Warning: AI generated
By ChatGPT

In this English-language summary formulated by AI, the scale designations A and S are not used correctly. S stands for shrinkage (German) and A for material surcharge. S_1 is not the percentage of the total mixture. In the example (see: example of a calculation), the ratios are shown correctly. The scale designation "W" has no relation to weight, as stated in the German answer. The middle scales on the slide rule are not labeled "W." However, they correspond to the W scales of the Faber-Castell 2/83, for example. The AI determined the connection independently. The reason for using these scales was probably the need to be able to calculate with a high degree of accuracy. The summary reproduces the original text of the AI. This allows interested parties to assess the performance of the AI. Errors were apparently made in the drafting of the summary and translation into English.

Didier-Stettin Ceramic Slide Rule

This specialized slide rule (Didier-Stettin Keramik-Rechenschieber) is designed for ceramic raw-material formulations. It contains custom scales labeled S1, S2, A1, and A2 on the front, along with chemical data tables on the back. The slides and cursor operate like a standard slide rule, allowing alignment of values to perform proportional calculations. The S and A scales convert weight ratios into percentages used in ceramic batch calculations, while the back-side tables list oxide compositions, molecular weights, and loss-on-ignition data for common ceramic materials (e.g. clay and feldspar).

Scale S1

- **Function:** S1 reads out a percentage according to the formula **$(W_1 - 1) / W_1 \times 100\%$**, where W_1 is a weight ratio taken from the slide. In practice, S1 gives the percentage of the **total mixture** that is made up by the extra portion above a base of 100%.
- **Usage:** To use S1, first position a weight-ratio value on the W_1 scale with the cursor hairline. The number read on the S1 scale then tells you what fraction (in percent) that extra component contributes to the final mix. For example, if W_1 = 1.20 (meaning 20% more material than the base), S1 reads 16.7%, indicating that the extra portion is 16.7% of the total.
- **Interpretation:** S1 is useful for determining **oxide fractions** in the final batch. The result corresponds to "part of whole" percentage. In ceramic formulation, this helps find what percent of the final mixture comes from a given raw material (after accounting for loss on ignition).

Scale S2

- **Function:** S2 performs the same calculation as S1 (using the same formula **$(W_1 - 1) / W_1 \times 100\%$**) but is an **alternative copy** of the scale. It covers the same computations over an expanded or more conveniently placed range.
- **Usage:** You use S2 exactly like S1. It may be printed on a different part of the slide or base for better precision or simultaneous use. In effect, S2 reads the identical percentage values as S1 when the same weight ratio is set.

- **Interpretation:** There is no difference in meaning between S1 and S2. Both give the percentage of the total mixture that the extra portion (above the base 100%) represents. S2 is simply a duplicate scale for ease of reading or for working with a second component.

Scale A1

- **Function:** A1 reads out a percentage by the formula **$(W_1 - 1) \times 100\%$**. This calculates the percent **above a base of 100**, i.e. how much extra material is needed compared to the base value.
- **Usage:** After setting the same W_1 on the W_1 scale and the cursor, the A1 scale directly gives the percentage **increase** over the base. For example, if $W_1 = 1.20$, A1 reads 20%, meaning that the mixture requires 20% more material than the base amount.
- **Interpretation:** The A1 scale effectively tells you the **percent addition** needed. It is useful when formulating a recipe to know how much more raw material (by percentage) must be added to achieve the desired ratio. In ceramic terms, A1 converts a weight factor into a percentage of base material.

Scale A2

- **Function:** A2 is the counterpart to A1 and performs **the same calculation** (with the formula **$(W_1 - 1) \times 100\%$**). It is a duplicate or enlarged version of A1.
- **Usage:** Use A2 the same way as A1: align W_1 with the cursor and read the result on A2. It will yield the same percentage as A1 for any given setting. The scale placement allows a clearer reading or facilitates working with two different components.
- **Interpretation:** As with S2, A2 does not introduce a new calculation – it mirrors A1. Both A1 and A2 indicate the percentage of extra material relative to the base of 100%. In practice, you can use either one interchangeably to find the percent of raw material needed.

Chemical Tables and Usage

On the back of the rule are printed **chemical tables** for common ceramic materials (specifically a clay "Ton-Substanz" and a potash feldspar "Kalifeldspar"). These tables list important data used in conjunction with the scales:

- **Oxide Formulas and Molecular Weights:** The tables show each oxide component (e.g. SiO_2, Al_2O_3, Fe_2O_3, CaO, Na_2O, K_2O, etc.) along with its *molecular weight*. This data is essential for converting between weight percentages of an oxide and actual weight of raw material. (For example, knowing the molecular weight of Al_2O_3 allows you to calculate how much feldspar is needed to supply a certain percentage of alumina in the batch.)
- **Loss on Ignition (Verlust):** The clay table includes a "Gebrannter Anteil" or *loss on ignition*, which is the percentage of mass lost when the raw material is fired (water and volatile content). This tells you how much of the raw clay's weight will disappear upon

firing. It must be accounted for when calculating raw ingredient amounts so that the final (fired) composition meets the target.

- **Oxide Composition:** In effect, the tables provide the **oxide content** of each material. By combining these values with the slide rule scales, you can determine batch formulas. For example, if you want a ceramic body with a certain percentage of Al_2O_3, you find Al_2O_3 in the table (with its weight% in clay or feldspar) and use the slide rule to compute how much feldspar to add.
- **Using the Data with the Slide Rule:** In typical use, a formulator reads the oxide percentage from the table and converts it to weight fraction using the scales. The W scales on the slide rule represent weight ratios of raw vs. fired components. By aligning these ratios and reading off S1/A1, the slide rule directly gives the percentage of each raw ingredient needed to achieve the desired final composition.

In summary, the S1/A1 and S2/A2 scales are specialized percentage-conversion scales (with S = fraction of total and A = percent over base) used for ceramic batch calculations. The back-side tables supply the chemical reference values (oxide contents, molecular weights, and loss-on-ignition) needed to apply those calculations. Together, they let a user determine how much of each raw material to mix in order to achieve a particular ceramic composition in the fired product.
