Preview Assessment: Aeration version 2

Name	Aeration version 2
Instructions	Answer the questions in small groups (2 persons). Think well before answering and consult your lecture notes or othe sources if necessary. The test can only be made once.
Multiple Attempts	This Test allows multiple attempts.
Force Completion	This Test can be saved and resumed later.

Question Completion Status:

Question 1 **10 points** Save

Which gas transfer system maches with the given photographs?

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A. Spray aeration
B. Cascade aeration
C. Tower aeration
D. Plate aeration

Question 2 **10 points** Save

Which words belong to which aeration system?

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Cascade aeration.

Tower aeration.

A. orifices.

- Plate aeration.
- Spray aeration.

B. packing media.
C. droplets.
D. weirs.

Question 3 **10 points** Save

Nett gass transport takes place from water to air until the gas concentration in water is equal to

- RQ
- saturation concentration.
- zero
- gas concentration in air.

Question 4 **10 points** Save

The saturation concentration is calculated with the next formula:

kD is smaller at a higher temperature

$$c_s = k_D \cdot c_l$$

- True
- False

Question 5 **10 points** Save

Gasses with a low k_D-values hardly dissolve in water and are therefore difficult to remove from the water.

- True
- False

Question 6 **10 points** Save

With an increasing water temperature the saturation concentration ..... .

- Decreases
- increases
- remains the same

Question 7 **10 points** Save

Which equation need to be used if the variation of the gas concentration in air cannot be neglected?

- equilibrium equation
- kinetic equation

- [ ] mass balance

Question 8 **10 points** Save

Fill in the blanks:

k_2 is the gas transfer coefficient. The larger the contact surface area between air and water and the renewal of this surface area the ..... the gas transfer and the ..... the gas transfer coefficient.

- worse, higher
- worse, smaller
- better, higher
- better, smaller

Question 9 **10 points** Save

K is the efficiency of a gas transfer system. Which formula belongs to which basic system?

- $K_1 = 1 - \exp(-k_2 \cdot t)$
- $K_2 = \frac{1}{1 + \frac{1}{k_2 \cdot t}}$
- $K_3 = \frac{1 - \exp\left(-k_2 \cdot t \cdot \left(1 + \frac{k_D}{RQ}\right)\right)}{1 + \frac{k_D}{RQ}}$
- $K_4 = \frac{1 - \exp\left(-k_2 \cdot t \cdot \left(1 - \frac{k_D}{RQ}\right)\right)}{1 - \frac{k_D}{RQ} \cdot \exp\left(-k_2 \cdot t \cdot \left(1 - \frac{k_D}{RQ}\right)\right)}$
- $K_5 = \frac{1}{1 + \frac{1}{k_2 \cdot t} + \frac{k_D}{RQ}}$

A. Plug flow, co-current flow and variable gas concentration in air.
B. Complete mixed system with variable gas concentration in air.
C. Plug flow with constant gas concentration in air.
D. Plug flow, counter current flow and variable gas concentration in air.
E. Complete mixed system with constant gas concentration in air.

Question 10 **10 points** Save

The removal of carbondioxide by one cascade is independent on fall height.

- True
- False

Question 11 **10 points** Save

The composition of air is given in table. For the removal of methane from groundwater a water company uses cascade aeration. The aeration consists of 5 stages and the total falling height is 2 m. The concentration of methane in the raw water is 0,8 mg/l and after the first stage 0,54 mg/l.

Table ¿ composition of air (10°C, 101325 Pa).

Gas	Volume percentage [%]
N_2	78,084
O_2	20,948
Ar	0,934
CO_2	0,034
CH_4	0,00001

Calculate the equilibrium concentration of methane in water at a pressure of 101325 Pa and a temperature of 10°C.

- 2.96*10-4 mg/l
- 8.38*10-5 mg/l
- 2.96*10-6 mg/l
- 2.34*10-6 mg/l

Question 12 **10 points** Save

For the removal of methane from groundwater a water company uses cascade aeration. The aeration consists of 5 stages and the total falling height is 2 m. The concentration of methane in the raw water is 0,8 mg/l and after the first stage 0,54 mg/l.

Calculate the methane removal after 5 cascade stages.

- 0.86
- 0.33
- 0.39
- 0.96

Question 13 **10 points** Save

Assuming K= 0.33 and Kd is 0.034, calculate the value of k_2*t for only one cascade stage with the assumption that the RQ of a cascade stage is 0.4.

- 0.49
- 0.40
- 0.41
- 0.52

Question 14 **10 points** Save

In groundwater treatment aeration and gas transfer is needed to remove methane, carbon dioxide and hydrogen sulfide. Why need these gasses to be removed? Match the right explanation with the gasses.

Methane

- [-]
- [-] Carbon dioxide
- [-] Hydrogen sulfide

A. to avoid excessive dosing of chemicals during softening.
B. To prevent biological growth in filters.
C. For taste and odour.

Question 15 **10 points** Save

A cascade stage with a height of 30 cm has a gas removal efficiency of 15%. How many steps are necessary to remove at least 60%?

- 4
- 5
- 6

Question 16 **10 points** Save

What is approximately the RQ of a cascade?

- 0.4
- 11
- 90

Question 17 **10 points** Save

For which gasses is the cascade suitable? More answers can be right.

- Removal of chloroform.
- Addition of oxygen.
- Removal of carbon dioxide.
- Removal of methane.

Question 18 **10 points** Save

The application of a tower aerator can lead to precipitation of calcium carbonate.

- True
- False

Question 19 **10 points** Save

The retention time in a tower aerator is practically independent of the water flow.

- True
- False

Question 20 **10 points** Save

Is it necessary to back flush a tower aerator?

- Yes, this is necessary.
- No, this is not necessary.

This is only necessary if iron is present in groundwater.

Save Submit