| Student experiment (5th - 10th grade) | **The oxidation of alcohols** | **Time:** max. 15 min. |
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**Safety:**

**safety glasses**

Alcohols are highly flammable.

**Instruments:**

- empty pill packaging
- five 1ml disposable syringes as pipette replacements

**Chemicals:**

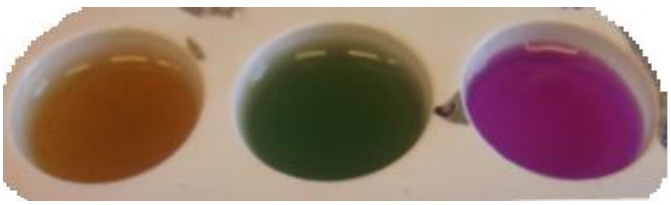
- 1-propanol (H: 225-318-336; P: 210-233-280-305+351+338-313)
- Isopropanol (H: 225-319-336; P: 210-233-305+351+338)
- tert-butanol (H: 225-332-319-335; P: 210-305+351+338-403+233)
- 0,001M potassium permanganate solution (H: 272-302-410; P: 210-273)
- 1M sodium hydroxide solution

**Experiment:**

- Place 0,5ml of sodium hydroxide solution in three separate pill packaging hollows. Do the same with 0,5ml of potassium permanganate solution in three additional hollows.
- Place several drops of alcohol in one of the chambers with sodium hydroxide and potassium permanganate. Repeat for the other two alcohols, using two unused chambers each time.

**Observations:**

After a very short time, color changes will be observable in the chambers.
1-propanol: The solution turns from pink to yellow-brown.
Isopropanol: The solution turns from pink to green.
tert-butanol: No color change observed.



**Results:**

- 1-propanol: Primary alcohols can be oxidized to form carboxylic acids. The manganese in the permanganate is reduced from oxidation level VII (violet) through level VI (green) to level IV (brown). The result is $Mn(IV)O_2$, often called "brownstone" in German trivial nomenclature.
- isopropanol: Secondary alcohols can be oxidized to form ketones. The manganese in the permanganate is reduced from oxidation level VII (violet) to VI (green).
- tert-butanol: No reaction takes place for tertiary alcohols.

**Disposal:** Collect the waste products in the heavy metal container for disposal.