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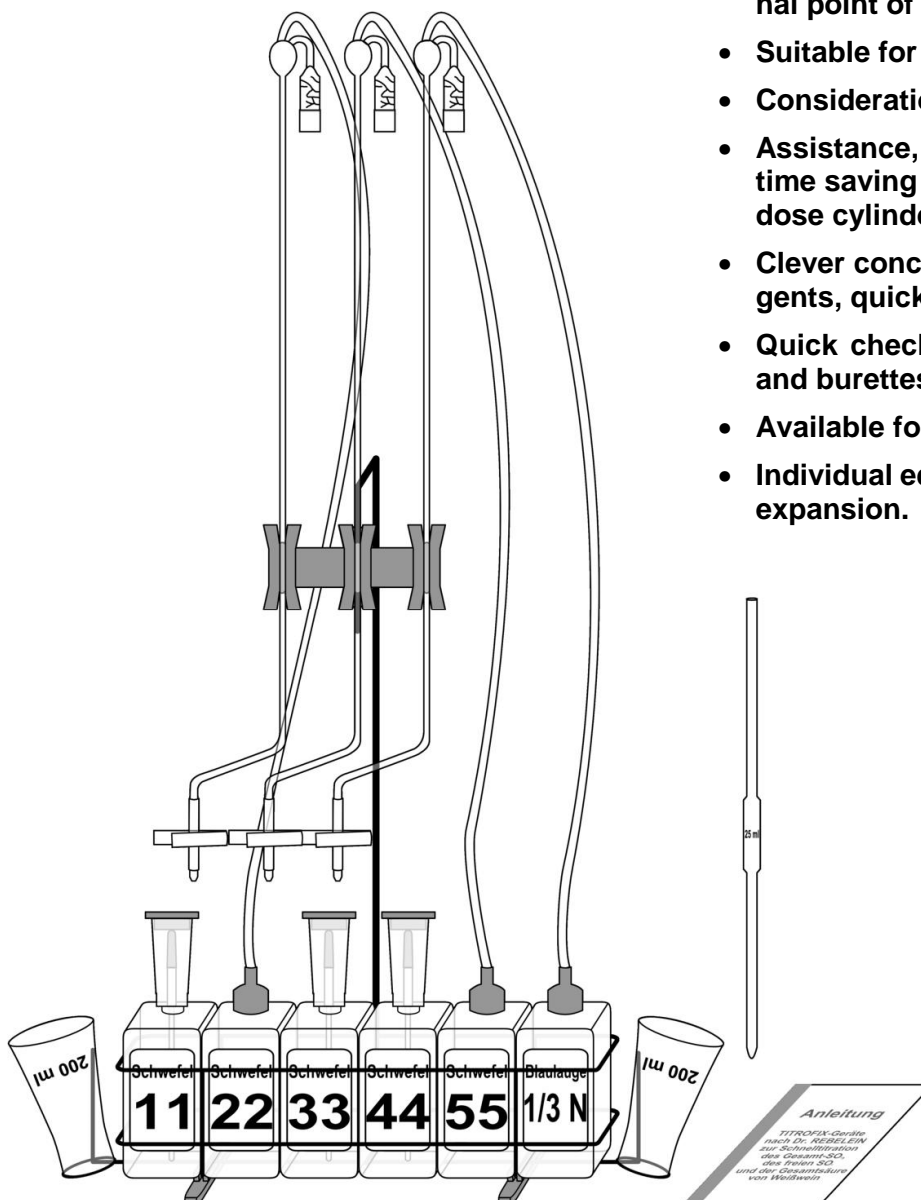
Getränkeanalytik

TITROFIX-equipment according to Dr. Rebelein for the rapid titration of total SO₂, free SO₂ and total acidity in white and rosé wines

version 04/2021

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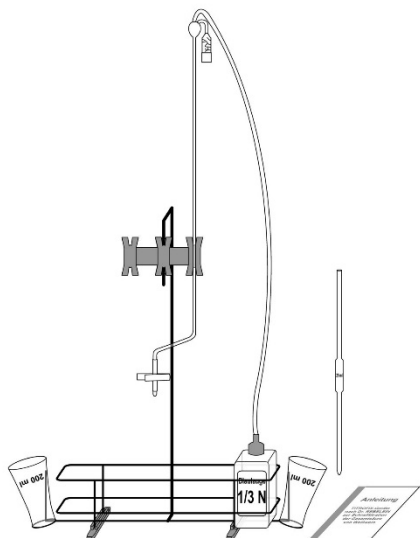
- The measurement result is available during only 3 minutes.
- The clear change of colour indicates the final point of titration.
- Suitable for pale red wines, too.
- Consideration of “reductones”-
- Assistance, accuracy of measurement and time saving by automatic burettes and dose cylinders.
- Clever conception for addition of all reagents, quick reaction kinetics.
- Quick checking of the reagents' condition and burettes by blank value titration.
- Available for stationary or portable use.
- Individual equipment and possibility of later expansion.



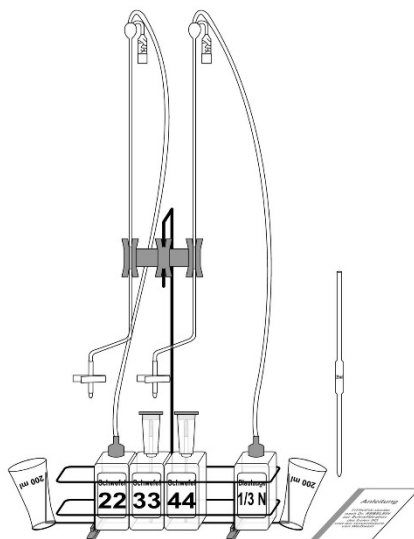
portable

TITROFIX

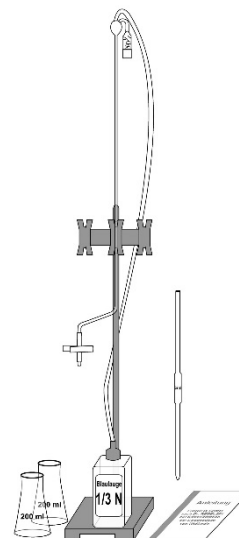
stationary



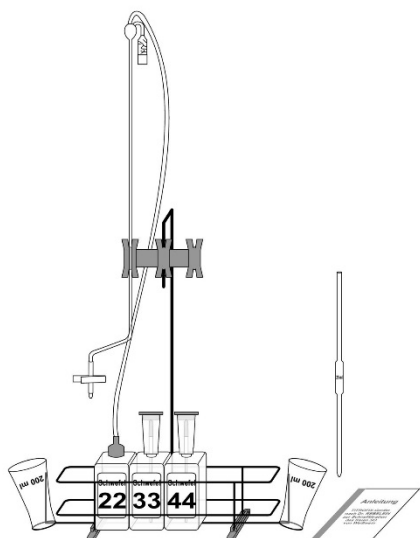
TITROFIX (1)



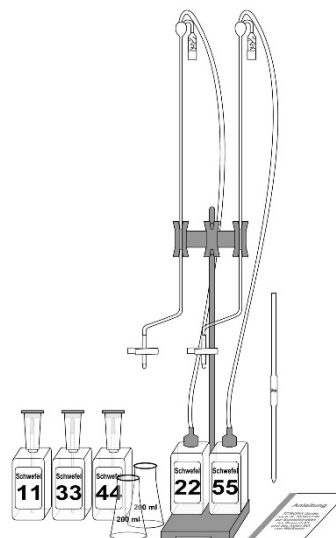
TITROFIX (1+2)



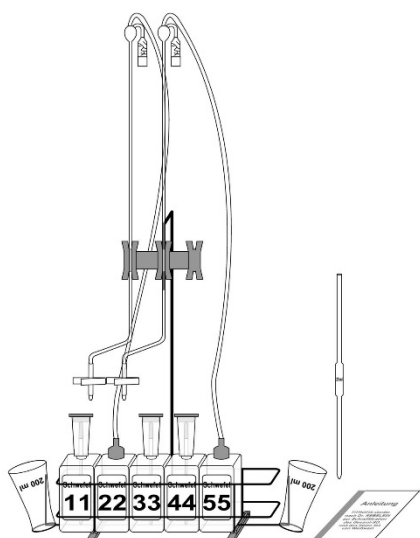
TITROFIX (A)



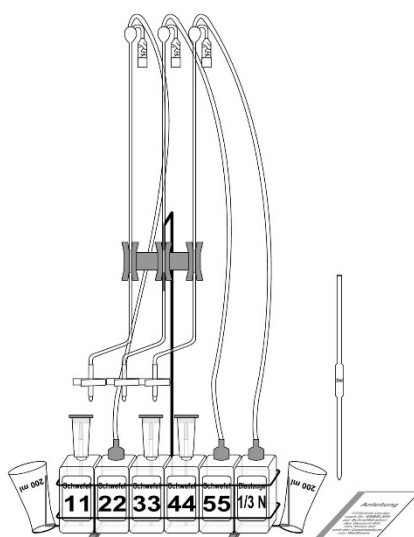
TITROFIX (2)



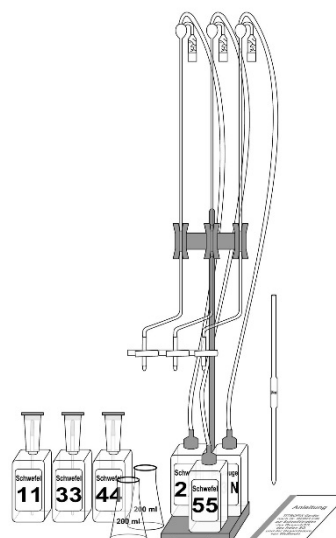
TITROFIX (B)



TITROFIX (3)



TITROFIX (1+3)



TITROFIX (C)

TITROFIX Equipment Variants for Total Acidity, Free SO₂ and Total SO₂

- **Portable TITROFIX-set:**

TITROFIX (1)	for total acidity (TA)
TITROFIX (2)	for free SO ₂
TITROFIX (1+2)	for TA and free SO ₂
TITROFIX (3)	for free SO ₂ and total SO ₂
TITROFIX (1+3)	for TA, free SO ₂ und total SO ₂

- **Stationary TITROFIX-set:**

TITROFIX (A)	for total acidity (TA)
TITROFIX (B)	for free SO ₂ and total SO ₂
TITROFIX (C)	for TA, free SO ₂ und total SO ₂

Every **TITROFIX-equipment** is prepared with the triple holder for all burettes for the individual completion of the method.

Working equipment / stand material:

Portable: TITROFIX-wire basket (for 6 reagent-bottels à 500ml) with stand-staff 8 mm and holder for three bu-
rettes 12-12-12/8 mm

Stationary: standplate with staff (length 600 x Ø12 mm, holder for three burettes 12-12-12/12 mm)

Accessories (• included in the equipments' price):	TITROFIX-equipment (name of the variant)							
	(1)	(2)	(1+2)	(3)	(1+3)	(A)	(B)	(C)
blowing out-pipette 25 ml	•	•	•	•	•	•	•	•
2 conical flasks 200 ml	•	•	•	•	•	•	•	•
burette 25 ml for 1/3 soda lye ("1/3n Blaulauge")	•		•		•	•		•
burette „SO ₂ -Titration Rebelein“ with main scale „0-25ml“ and ad- ditional scale „0-100 mg/l freies SO ₂ “ for „Schwefel 22 / Sulfur 22“		•	•	•	•		•	•
burette „SO ₂ -Titration Rebelein“ with scale „0-500 mg/l Gesamt- SO ₂ “ for reagent „Schwefel 55 / Sulfur 55“				•	•		•	•
dose cylinder 10 ml for „Sulfur 11 / Schwefel 11“				•	•		•	•
dose cylinder 10 ml for „Sulfur 33 / Schwefel 33“		•	•	•	•		•	•
dose cylinder 10 ml for „Sulfur 44 / Schwefel 44“		•	•	•	•		•	•
instructions for method and working equipment	•	•	•	•	•	•	•	•

Necessary reagents (not included in the equipments' price):	TITROFIX-equipment (name of the variant)							
	(1)	(2)	(1+2)	(3)	(1+3)	(A)	(B)	(C)
500 ml 1/3 n soda lye in poly-bottle ("1/3n Blaulauge")	•		•		•	•		•
500 ml „Sulfur 11“ in poly-bottle ("Schwefel 11")				•	•		•	•
500 ml „Sulfur 22“ in poly-bottle ("Schwefel 22")		•	•	•	•		•	•
500 ml „Sulfur 33“ in poly-bottle ("Schwefel 33")		•	•	•	•		•	•
500 ml „Sulfur 44“ in poly-bottle ("Schwefel 44")		•	•	•	•		•	•
500 ml „Sulfur 55“ in poly-bottle ("Schwefel 55")				•	•		•	•

For the titration of reductones/ ascorbic acid are additionally needed (not included in the basic equipments' price):

- 100 ml neutral glyoxal solution 40%ig ("Glyoxal"), which may be dosed using a...
- glass-dosing cylinder 2 ml or a full-pipette 2 ml with a "Pi-Pump 2500 10ml" pipetting aid

Sample Preparation:

Before the **determination of SO₂**, the carbonic acid contained in the beverage must not be removed from the sample by shaking out or filtering, as otherwise the content of free SO₂ will also decrease. If the liquid cannot be pipetted because of the formation of bubbles, the volume of the sample has to be measured using a 25 ml measuring cylinder as accurately as possible.

Before the **determination of the total acidity**, on the other hand, the carbonic acid must be removed, as it would simulate a higher content of acidity. By definition, "titratable total acidity" only includes tartaric, malic, lactic and citric acid, which are detected by titration with sodium hydroxide solution up to the "neutral point". The removal of carbonic acid is achieved by:

- shaking out of approx. 100ml of the beverage at ambient temperature in a 500mL- or 1L-suction bottle under the vacuum of a water jet pump until no more carbonic acid bubbles out, or
- by heating of a sample of 25 ml of wine, which has been measured previously as accurately as possible, until beginning boiling, degassing it in an ultrasonic bath and then cooling it down to about 20°C.

Titration of Total SO₂:

- Pour 10 ml of reagent "Sulphur 11 / Schwefel 11" into the conical flask;
- Add by the pipette 25 ml of wine sample; the tip of the pipette must just be immersed into the liquid; blow out the pipette approx. 10-15 seconds after the pipette has emptied and wipe it off at the edge of the glass;
- Add 25,0 ml of reagent "Sulphur 22 / Schwefel 22" from the **burette with the main scale "0-25 ml" and the additional scale "0-100 mg freies SO₂/l"**;
- While swirling, add in one pour 10 ml of "Sulphur 33 / Schwefel 33" and again in one pour 10 ml "Sulphur 44 / Schwefel 44";
- Titrate with reagent "Sulphur 55 / Schwefel 55" from the **burette with the scale "0-500 mg Gesamt-SO₂/l"** until the original wine colour reappears;
- The reading of the burette scale indicates the content of total SO₂ in mg/l.

Notes:

- The detection limit of this method is 500 mg/l total SO₂. For safety reasons, total SO₂ values in the range of legal limits should be checked with a distillation method, e.g. "Distillation of the total sulphurous acid according to Dr. Rebelein".
- If you want to save reagents, you can, with an otherwise unchanged procedure and with the same result...
 - halve the amount of the reagent "Sulphur 22 / Schwefel 22" to 12.5 ml and
 - reduce the burette reading by 250 mg/l (e.g.: burette reading 385 mg/l - 250 mg/l = 135 mg/l actual titration result).

Titration of Free SO₂:

- Pipette 25 ml of wine sample into the conical flask, place the pipette tip near the bottom of the flask against its wall; blow out the pipette approx. 10-15 seconds after the pipette has emptied and wipe it off at the edge of the glass;
- Add 10 ml each of reagent "Sulphur 33 / Schwefel 33" and reagent "Sulphur 44 / Schwefel 44";
- Titrate with "Sulphur 22 / Schwefel 22" from the **burette with the main scale "0-25 ml" and the additional scale "0-100 mg freies SO₂/l"** until a slight blue colour remains;
- Read off the content of free SO₂ in mg/l from the additional scale "0-100 mg freies SO₂/l".

Titration of Reductones/ Ascorbic Acid:

The results of the above methods incorrectly include reductones and / or ascorbic acid. To determine the "real SO₂", titrate one sample of the wine as described above (Titration of Free SO₂) and a second sample as follows:

- Pipette 25 ml of test liquid into the conical flask;
- Add 2 ml of glyoxal solution ("Glyoxal");
- After a standing time of exactly 5 minutes add 10 ml each of reagent "Sulphur 33" and "Sulphur 44";
- Titrate with "Sulphur 22" from the **burette with the main scale "0-25 ml" and the additional scale "0-100 mg freies SO₂/l"** until a slight blue colour remains;
- Read off the content of reductones and ascorbic acid expressed as free SO₂ in mg/l from the additional scale "0-100 mg freies SO₂/l".

The difference between the first and second titration is the "real SO₂". To calculate the reductones, expressed as ascorbic acid, multiply the titration result of the second titration in mg SO₂/l by 2,75. This orientating value includes all reductones!

Blind titration to check the reagents and burettes for the determination of SO₂:

- Pour 25 ml of reagent "Sulphur 22 / Schwefel 22" from the **burette with the main scale "0-25 ml" and the additional scale "0-100 mg freies SO₂/l"** into the 200 ml conical flask;
- Add 10 ml each of reagent "Sulphur 33 / Schwefel 33" and "Sulphur 44 / Schwefel 44";
- Titrate with reagent "Sulphur 55 / Schwefel 55" from the **burette with the scale "0-500 mg Gesamt-SO₂/l"** until the blue colour disappears;
- The reagents and burettes are faultless if the deviation from the blank value 0 mg/l is not greater than ± 6 mg/l.

Titration of the Total Acidity with 1/3 n Soda Lye with Blue Indicator ("Blaulauge"):

- Remove carbonic acid contained in the sample by shaking out or briefly heating, (see Sample Preparation, please);
- Pipette 25 ml of wine sample into the conical flask;
- Titrate with reagent "1/3 n Blaulauge" from the **burette 0-25ml** to the neutral point (colour change from green to blue).
- The reading of the burette scale indicates the content of total acidity in g/l, calculated as tartaric acid.

Tip: The proximity of the neutral point is announced in light-coloured drinks by the colour change from yellow to green. The neutral point of about pH 7.3 is only reached at the moment of the colour change from dark green to blue that follows shortly afterwards.