Test Canvas

Add, modify, and remove questions. Select a question type from the Add Question drop-down list and click **Go** to add questions. Use Creation Settings to establish which default options, such as feedback and images, are available for question creation.

Add | Calculated Formula ▼ | GO | Creation Settings

Name	Adsorption
Description	Questions for chapter Adsorption of Drinking Water Treatment 1
Instructions	Modify

Question 1 ▼ **Multiple Answer**   **10 points**

Question

Dissolved organic compounds are removed by:
Answer

  Rapid sand filtration
  Dual media filtration
✔ Granular activated carbon filtration
✔ Powdered activated carbon
  Continuous filtration
✔ Pseudo moving bed filtration

Question 2 ▼ **Multiple Answer**   **10 points**

Question

Activated carbon is mainly used for the treatment of:

(More answers can be right).
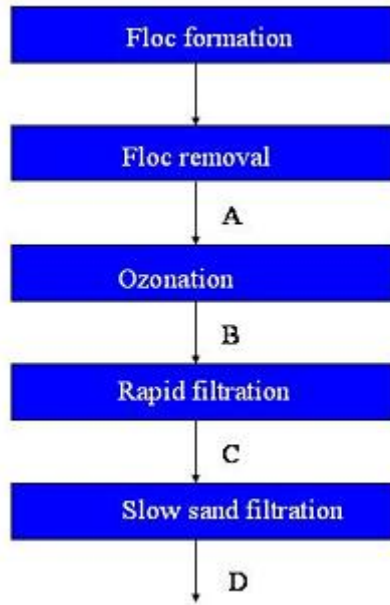**Answer**   ✔ Surface water
                        Ground water
                     ✔ River bank groundwater
                     ✔ Infiltration water

Correct Feedback   See section 4.1
Incorrect Feedback See section 4.1

Question 3 ▼ **Multiple Choice**   **10 points**

Question Indicate the position of Granular Activated Carbon filtration in a treatment train

Answer   A
                B
  ✓   C
                D

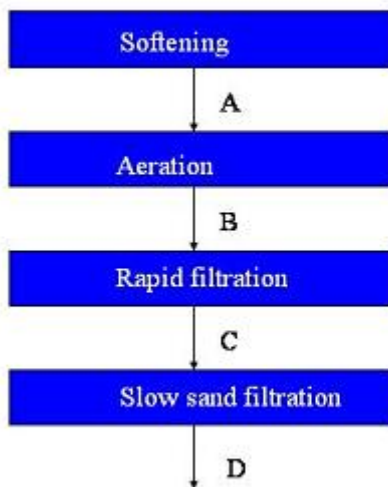| **Correct Feedback** | Granular Activated Carbon filtration is situated after rapid sand filtration to avoid rapid clog before slow sand filtration to avoid regrowth in the distribution network |
| **Incorrect Feedback** | Granular Activated Carbon filtration is situated after rapid sand filtration to avoid rapid clog before slow sand filtration to avoid regrowth in the distribution network |

Question 4 ▼   **Multiple Choice**   **10 points**

Question Indicate the position of Powdered Activated Carbon in a treatment train

Answer   A
  ✓   B
                C

D

Correct Feedback	Powdered Activated Carbon is situated before rapid sand filtration for removal of the PAC. situated before the aeration for intensive mixing and sufficient contact time.
Incorrect Feedback	Powdered Activated Carbon is situated before rapid sand filtration for removal of the PAC. situated before the aeration for intensive mixing and sufficient contact time.

Question 5 ▼ **True/False**   **10 points**

Question

True or False:

Trihalomethanes are toxic.

Answer   ✔ True

          False

Correct Feedback See section 4.1
Incorrect Feedback See section 4.1

Question 6 ▼ **Multiple Choice**   **10 points**

Question When the filter is clogged with suspended matter or biomass and the resistance is high, the granu filter bed is:

Answer   Regenerated.
                                                                   ✔ Back washed.
                                                                   Scraped
                                                                   Uploaded

Correct Feedback   See section 4.1
Incorrect Feedback   See section 4.1

Question 7 ▼ **Multiple Choice**   **10 points**

Question When the activated carbon is saturated with adsorbed organic matter the activated carbon is:

Answer   ✔

                                                                   Regenerated.

                                                                   Back washed.
                                                                   Scraped
                                                                   Uploaded

Correct Feedback   See section 4.1
Incorrect Feedback   See section 4.1

Question 8 ▼ **Multiple Choice**   **10 points**

Question What is the order of the regeneration frequency?

Answer   Hours
                                                                   Days
                                                                   Months
                                                                   ✔ Years

Correct Feedback	See section 4.1	
Incorrect Feedback	See section 4.1	

Question 9 ▼ **True/False**   **10 points**

Question

True or False?

The higher the concentration adsorbable matter in the bulk liquid, the smaller the loading capacity.

Answer   True

   ✔ False

Correct Feedback   The higher the concentration adsorbable matter in the bulk liquid, the higher the loadin

See section 4.2.

Incorrect Feedback The higher the concentration adsorbable matter in the bulk liquid, the higher the loadin

See section 4.2.

Question 10 ▼ **True/False**   **10 points**

Question

The relation between contact time and filter run time depends on the adsorption characteristics of the compo

True or False:

In general the filter run time increases exponentially with decreasing contact time.

Answer   True

   ✔ False

Correct Feedback   In general the filter run time increases exponentially with increasing contact time. See

Incorrect Feedback In general the filter run time increases exponentially with increasing contact time. See

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Question 11 ▼ **Multiple Choice**   **10 points**

Question

Assume a Granular activated carbon filter that treats a flow of 500 m^3/h and has a surface area of 50 m^2 ;

Determine the EBCT and the number of BV after a year of operation.

Answer   ✔ EBCT = 18 min. and BV = 29200

EBCT = 20 min. and BV = 1217

EBCT = 20 min. and BV = 29200

EBCT = 18 min. and BV = 1217

Correct Feedback   EBCT = V/Q = 50*3/500 = 0.3 h = 18 min.

BV = Q*T/V = 500*365*24/150 = 29200

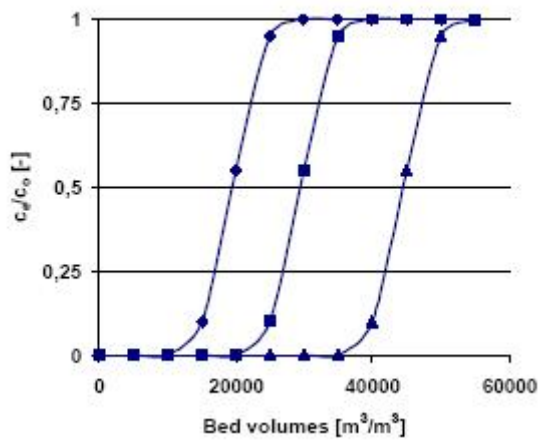**Incorrect Feedback**   EBCT = V/Q = 50*3/500 = 0.3 h = 18 min.

BV = Q.T/V = 500*365*24/150 = 29200

Question 12 ▼   **Matching**   **10 points**

Question In the figure 3 breakthrough curves are shown. One is for THM, one for Bentazon and one for tast which organic compound?

Answer

Match Question Items	Answer Items
B. - A.	A. Bentazon
A. - B.	B. THM
C. - C.	C. Taste

Correct Feedback	See figure 4.9
Incorrect Feedback	See figure 4.9

Question 13 ▼   **Multiple Choice**   **10 points**

Question

Assume a Granular Activated Carbon filter that has a run time of 29200 BV and is filled with 150 m^3 activat of 400 kg/m^3

What is the atrazin loading capacity of the carbon, assuming an influent concentration of 2.10^-3 mg/l and a breakthrough curve.

Answer
  58.4 g/kg
✓ 0.146 g/kg
  8.76 g/kg
  0.876 g/kg

Correct Feedback	Loading capacity = Q*T*c/(V*rho) = BV*c/rho = 29200*0.002/400 = 0.146 g/kg
Incorrect Feedback	Loading capacity = Q*T*c/(V*rho) = BV*c/rho = 29200*0.002/400 = 0.146 g/kg

Question 14 ▼   **Multiple Choice**   **10 points**

Question

Assume a Granular Activated carbon filter with the following characteristics:

qmax = 0.25 g/kg; c0 = 0,004 mg/l; EBCT = 12 min; k2 = 20/h; rho = 400 kg/m^3;

Determine the effluent concentration after 20000 BV

Answer   3.23*10^-3 mg/l

3.1*10^-3 mg/l
4*10^-3 mg/l
✓ 1.24*10^-3 mg/l

Correct Feedback   c0/ce = 1+exp(k2*EBCT*(1-BV*c0/(q*rho))) = 3.23; ce/c0 = 0.31; ce = 1.24 mg/l
Incorrect Feedback c0/ce = 1+exp(k2*EBCT*(1-BV*c0/(q*rho))) = 3.23; ce/c0 = 0.31; ce = 1.24 mg/l

Question 15 ▾   **Multiple Choice**   **10 points**

Question Determine from the figure for Chlorophenol K- and n- Freundlich constants
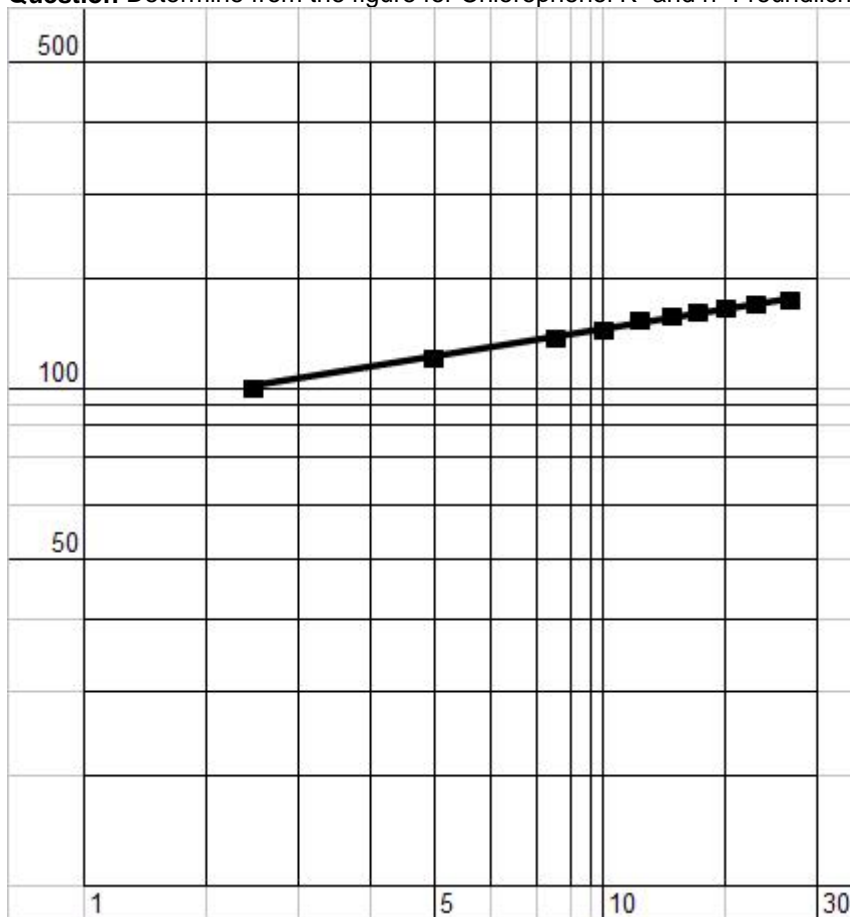
Answer   ✓ K=85 n=0.18
K=85 n=0.10
K=130 n=0.20
K=130 n=0.10

Correct Feedback   The freundlich constant K can be determined from the intersection of the graph with th
85.

qmax=Kc^n --> logq=logK+nlogc --> n=(logq-logK)/logc = (log170-log85)/log25=0.21.
Incorrect

The freundlich constant K can be determined from the intersection of the graph with th

Feedback   85.

qmax=Kc^n --> logq=logK+nlogc --> n=(logq-logK)/logc = (log170-log85)/log25=0.21.

Question 16 ▾   **Multiple Choice**   **10 points**

Question Two filters are placed in series at the "pseudo-moving-bed" system. The cleanest filter is:

Answer   The first filter

✔   The second filter

Sometimes the first filter, sometimes the second filter.
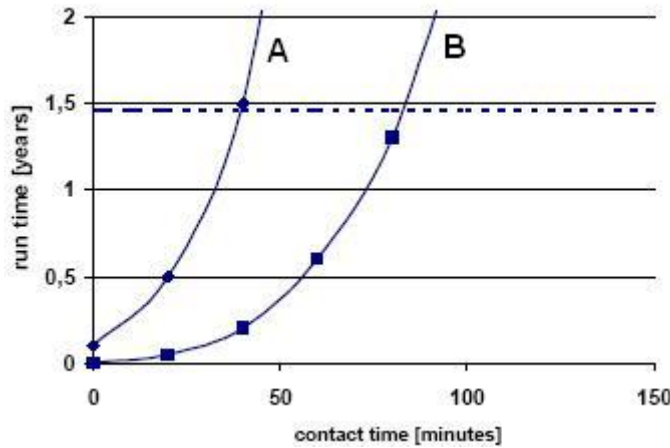
Correct Feedback   See figure 4.14
Incorrect Feedback   See figure 4.14

Question 17 ▾   **Multiple Choice**   **10 points**

Question In the figure is the influence of pre-ozonation on required contact time shown for biological activat
Which line shows the influence of pre-oxidising the organic matter by ozon?

Answer   ✔   A with ozon, B without ozon

B with ozon, A without ozon

Correct Feedback   See figure 4.16
Incorrect Feedback   See figure 4.16

Question 18 ▾   **True/False**   **10 points**

Question

Tue or False:

The organic matter that is adsorbed in winter will partially be decomposed biologically in summer.

Answer   ✔ True

False

Correct Feedback   See section 4.3.3.
Incorrect Feedback   See section 4.3.3.

Question 19 ▾   **Multiple Choice**   **10 points**

Question

Calculate for the dosing of powdered activated carbon the minimal dose in mg/m^3.

A water company is fasing a concentration of 0.5 µg/l atrazine in the surface water. With activated carbon the water comapny wants to reduce the concentration below th legislated concentration of 0.1 µg/l. Two option are evaluated:

a.   dosing of powdered activated carbon before the coagulation

b.   Granular Activated Carbon filtration after the rapid sand filters. GAC-filters sho be build.

The Freundlich constants for atrazine are:

$K \quad = \quad 20 \quad (g/kg)(m^3/g)^n$

$n \quad = \quad 0.77 \quad -$

$\rho \quad = \quad 400 \quad kg/m^3$

Answer

    0.017

    0.057

✓ 24

    7

Correct Feedback

$q = K * (C_{effluent})^n = 20 * (0.1*10^{-3})^{0.77} = 0.0166 \ g/kg$

$PAC_{min} = (0.5*10^{-3} - 0.1*10^{-3}) * 1000 / 0.0166 = 24.1 \ g/m^3$

Incorrect Feedback

$q = K * (C_{effluent})^n = 20 * (0.1*10^{-3})^{0.77} = 0.0166 \ g/kg$

$PAC_{min} = (0.5*10^{-3} - 0.1*10^{-3}) * 1000 / 0.0166 = 24.1 \ g/m^3$

Question 20 ▾ **Multiple Choice**   **10 points**

Question

Calculate for the Granular Activated Carbon filtration the minimal dose in g/m^3.

Answer

    0.017

    0.057

    1.7

✓ 8.7

Correct Feedback

$q = 20 * (0.5*10^{-3})^{0.77} = 0.0574 \ g/kg$

$W = c_o * 1000 / q = 0.5*10^{-3} * 1000 / 0.0574 = 8.7 \ g/m^3$

Incorrect Feedback

$q = 20 * (0.5*10^{-3})^{0.77} = 0.0574 \ g/kg$

$W = c_o * 1000 / q = 0.5*10^{-3} * 1000 / 0.0574 = 8.7 \ g/m^3$

Question 21 ▾ **Multiple Choice**   **10 points**

Question Which of the two pesticides is the most difficult to remove, regarding both the concentration as we
pesticide for the activated carbon.

The raw water of a surface water treatment plant contains 1.4 µg/l atrazin and 0.8 µ
diuron. The Freundlich-constants for diuron and atrazin are given in the table below.

Pesticide	K [(g/kg)·(m³/g)]	n [-]
Diuron	10	0.50
Atrazin	30	0.50

The regulated maximum concentration in the drinking water is 0.1 µg/l.

Answer

    Diuron

✔ Atrazin

Correct Feedback   The K-value of atrazin is 3x higher compared to diuron. This compensates the h
atrazin.

Incorrect Feedback   The K-value of atrazin is 3x higher compared to diuron. This compensates the h
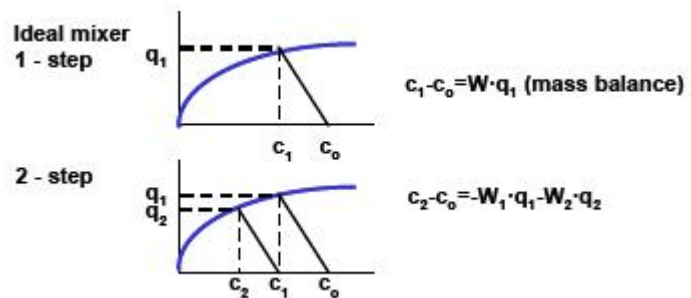atrazin.

Question 22 ▼   **Multiple Choice**   **10 points**
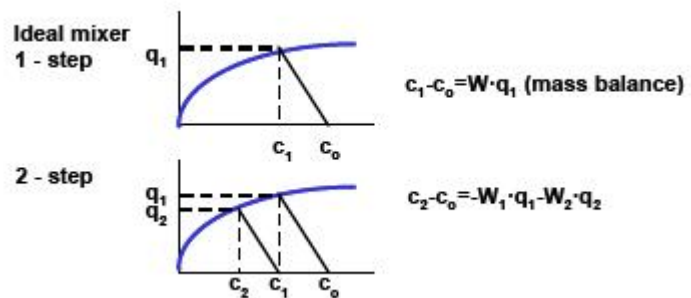
Question For two ideal mixers placed in series the loading capacity of the powdered carbon in the second ta
tank.

Answer

    higher

✔ lower

Correct Feedback

Incorrect Feedback

OK