < 21,4 µg/mm³ < 2,7 µg/mm³ > 74N/mm²

Table 6.

Physical, chemical characteristics and ways to use the prosthesis materials, for SR Ivocap High Impact, Luxene, Combipress N/LM and Promolux

Manufacturer	Ivoclar Vivadent	Astron/Kentzler	Merz Dental	Merz Dental
Commercial / **Distribution year**	**SR Ivocap High Impact** **2005**	**Luxene** **1996**	**Combipress N Combipress LM** **-**	**Promolux** **-**
System / Chemical reaction	- PMMA - thermal peroxide decomposion	- Polyvinil copolymer -	PMMA - Cold plymerization	Acid polymethyl methacryl methylesther - Hot polymerization
Components proportion / UV stability	- 20g powder: 30ml monomer (tamping) -Standard obligatory	- -	- 10g powder: 6-7ml liquid - DIN EN 1567	- 3:1 weight proportion - DIN EN 1567
Indications / **Contraindications**	- Total, partial prosthesis, lining, KFO prosthesis, occlusal retainers - Avoid uncured material contact direct to the mouth	- prosthesis bases material -	- Total, partial, skeletal prosthesis bases, lining, repairs - Allergy to the one of the material components	- Prosthesis bases material - Allergy to the one of the material components
Use and storage conditions	- Dark, cool, airy place, at 12-28ºC	- 1 year at 5ºC	- 3 years, Dark, cool, airy < 30ºC	- 3 years, Dark, cool, airy < 30ºC
Operating procedures / **Repair, lining**	- Injection technique SR Ivocap system - Monomer treated rough surface	- Injection technique - Lining and repairs	- Casting techique for mobile prosth., tamping-compressing technique for whole piece - Yes burn	- Under pressure tamping-compression technique 20KN - Yes, rough
Own sistems / **Polymerization**	- SRIvocap system - Hot	- Injection unit - Hot polymeriz.	- Swiss Jet - Under pressure	- Swiss Jet - Redox system, polymeriz.

type	polymerization		cuvette polymeriz.	initiated
Polymerization time / **Temperature**	- 35 min/100ºC, 30min cool, 2,5 bari	- 540 min/75-78ºC	- Combipress N 10min/ 45°C, 2 bari, Combipress LM 15min/50ºC	- 10 min/75ºC, then boiling 30 min
Polymerization contraction / **Residual monomers**	- see processing procedures ≤ 2,2 %	- -	- Depending on mixing proportion - 1,7-1,8 %	- Depending on mixing proportion - 1,5% (ISO 1567)
Colors/ **Marmoration**	- 5 colors - At choice	- 7 colors - At choice	- 3 colors C34 marmoration opaque pink	- 3 colors - C34 marmoration opaque pink
Bonding system tooth / **metal**	- DIN 3336 - SR Link, mechanic retentions	- By itself - By itself	- Burn, retentions - Adhesios or macroretentions	- By itself - Adhesion system or macroretentions
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural resistance (N/mm²)**	- 2100 N/mm² - 19.6 µg/mm³ - 0,9 µg/mm³ - 73,5 N/mm²	- - 0,40 % - - 7500 G	- 2376-2453 MPa - 22 µg /mm³ - 2,4 µg/mm³ - 76 MPa / 80 MPa	- 2600N/ mm² - 16 µg/mm³ - 0,23 µg/mm³ - 86 MPa

Table 7.

Physical, chemical characteristics and ways to use the prosthesis materials, for Sheradon, Sherapress, FuturaPress LT and FuturaGen

Manufacturer	SHERA GmbH	SHERA GmbH	Schütz Dental	Schütz Dental
Commercial / **Distribution year**	**SHERADON** **1991**	**SHERAPRESS** **1991**	**FuturaPress LT** **1979**	**FuturaGen** **2004**
System / **Chemical reaction**	- PMMA - Polymerization	- PMMA - Polymerization	- PMMA - Cold polymeriz.	- PMMA - Cold polymeriz.
Components proportion / **UV stability**	- 10g powder: 4ml liquid - DIN 1567	- 10g powder: 7ml liquid - DIN 1567	- Powder/liquid 10:7, free dosing - Yes	- Powder/liquid 14:6 - Yes
Indications /	- Injection	- Total and	- Prosthesis	- Prosthesis

Contraindications	compressing technique for acrylic prosthesis - Allergy to the one of the material components	imediate prosthesis, lining, completing partial prosthesis, repairs - Allergy to the one of the material components	bases material, lining, repais Methylmethacrylat, dibenzoyl peroxide allergy	bases material, lining, repais Methylmethacrylat, dibenzoyl peroxide allergy
Use and storage conditions	- 3 years, deposing temp. < 25° C	- 3 years, deposing temp. < 25° C	- 3 years, 10-25°C	- 3 years 10-25°C
Operating procedures / **Repair, lining**	- Compression and injection technique - very good	- Laminates, casting technique - very good	- Casting technique - Both posible, rough surface	- casting injection technique - Both posible, rough surface
Own sistems / **Polymerization type**	- - Hot polymerization	- - Cold polymerization	- - Radical polymerization	- - Radical polymerization
Polymerization time / Temperature	- 20 min under pressure at 100°C	- 30 min under pressure at 55°C	- 15 min/ 45°C	- 15 min/ 45°C
Polymerization contraction / **Residual monomers**	- < 5,4 (linear) - <1,5 %	- < 7.8 (linear) - < 4,5 %	- - < 4,5 %	- - < 4,5 %
Colors/ **Marmoration**	- 3 colors - See colors	- 5 colors - See colors	- 7 colors - At choice	- 9 colors - Separately obtained
Bonding system tooth / **metal**	- -	- -	- HS CrossLiquid - Sebond Smart + powder, Bond Opaker, Sebond Pink	- HS CrossLiquid - Sebond Smart + powder orBond Opaker, Sebond Pink
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility**	- 2380 MPa - 1,2 g/cm³ - < 25 µg/mm³ - < 1,6 µg/mm³ - 65 N/mm²	- 2174 MPa - 1,2 g/cm³ - < 25 µg /mm³ - < 3,5 µg/mm³ - 60 N/mm²	- 2470-2550N/mm² - 23-25 µg /mm³ - 0,5-0,6 µg/mm³	- 2550-2600 MPa - 23,3 µg/mm³ - 1,1 µg/mm³ - 95-98 MPa

µg/mm³ Flexural resistance (N/mm²)			- 88-91 N/mm²	

Table 8.

Physical, chemical characteristics and ways to use the prosthesis materials, for Futur Acryl 2000**,** Weitur-Press, Weiton-Rapid and Natura Acrylith

Manufacturer	Schütz Dental	Johannes Weithas	Johannes Weithas	ZahnfabrikNauheim
Commercial / Distribution year	**Futur Acryl 2000 1975**	**Weitur-Press 1980**	**Weiton-Rapid 1965**	**Natura Acrylith 2005**
System / Chemical reaction	- PMMA - Hot polymeriz.	- PMMA - Cold polymeriz.	- Peroxide / amine - Microwave and hot polymeriz.	- Copolymere de methylmethacrylate -
Components proportion / UV stability	- 10g powder: 4ml liquid, free dosing - Yes ISO 13907	- 15g powder: 10ml liquid - Yes	- 22g powder: 10ml liquid - Yes	- Manufacturer prospect - very good colors
Indications / Contraindications	- Prosthesis bases and lining material -Methylmethacryl and dibenzoil peroxide allergy	- Prosthesis bases material, mobile partial skeletal prosthesis tech - MMA allergy	- Prosthesis bases material - MMA allergy	- Total and partial prosthesis completion teeth material, repairs - Nothing special
Use and storage conditions	- 3 years, la 10-25°C	- 6 years at max 26°C, no light	- 6 years at max 26°C, no light	- Manufacturer prospect
Operating procedures / Repair, lining	- Tamping-compressing technique, injection - Both posible, previous rough surface	- Compressing technique - Yes	- tamping-compressing technique, microwave polymeriz. - Yes	- Casting and modeling - Very good
Own sistems / Polymerization type	- - radicalic polymerization	- No, the usual -	- No, the usual - Boiling / microwave	- - Cold polymeriz.
Polymerization time /	- 20-30 min / 100°C	- 30 min / 55ºC under pressure	- 20 min / 100°C, 3 min /	- see manufarturer indications

Temperature		cuvette	500 W in microwave	
Polymerization contraction / Residual monomers	- - < 2,2 %	- - < 3 %	- < 1,5 µg /mm³ - < 0,8 %	- Insignificant - < 2,1%
Colors/ Marmoration	- 6 colors - At choice	- 4 colors - At choice	- 4 colors - At choice	- 8 colors -
Bonding system tooth / metal	- HS CrossLiquid - Sebond Smart + powder, Bond Opaker, Sebond Pink	- No properly	- No properly	- Good
Module E (N/mm²) **Density (g/cm²)** **Hygroscopic (µg/mm³)** **Solubility µg/mm³** **Flexural resistance (N/mm²)**	- 2540-2600 MPa - 18-20 µg/mm³ - 0,5-0,6 µg/mm³ - 98-101 MPa	- 2400 N/mm² - < 23µg /mm³ - 0,7 µg/mm³ - 80 N/mm²	- 2160 N/mm² - < 30 µg /mm³ - < 1,6 µg/mm³ - 78 N/mm²	- - 1.1 g/cm³ - 0,0 % - 0,0 % - very good mechanical value

References:

Bratu, D., Nussbaum, R., cood., (2001), *Bazele clinice și tehnice ale protezării fixe,* Editura Signata, Timișoara, p.1111;

Gavrilă-Ardelean, L, Bratu, D., (2012), *Total edentulous prosthesis,* Editura Waldpress, Timișoara, p.155,157;

Gavrilă, A.M., Gavrilă, A.L., (2011), *Internal medicine and social element: courses notes,*Editura Mirton, Timișoara, p. 168;

Gavrilă-Ardelean, M.F., (2008), *Social policies for health: health insurance, contributions to health services management,* University Publishing House "Aurel Vlaicu", Arad, p. 39;

www.bredent.de

www.degudent.de

www.ivoclar-vivadent.de.