

Student experiment  
(5th - 10th grade)

## Redox titrations

🕒 Time: max. 15 min.

### Safety:

safety glasses

### Instruments:

- two 1ml disposable syringes
- glass ampules
- a toothpick

### Chemicals:

- 0,1M hydrochloric acid
- sodium hydroxide (0,05M – 0,2M)
- distilled water
- bromthymol blue

### Experiment:

- Use one disposable syringe to place 0,6 ml of sodium hydroxide into the glass ampule. Add a few drops of bromthymol blue and enough distilled water to fill the ampule.
- Pull 1 ml of hydrochloric acid into the second syringe, making sure to keep all air bubbles out. Turn the syringe tip up, tap on the side, then carefully press any air out of the top with the plunger.
- Drip the acid into the first ampule, carefully stirring with the toothpick to mix it well. The titration is over when the resulting color change does not go away any more despite stirring the mixture.
- If one ampule of acid does not suffice, continue the titration with a second 1 ml charge until the color change does not disappear.

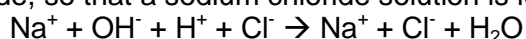


### Observations:

The solution turns from blue to yellow after a short while.

### Results:

Bromthymol blue changes color at a pH value of 7. At this pH the H<sup>+</sup> ions in the hydrochloric acid have neutralized the OH<sup>-</sup> ions stemming from the sodium hydroxide, so that a sodium chloride solution is left:



The concentration of sodium hydroxide can be calculated with the following formula:

$$n_{(\text{HCl})} = n_{(\text{NaOH})}$$

### Disposal:

The liquids containing bromthymol blue must be disposed of in the container for organic waste without halogens. Remaining acid or base can be diluted and poured down the drain.