

EXAM AIR POLLUTION CONTROL

25-02-2021

Exercise 1 (2 points)

The measured SO₂ emission concentration is 45 mg/m³ (p=1.0 atm; t=120°C). Convert the measured concentration to normal conditions:

Convert the concentration of SO₂ in the above exercise to ppm.

Exercise 2 (2 points)

True or false?

- Settling chamber can be connected with other control equipments in series to increase efficiency.
- Settling chamber can remove less than 1 μ particles with 90% efficiency.
- Increase in flow velocity increases efficiency of settling chamber.

Exercise 3 (3 points)

Complete the sentence with the correct word

- In an electrostatic precipitator, the _____ electrode is normally a small-diameter metal wire or a rigid frame containing wires.
- The charged particles migrate to the _____.
- True or False? Particles are usually charged by negative gas ions that are migrating toward the collection electrode.
- True or False? Large particles move more slowly towards the collection plate than small particles.
- Dust that has accumulated on collection electrodes can be removed either by _____ or a process called _____.

Exercise 4 (3 points)

In dry scrubbing systems where alkaline reagents and PAC are injected how does the temperature influence the process?

Exercise 5 (3 points)

Due to the increase of demand for MSW incineration, a 2nd identical WI line has to be built inside the existing incineration plant. To minimize the maximum ground concentration of pollutants, the best stacks configuration is looked for. **Choose the best one in each couple below:**

a) **config. A** (two separated, far away, single chimneys; each stack diam.=1.0 m), **or config. B** (two separated single chimneys, distance $D_2 = 1.0$ m; each stack diam.=1.0 m))?



b) **config. A** (same as above), **or config. C** (a new single chimney with a design exit gas speed equal to the one of the two single stacks (A)). Estimate the stack diam of config. D) in meter.



c) **config. B** (same as above), **or config. D** (same as config. A, but with the two flues in a single stack)?



Exercise 6 (2 points)

Air flow velocities in ducts should be kept below certain limits to avoid unacceptable:

- a) noise generation
- b) dust settling
- c) pressure drops and energy consumption
- d) high weight and size ducts.

Exercise 7 (2 points)

The saturation pressure of water vapour in the air at 60°C is 19.9 kPa. In a waste gas the water content is 15% by volume. Calculate the relative humidity: $RH = \dots\%$ (hint: 1 atm = 101.3 kPa)

Exercise 8 (3 points)

A fabric filter is treating 70.000 Nm³/h with an average air-to-cloth ratio of 1.2 m/min. The bags are 0.15 m in diameter and 3.6 m long. Estimate the number of bags in the baghouse.