

## Carbon dioxide and moist in classrooms

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### Pollution sources

In schools, pollution with carbon dioxide and moisture typically comes from three sources:

- 1) Students and teachers (carbon dioxide and moist).
- 2) Washing floor and wet clothes (moist)
- 3) Penetration of water from outside (humidity/moist).

Carbon dioxide and moist are not in themselves harmful to your health. But a high content of carbon dioxide in the indoor environment is a sign of poor air quality in the classroom, which increases the risk of headaches, fatigue, and difficulty in concentrating. High humidity increases the risk of mould that can cause severe allergic reactions. Aeration can often reduce the content of carbon dioxide and humidity levels in the classroom.

It must be emphasized that moist and carbon dioxide are rarely a problem in newer buildings with mechanical ventilation. Here, however, dry air (especially in the winter) can cause mucosal irritations, damage on wooden furniture, and it may be necessary to turn down the ventilation system and dry damp/wet clothes in the rooms to keep up humidity during the winter season.

In energy-renovated schools, special care must be taken to ensure that moisture problems do not arise, as air exchange is often lower after renovation due to sealing. The risk of moisture problems is also high in schools where the temperature is not the same in all rooms, or where thermal bridges give rise to local condensation on walls.

Long-lasting steamy windows and earthy/musty smells in cupboards/closets or classrooms are signs of moisture problems. Dark spots on wallpaper (in corners, windowsills and behind furniture on exterior walls) can be mould and must always be removed e.g., with Hysan, Protoxskimmel, Rodalon or chlorine (pay attention to possible discolouration).

### Measurements

It is always a good idea to **buy an electronic hygrometer with a thermometer**. It costs 15-30 euros, and then you can monitor the humidity level in the classroom. The humidity should be 25-45 percent in the winter and not exceed 65 percent during summer. However, you must be aware that the hygrometer only measures the humidity where it is placed. If you place furniture against exterior walls, there is a risk of increased moisture behind the furniture, which can result in mould that can contaminate the entire classroom with spores. The hygrometer cannot measure this if it is placed elsewhere.

It is also a good idea to **buy an indoor (carbon dioxide) CO<sub>2</sub> sensor**. Simple ones cost some 30 euros and then you can monitor the CO<sub>2</sub> content in the classrooms yourself.

The good thing about measuring is that you can investigate for yourselves what effectively removes CO<sub>2</sub> and moisture in the classrooms, and what fits your everyday life and habits during classes: how much does it help if you aerate with draughts 3-5 times a day - or if you leave ventilation dampers in windows/doors open? Use

the measurement results in class and engage the students in creating a good indoor environment in the classroom - then they will also incorporate good indoor environment habits to bring home and further in their life.

### **1) People**

We all exhale carbon dioxide and water vapor when breathing, just as we release water vapour when sweating. A person typically releases around 2 litres of water per day by exhaling and sweating. Although students are only at school during the day, it adds up to a lot of water per classroom per day. That moist must be removed from the classroom by aeration to avoid moisture problems.

Aerate with a draught (open all windows) preferably for 5 minutes between each class - turn off the radiators meanwhile to minimise heat loss. If there are ventilation dampers in doors and windows, they should be open and regularly cleaned from dust, pollen, etc. Preferably leave windows ajar during summer months if it does not cause problems of noise from outside, which disturbs the teaching.

### **2) Washing the floor and wet clothes**

Washing floors and wet clothes release water vapour.

Never wash the floor with an excess of water and always aerate with a draught for 5 minutes after washing the floor or prior to the first class of the day – remember to turn off the radiators meanwhile to minimise heat loss.

### **3) Water penetration from outside**

Water in the school's construction, due to water damage, downpour or moist, as well as high levels of ground water around the foundation, can cause mould both on and inside the walls. In these cases, you should always get help from professionals.

Dehumidifiers are often necessary after water damage but are a symptomatic treatment that does not prevent the sources of moist mentioned above from causing problems.

### **Have measurements made**

We can help with measurements and assessments of the indoor environment, and solution options to get a better indoor environment. Contact the Head of secretariat Kaare Press-Kristensen: kaare@godtindeklima.nu / tel. (+45) 22 81 10 27.

**More on indoor air pollution and solutions:**

**[www.healthyindoorenvironment.org](http://www.healthyindoorenvironment.org)**