Chemical analyse of water

We made chemical analyse of water all around Kandava:

- spring,
- Abava,
- Teteriņu lake,
- Čužu marsh,
- sulphur springs,
- rain

Our experiments with water were made in following steps

1. gathering of water samples
2. detecting pH, temperature and dissolved oxygen directly on place
3. making chemical analyse of water using Hanna Intruments colorimetric test kits at school laboratory (
4. making PP presentations in groups – reflection of obtained results
5. presenting results and impressions at computer room

The aim of our experiment was to detect chemical factors and to compare them with results in October.

The temperature of air in December was $t = 4.4\ ^{O}C$, in October $t = 13.0\ ^{O}C$

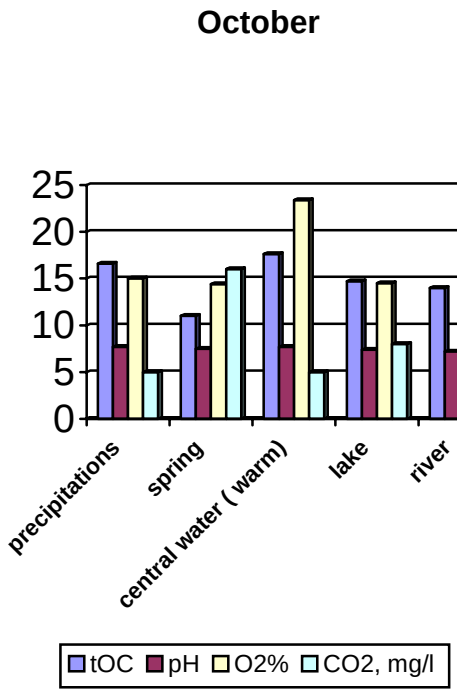
Temperature, pH, dissolved oxigen and carbon dioxide

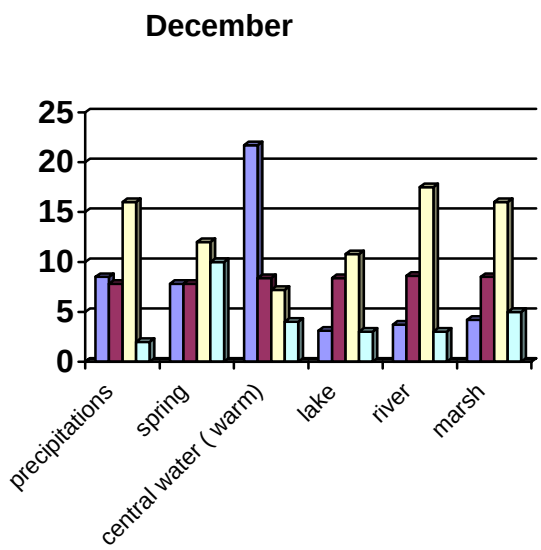
Significance of analyse:

The concentration of **dissolved oxygen** in water is extremely important in nature as well in man's environment. In the oceans, lakes, rivers, and other surface water bodies, dissolved oxygen is essential to the growth and development of aquatic life. Without oxygen, the water can become toxic due to the anaerobic decaying of organic matter.

In nature, lakes and rivers contain **carbon dioxide** in concentrations smaller than 10 mg/l, however stagnant or contaminant water can contain higher concentrations because of organic decomposition. This creates a problem for fish farming applications.

Water	precipitations	spring	central water (warm)	lake	river	marsh
October						
$t^{O}C$	16.6	11.0	17.6	14.7	14.0	12.9
pH	7.7	7.5	7.7	7.4	7.2	8.0
O_2%	15.0	14.4	23.4	14.5	13.5	14.4
CO_2,mg/l	5	16	5	8	8	6
December						
$t^{O}C$	8.5	7.8	21.7	3.1	3.7	4.2
pH	7.8	7.8	8.4	8.4	8.6	8.5
O_2%	16.0	12.0	7.2	10.8	17.5	16.0
CO_2,mg/l	2	10	4	3	3	5





Conclusions:

- After the analyses in December we can compare the results – percentage of oxigen in the water in different places.
- More oxigen than in September was in the river and in the marsh.
- Less oxigen were in the spring, in the lake.
- Large difference is between central water in September and in December.
- Temperature in springs are higher than in lakes and rivers
- We found CO2 in spring and sulphur spring water.
- In december there was lover dioxide level than september.
- In september the tempereture and o2% was higher than december, but pH was lover.

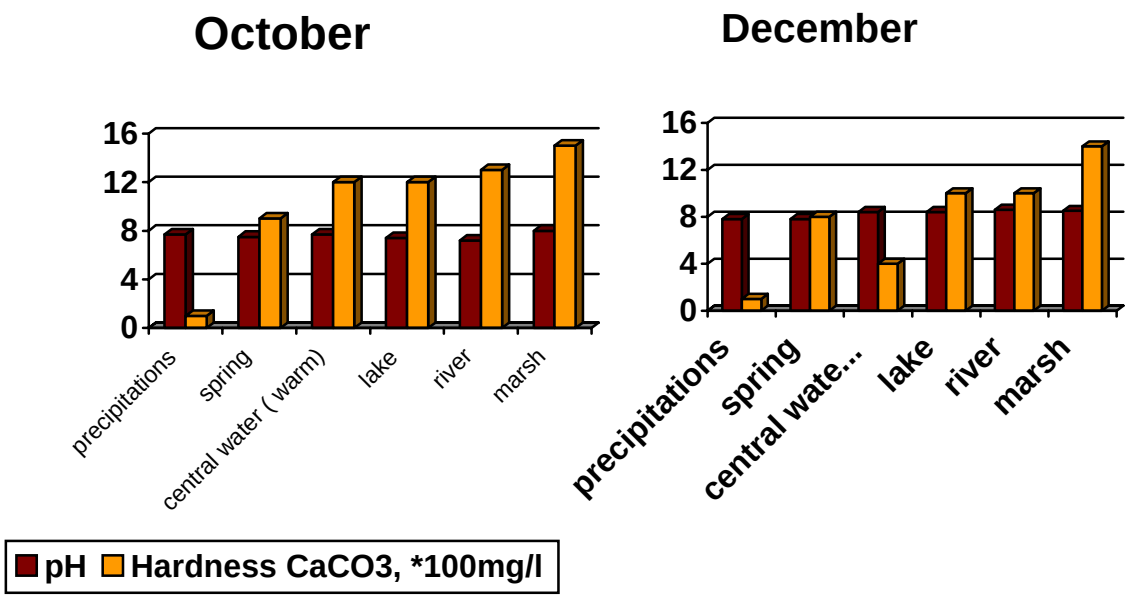
Hardness and pH

Significance of analyse:

- **Hardness** in water is mainly due to the presence of Calcium and Magnesium ions. Calcium and Magnesium also contribute to the amount of total hardness. Monitoring and controlling hardness is fundamental in order to prevent scaling and corrosion. Water is categorized as very
- soft 0-70 mg/l
- Soft 70-150 mg/l
- Slightly hard 150-250 mg/l
- Moderately hard 250-320 mg/l
- Hard 320-420 mg/l
- Very hard 420mg/l and above

pH Industries and motor vehicles emit nitrogen oxides and sulfur oxides into the environment. When these emissions combine with water vapor in the atmosphere, they form acids. These acids accumulate in the clouds and fall to earth as acid rain or acid snow. Acid rain damages trees, crops, and buildings. It can make lakes and rivers so acidic that fish and other aquatic organisms cannot survive.Water with a pH level less than 7.0 is considered to be acidic. The lower the pH, the more acidic the water. Water with a pH greater than 7.0 is considered to be basic or alkaline. The greater the pH, the greater its alkalinity. Fresh water sources with a pH below 5.0 or above 9.5 may not be able to sustain plant or animal species.

Water	precipitations	spring	central water (warm)	lake	river	marsh
October						
pH	7.7	7.5	7.7	7.4	7.2	8.0
Hardness $CaCO_3$, *100mg/l	1	9	12	12	13	15
December						
pH	7.8	7.8	8.4	8.4	8.6	8.5
Hardness $CaCO_3$, mg/l	1	8	4	10	10	14



Conclusions:

- We found that water is very hard in Kandava, except rain
- Ph is the highest in the river (8,6)

and the lowest is in the precipitations (7,8) and spring (7,8)

Ammonia, nitrate, nitrite and pH

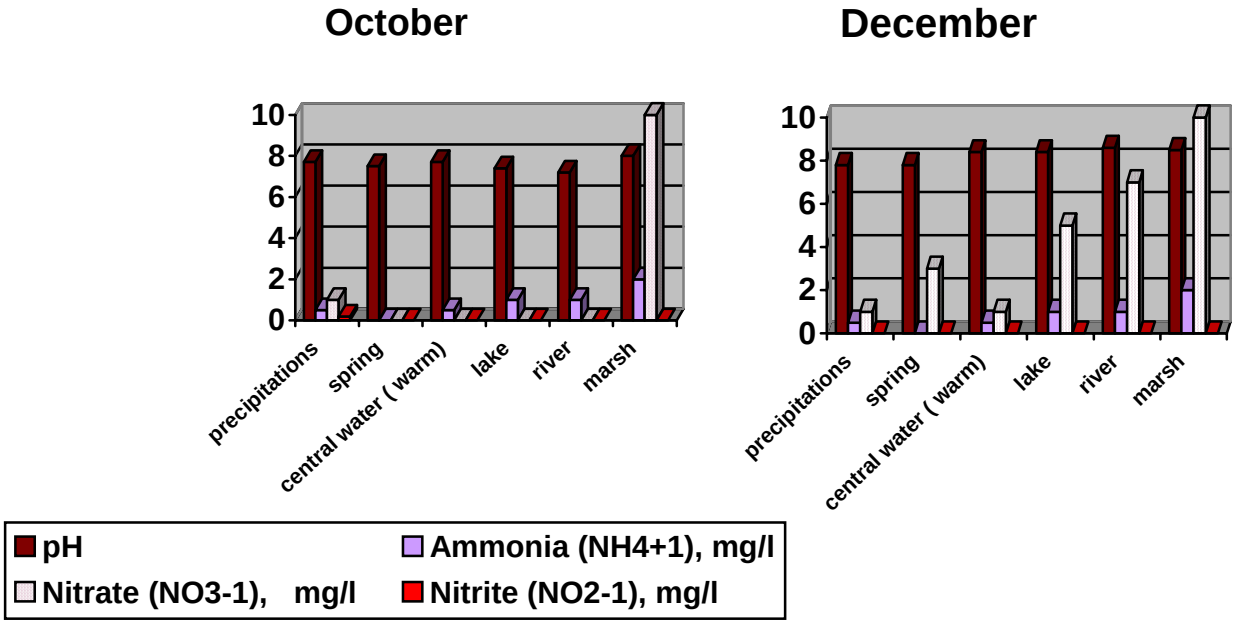
Significance of analyse:

In nature, the **ammonia** level in water can vary. Ground water normally contains ammonia due to bacterial decay of plants and animals. However, the presence of ammonia in surface water may be evidence of sanitary pollution due to waste discharges or natural causes.

Nitrate ions are present in trace amounts in surface water and in higher levels in some groundwater. Nitrate is found only in small quantities in domestic wastewater but can reach higher concentration (up to 30 mg/L as nitrogen) in the outflow of nitrifying biological treatment plants. Excessive amounts can contribute to infant death and adult illness. In order to prevent this, a 10 mg/L limit (as nitrogen) has been imposed on drinking water.

Nitrites are intermediate oxidation state of nitrogen (in the oxidation of ammonia to nitrate or in the reduction of nitrate). Such oxidation/reduction may occur in wastewater of treatment plants and in natural waters during the biological decomposition of nitrogen-compounds. In small quantities it can cause illness among infants. Conversely, high levels are used to inhibit corrosion in cooling towers. Nitrosation reactions of nitrites can yield organic nitrosamines, which are known to be carcinogenic.

Water	precipitations	spring	central water (warm)	lake	river	marsh
October						
pH	7.8	7.8	8.4	8.4	8.6	8.5
Ammonia(NH_4^{+1}),mg/l	0.5	0	0.5	1.0	1.0	2.0
Nitrate(NO_3^{-1}), mg/l	1	3	1	5	7	10
Nitrite(NO_2^{-1}),mg/l	0.2	0	0	0	0	0
December						
pH	7.7	7.5	7.7	7.4	7.2	8.0
Ammonia(NH_4^{+1}),mg/l	0.5	0	0.5	1.0	1.0	2.0
Nitrate(NO_3^{-1}), mg/l	1	0	0	0	0	10
Nitrite(NO_2^{-1}),mg/l	0	0	0	0	0	0



Conclusions:

- Ammonia level the higher was in marsh. Medium was in lake and river. And in spring there was no ammonia found..
- The higher nitrate limit is in marsh. The lowest limit of nitrate is in precipitation, central water and in sulphur spring. In december limit of nitrate is higher then in september.
- We found nitrites only in precipitations.
- In other water examples we didn`t found nitrites.

Sulfate, sulfite, phosphate and pH

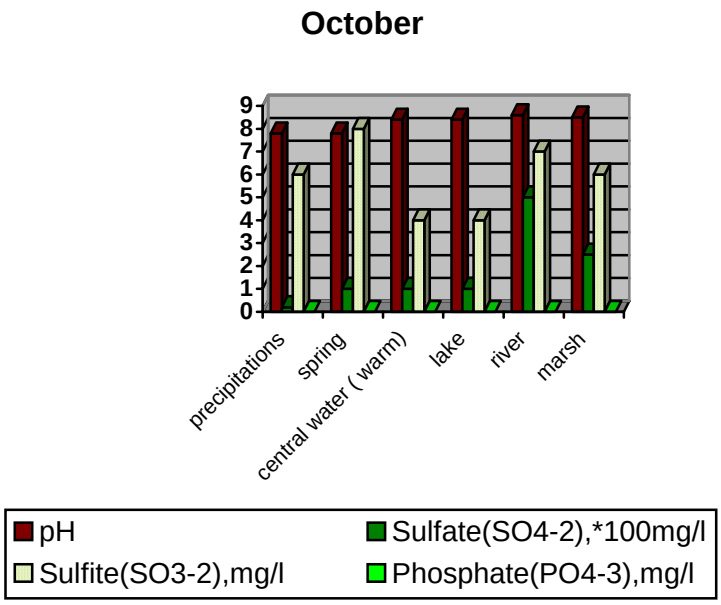
Significance of analyse:

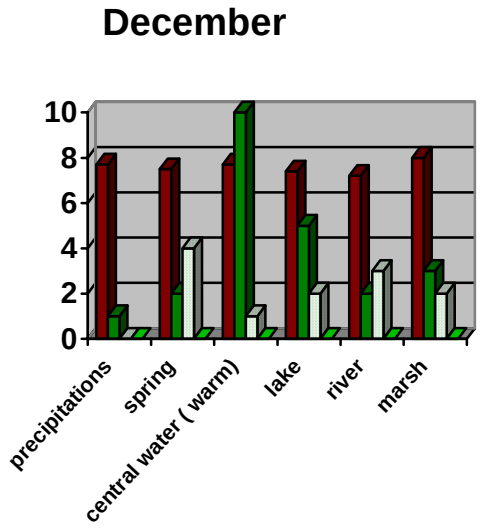
Sulfate is largely present in natural waters in a wide range of concentrations. It is not toxic but has to be kept below a certain threshold to prevent it from creating an unpleasant taste in water. The concentrations are particularly higher close to mine run-off water. Sulfate is extensively used as a nutrient in agriculture.

There are many reasons to monitor **sulfite** concentration in water. In industrial applications, a sulfite concentration of approximately 20 mg/L must be mantained to prevent pitting and oxidation of metal components as in boiler feed and effluent waters. A high level of sulfite results in a lowered pH, thus promoting corrosion. The monitoring of sulfite is important in environmental control. Sulfite ions are toxic to aquatic lifeforms and their ability to remove dissolved oxygen in water will destroy the delicate balance of ecology of lakes, rivers and ponds.

Phosphates are widely introduced into the environment from such sources as agricultural fertilizers, cleaning and laundering products, boiler water conditioners, and drinking water treatment aids. At high levels, phosphates stimulate the growth of photosynthetic organisms which may contribute to eutrophication of lakes, rivers, and ponds. This makes it important to monitor and control phosphate discharges into the environment.

Water	precipitations	spring	central water (warm)	lake	river	marsh
October						
pH	7.7	7.5	7.7	7.4	7.2	8.0
Sulfate(SO_4^{-2}),*100mg/l	0.2	1	1	1	5	2.5
Sulfite(SO_3^{-2}),mg/l	6	8	4	4	7	6
Phosphate(PO_4^{-3}),mg/l	0	0	0	0	0	0
December						
pH	7.8	7.8	8.4	8.4	8.6	8.5
Sulfate(SO_4^{-2}),*100mg/l	1	2	10	5	2	3
Sulfite(SO_3^{-2}),mg/l	0	4	1	2	3	2
Phosphate(PO_4^{-3}),mg/l	0	0	0	0	0	0





Conclusions

- In December the sulfate was in a higher level than in September
- pH was lower in September than in December
- The higher sulfate in September was in a river and in December was in central water
- The lower oxygen in Semptember was in a river and in Demeber in a sulphur spring
- In september sulfite results is biger, than december. It's good. Nature makes better.
- We did not find any phosphates in water, it only was in precipitations

! Very nice and interesting nature, having fun with other students!

! Good experience, something new.. good company and also having fun!

! Excursion was very interesting, we get known each other better.

! We had interesting actions

! New experience

! And wet shoes ☺

! Analyse is very interesting for us and other. I am happy to learn about this type of chemistry. I can get new information about my countries water. And for me it is very good experience.

! It was interesting

! We saw a beautiful land and nature

! It was a little bit cold

! The water smelt bad

! The city Kandava is very nice place

! WE HAD A GREAT TIME WITH OTHER PARTICIPANTS

! Analyse was funny for me. I am happy because I saw different chemistry experiments. In this day we get new friends. This analyse was very interesting for us..

! We like this chemical analise of nitrate. We get good emotions and pass good time and we learn something new.

! We liked the nature.

! IT WAS VERY WET.

! We had lot of fun.

! LATVIJA IS BEAUTIFUL LAND.

! Latvija is not cold land but is raining and foggy

! Beautiful nature full of fish (i have seen)

! Wild nature

! It was a great way to spend time. We learnt a lot about Latvian water. I got to know many fabulous people. We were to Čužu marsh and there we had a lot of fun. The only one disadvantage was that the excursion was too long and it was too wet.