SAINA CO.

RRP® GmbH International

RRP-235-Spezial

New Generation of Road and Railway Construction

Made in Germany

Oct 2023

SAINA CO.

RRP International GmbH

RRP-235-Spezial

holds the worldwide rights

over 40 years of experience

Saving time and money as well as the maintenance of the nature are our priority goals.

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RRP-235-spezial

Has been used for clayey soil stabilization of …

Road and Trail construction

Parking Areas

Clayey Dams

Underground for building and Halls

Railway Tracks

Benefits of the RRP-235-spezial

- Cheaper
- Better performance
- Faster construction
- Environment friendly

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Question

- How does the soil stabilization with RRP-235-$_{Spezial}$ work?

1

- **First a chemical reaction**

2

- **Second the mechanical compaction**

Result

- **Only this two elements together gives the result of a long-lasting soil stabilization**

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Non-cohesive

gravel + sand soil, the fine grain fraction is under < 5%

The fine grain fraction of < 0,06 mm must have a minimum of 15% to realize a soil stabilization with RRP-235-Spezial

Soil Types

Cohesive

cohesive soil, the fine grain fraction < 0,06mm is **over 40%**

Composite

mixed soil, the fine grain fraction is between **> 5% and < 40%**

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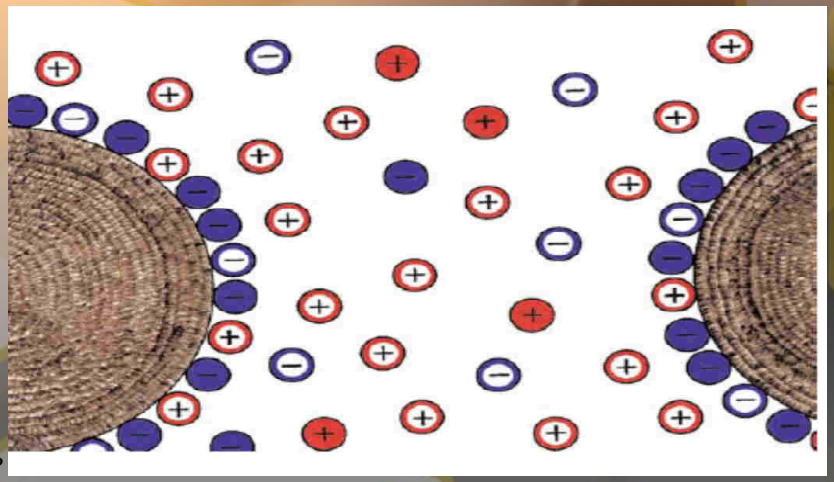
A look at a cohesion soil

soil collides and ion details



On the colloids and in the **space in between** are **bounded and free ions** of different elements located.

Essential are the following ions:

Dissolved ions:

a) **cationic** $K^+(aq)$, $Na^+(aq)$
$Ca^{++}(aq)$, $Mg^{++}(aq)$
$H^+(aq)$

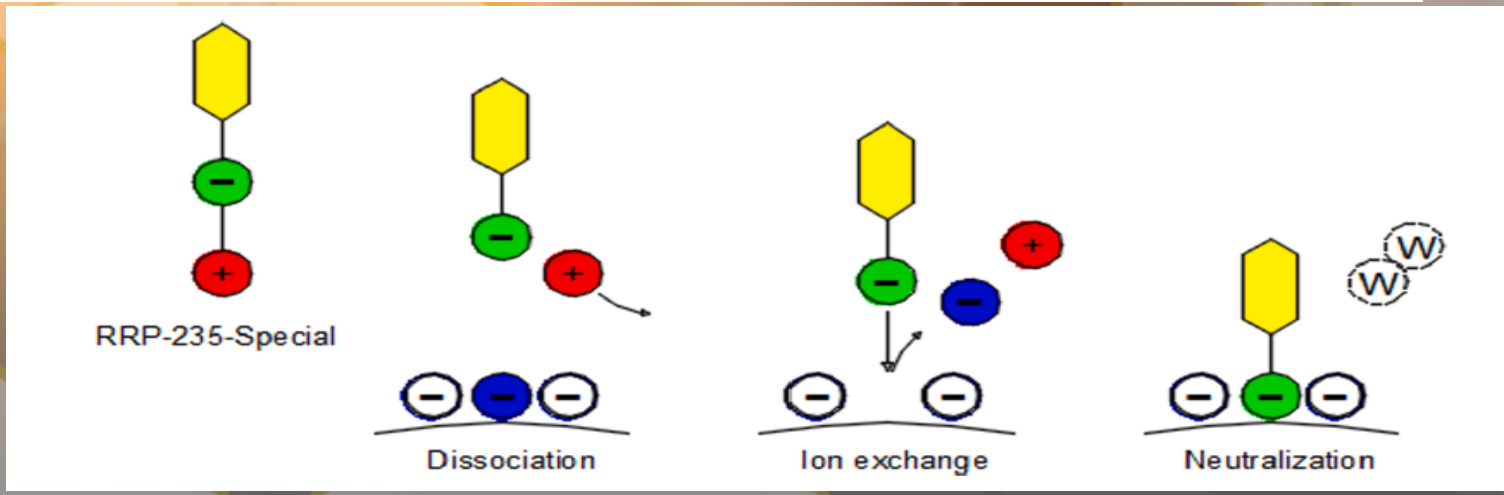
b) **anionic** $OH^-(aq)$
$SiO_3^{--}(aq)$

The progress of RRP-235-spezial chemical reaction process

Dissociation = Under dissociation we understand the animated or the automatic run of the process of dividing a chemical connection in two or more molecules. A dissociation is the way salt dissolves in water. In this polar solvent the dissolved salt appears in form of free ions.

Ion exchange = The process of ion exchange describes the connection or the chemical accessibility of positive or negative loaded molecules on free ions through dissociation.

Neutralization = When all free and reactive ions (molecules parts) **had found the strongest possible chemical connection** (for example H_2O = water) and the reaction is finished then there are no more electric loaded ions left. The product is called neutral



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Chemical dissociation of RRP-235-Spezial

$$RSO_3H \xrightarrow{H_2O} RSO_3^- + H^+$$

$$H^+ \xrightarrow{+ H_2O} H_3O^+$$

Dissociation

$$RSO_3^- H^+ + Me^+ OH^- \longrightarrow RSO_3^- Me^+ + H^+ OH^-$$

$$2\,RSO_3^- H^+ + Me^{++} (OH^-)_2 \longrightarrow 2\,RSO_3^- Me^{++} + 2\,H^+ OH^-$$

Ion exchange

$$H^+(aq) + OH^-(aq) \longrightarrow H_2O$$

Neutralization

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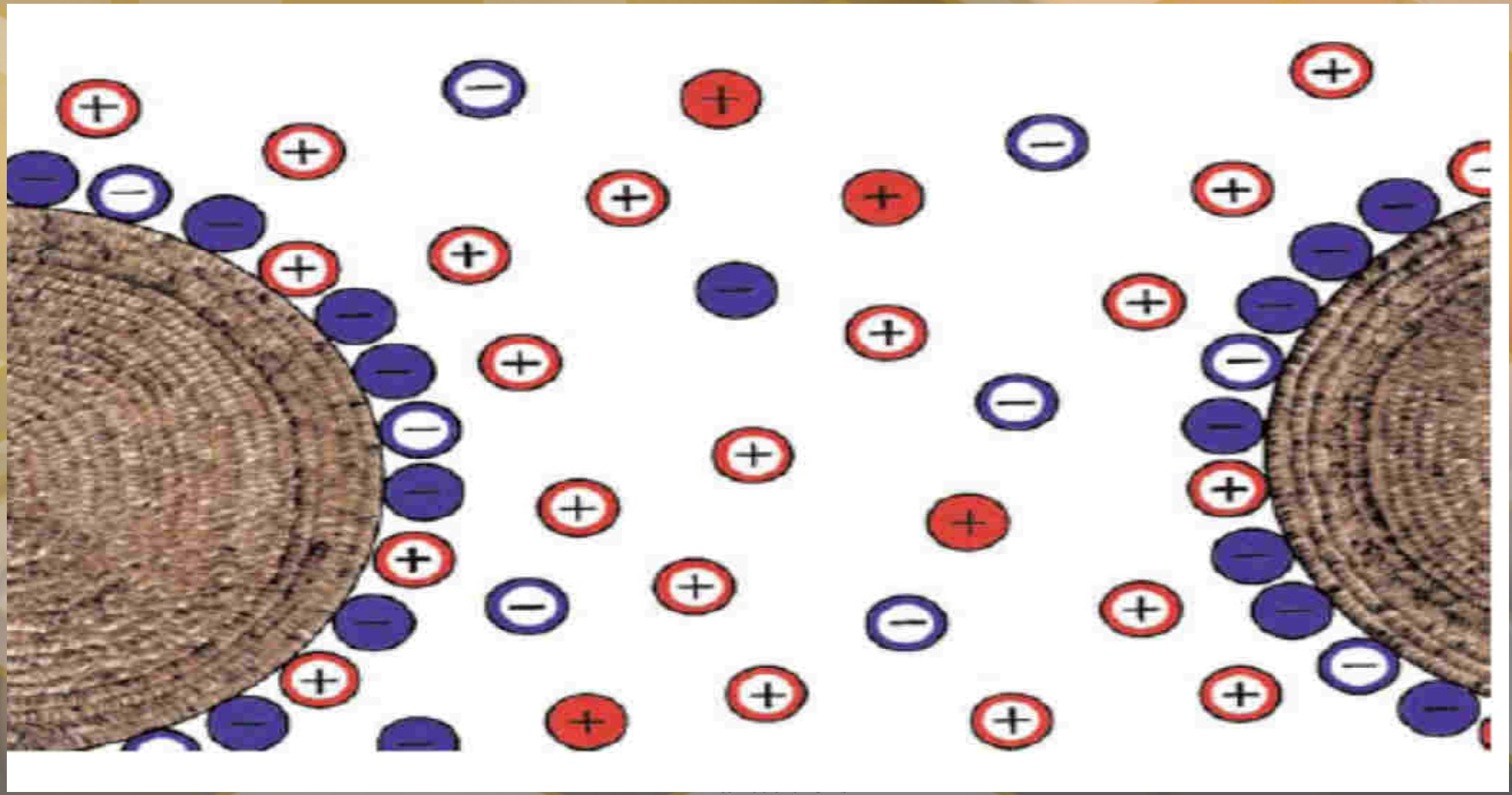
Colloids before use of the RRP-235-$_{Spezial}$ mixture



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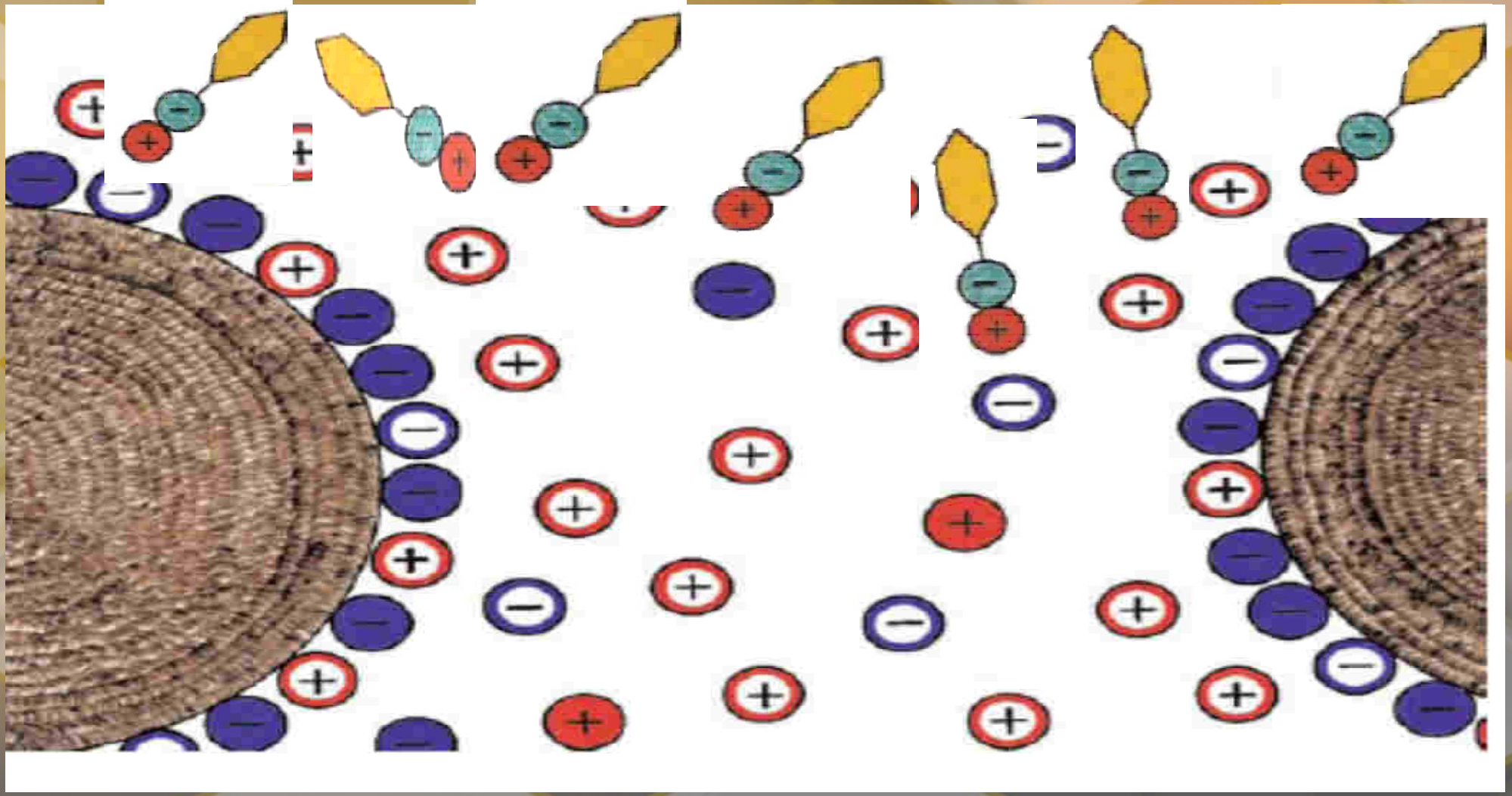
After procurement of RRP-235-$_{Spezial}$ mixture



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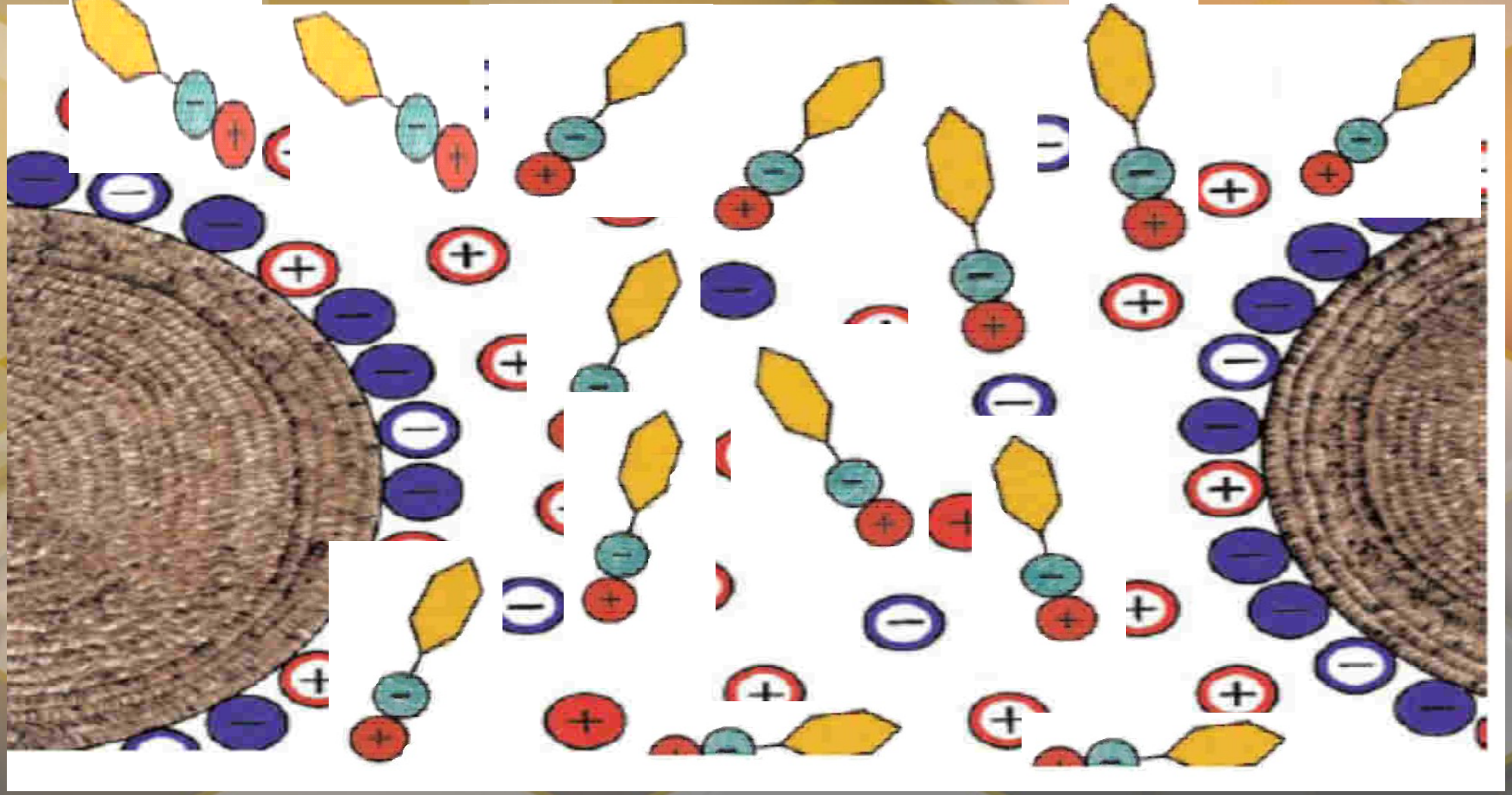
Milling of RRP-235-$_{Spezial}$ mixture into the soil



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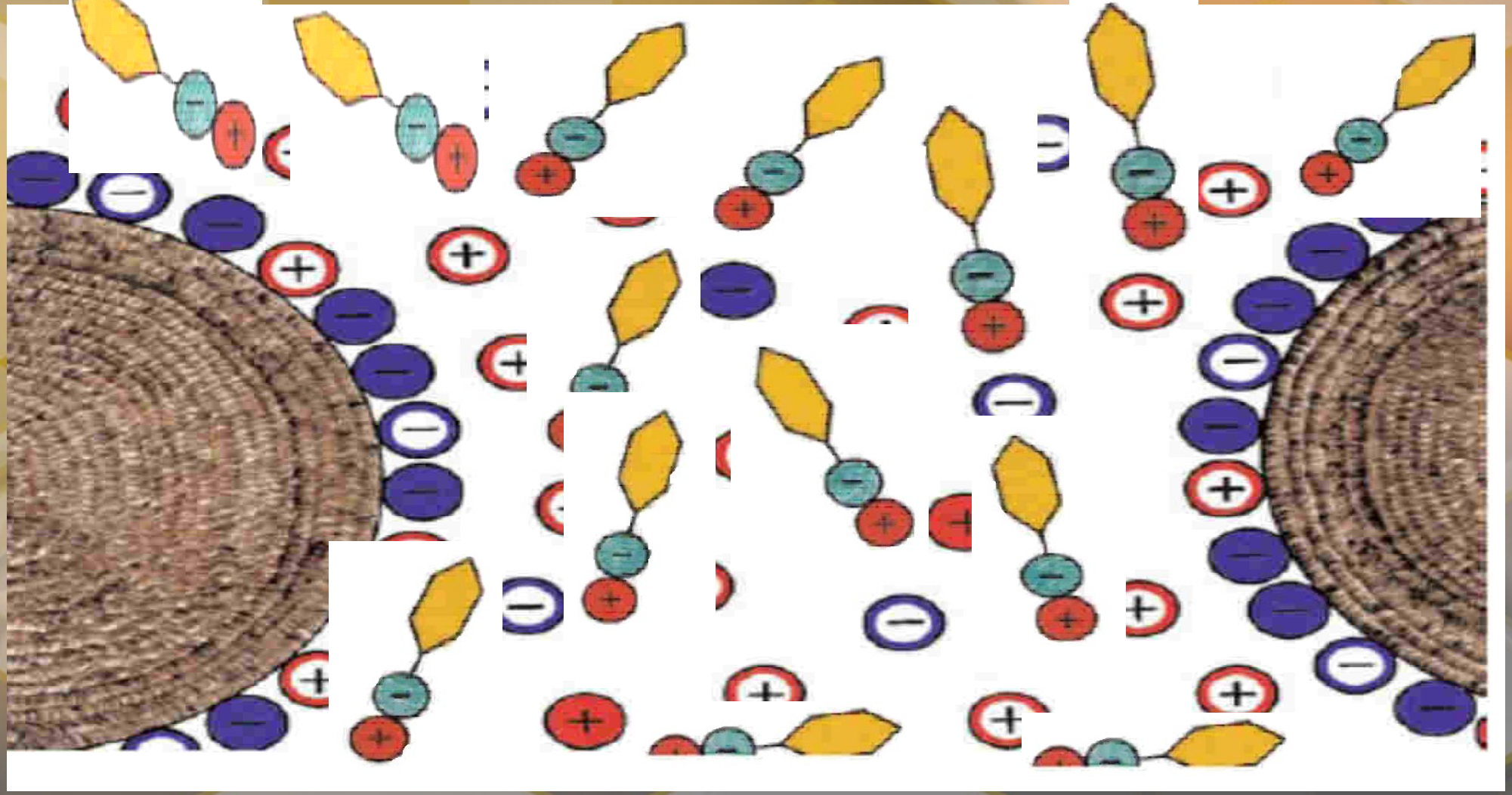
After milling of RRP-235-Spezial into the soil



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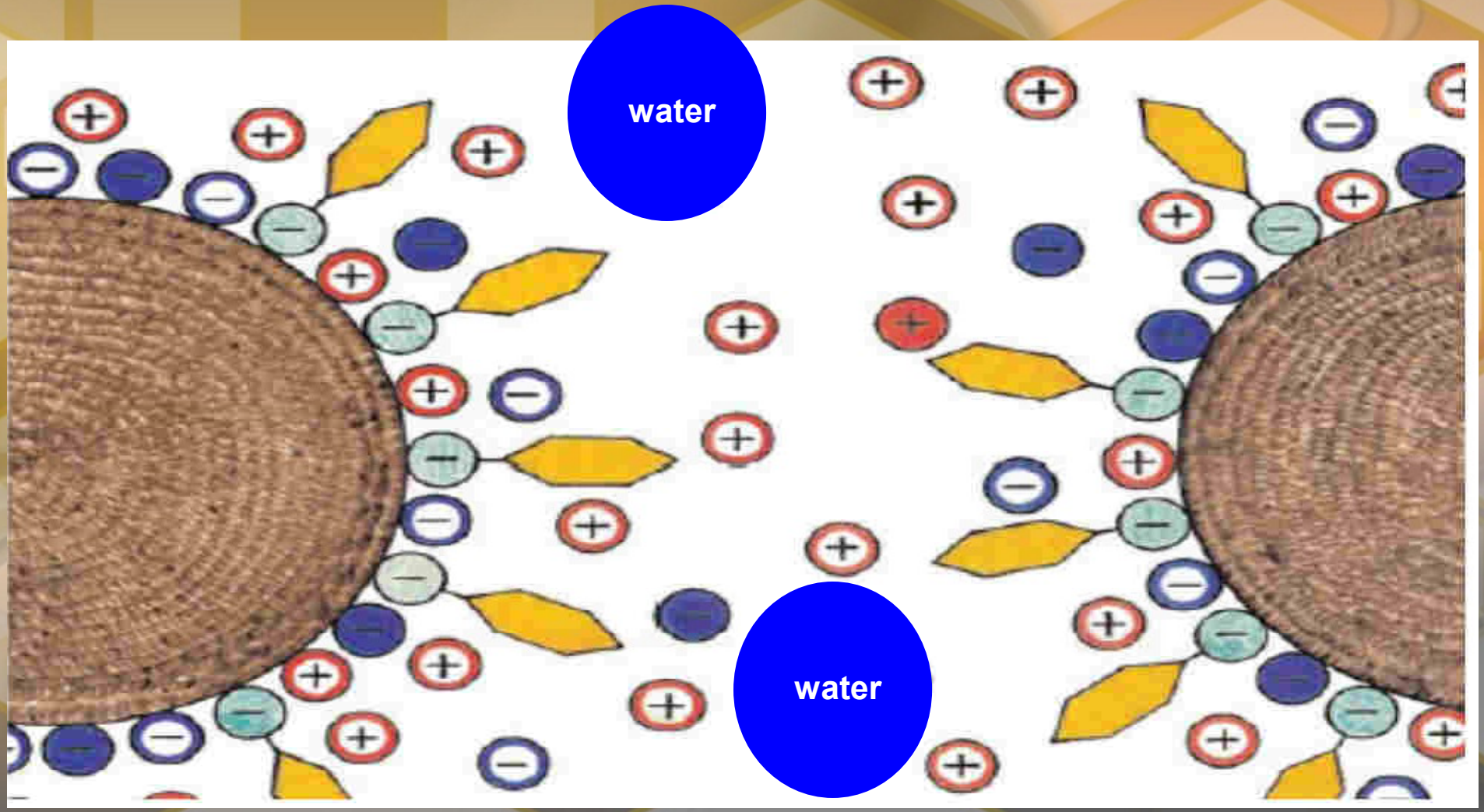
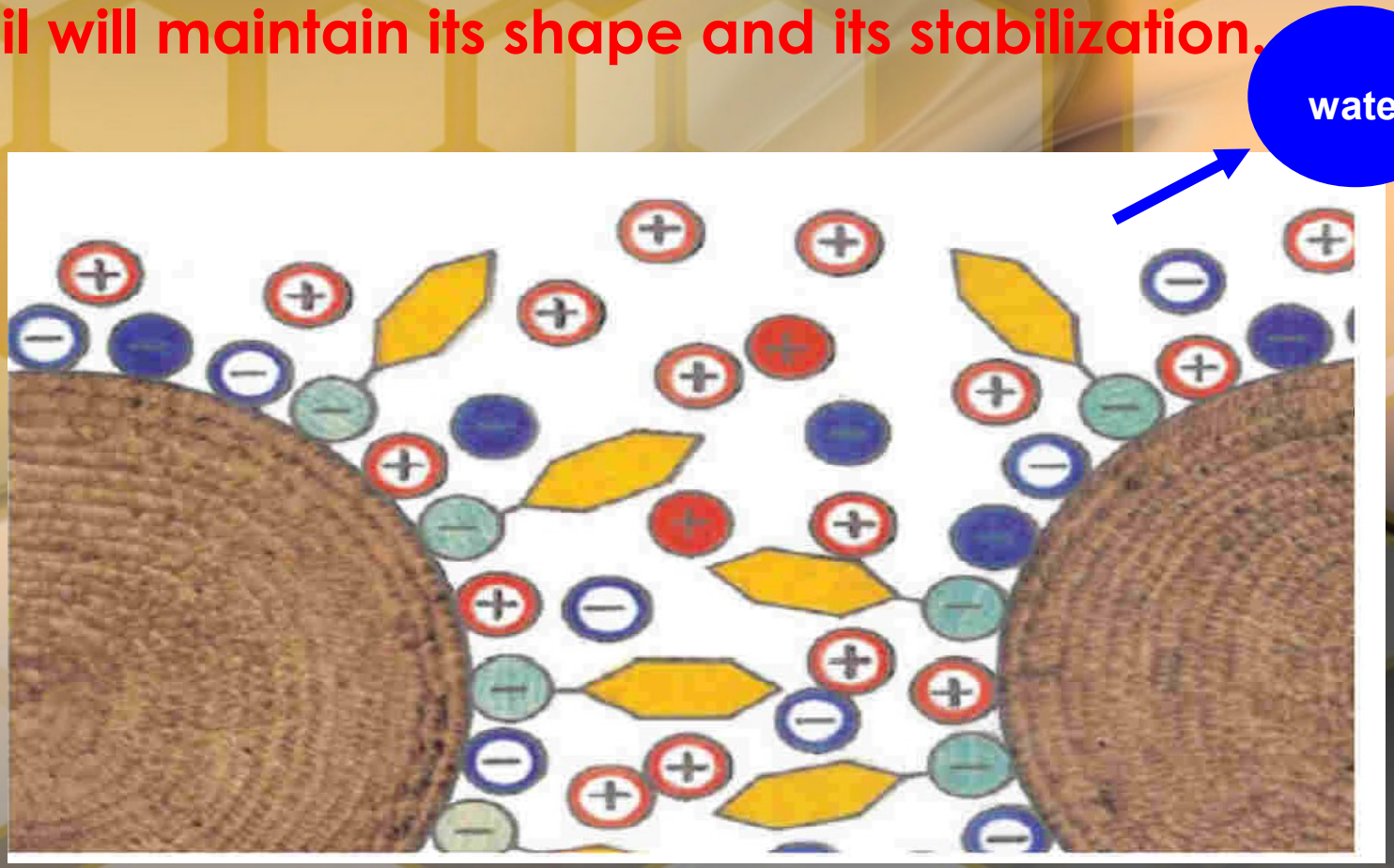
After Ion exchange with RRP-235-Spezial



After compaction water or better water molecules have no chance **to penetrate into the soil** or **to start a chemical reaction with the colloids**.
The soil could be called impregnated.

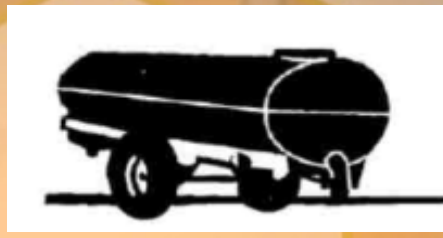
Since the soil can not swell or shrink any more,
the soil will maintain its shape and its stabilization.

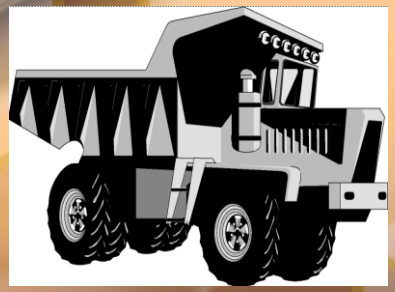
RRP-235-Spezial after compaction



Machine equipment

Bulldozer **Grader** **Vibration roller** **Truck** **Barrelwagon**





Some other machines:

- **Soil mixer**
- **Digger**

These two machines will be used by road construction only if they are needed.

Build constructions faster, more stable, less expensiver and most notably environmentally sustainable.

up to 50% lesser use of trucks

RRP-235-spezial benefits

up to 50% reduced material costs

up to 50% reduced construction time

Saving time and material (less gravel as well as crushed rocks) and especially **a lesser use of machines and trucks** (less transports with trucks) enables a contemporary way to build roads and other projects.

Comparison of RRP-235-spezial with ordinary roads

	RRP-235-spezial	Ordinary
Layer depth	25-30 cm	15 cm
Compaction	5-10 times	15-20 times
Water Penetration	Waterproof	enable
Raw material usage	Low (Less than 15%)	High (100%)
Material Transportation	Low	High
Construction Cost	Low (up to 50%)	High
Construction Time	Low (up to 50%)	High
Environment Friendly	High	Low
durability	High	Low
Maintenance	Low	High
Asphalt thickness	Low (up to 50%)	High

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Construction steps

1-Spreading, plowing and leveling of clayey soil

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2- Splashing the water contains RRP-235-spezial

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3- Compaction

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4- Drainage layer construction

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5- Asphalt paving and finalizing

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The track after a few years with no problem

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The track after a few years with no problem

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The adjacent track with no RRP-235-spezial
The cracks and settlement starts to appear

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Railway track construction

Digging the surface vegetable soil

The exist track

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Railway track construction
Digging the surface vegetable soil

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Railway track construction

Digging the soil to the desired depth

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Railway track construction

Splashing the water contains RRP-235-spezial

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Railway track construction
Compaction

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Railway track construction

Spreading the ballast to supply drainage and lateral resistance

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Railway track construction
Compaction

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Railway track construction
Placement the travers

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Railway track construction
Placement the rails

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Railway track construction
Finalized track before ballast

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Railway track construction

Finalized track before ballast

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