

Topic J05 Microbes and outer influences, decontamination methods

To study: Tenacity of microbes, disinfection, sterilisation, bacterial endospores

Task 1: Influence of various factor to bacterial growth and survival

Task 1a: Influence of temperature to bacteria

Observe the results of an experiment. The bacteria in the first row were cultivated at various temperatures. The bacteria in the second row were cultivated at the same temperatures, but only for a limited time, and then they were removed to an optimum temperature. Write GROWTH – NO GROWTH and make a conclusion.

Temperature (°C)	20	30	40	50	60
First row (24 h)					
Second row (4 h, then 37 °C)					

Conclusion. (White what is sure. E. g. when lower survival limit is between 20 and 30 °C, we can say with sure that it does grow at 30 °C).

Given bacterium grows from _____ °C to _____ °C and is killed at ____ °C.

Task 1b: Influence of a disinfectant to bacteria

The bacteria were put into a solution of a disinfectant. Then they were removed and placed to an agar medium. Of course, the medium was already without disinfectant. Write GROWTH – NO GROWTH (or N – G).

Concentration	0.5 %	1 %	2 %	5 %
Result				

Conclusion: Minimal bactericidal concentration of a given disinfectant is _____

Task 1c: Influence of time combined with temperature.

We have similar test-tubes as in Task 1a, but there was always only limited time of exposition to extreme temperatures, and then a cultivation at optimum conditions followed. The time of exposition differed. Write GROWTH – NO GROWTH (or N – G) to the table.

Temperature (°C)	160				180			
Time (min)	10	20	30	60	10	20	30	60
Result								

Conclusion: The bacteria were killed in _____ min at _____ °C, or in ____ min at ____ °C.

Task 2: Practical using of a disinfectants

Task 2a: Choice of a proper disinfectant and way of its use

On the table, you have cards with examples of some situations, that may appear and when it is useful or necessary to make disinfection. On the table, there is also a photocopy of a manual concerning disinfectants. In the manual you would find a suitable disinfectant and suitable concentration and required time. Choose dilution of a disinfectant, if you should prepare one liter of it.

Description of situation (simplify it, do not re-write the card)				
Name of disinfectant				
Time (or data replacing it)				
Concentration of the agent				
How I would dilute it in practice				

Eventual notes

Task 2b: Evaluation of properties of several very important disinfectants

Although the specter of disinfectants is developing all the time, there are some agents used for decades. Find and write to the table classical use of some disinfectants. Add notes according to your teacher's help. Observe some of them in their commercial packaging.

Name	Group (type of stuff)	Practical use	Teacher's note
PAA (peracetic acid, „PERSTERIL“ in CZ)			
HYDROGEN PEROXIDE			
CHLORAMINE			
CHLORINE BLEACH (SODIUM HYPOCHLORITE)			
JODISOL			
JODONAL B			
AJATIN			
SEPTONEX			

Task 2c: Choice of a correct sterilisation method and way of its use

On your table, you have cards and examples of some situation that may appear, so that sterilisation should be performed. On your table, there is also photocopy of a part of regulations concerning decontamination methods in health care. Find a proper method and its use.

Description of situation				
Name of the method				
Time				
Temperature (radiation level)				
Eventual notes that teacher made to my choice				

Task 3: Checking up disinfection effectivity

Task 3a: Check-up of effectivity of a hot-air steriliser using bioindicators

In eight sites of a hot-air sterilizer, bioindicators were placed, and cultivated at usual conditions. Write, whether the bacterium does or does not grow.

Site	A	B	C	D	E	F	G	H
Growth								

Conclusion: It is – it is not possible to use this hot-air sterilizer.

Task 3b: Check-up of effectivity of a steam steriliser using bioindicators

In six sites of a steam sterilizer, bioindicators were placed, and cultivated at usual conditions. Write, whether the bacterium does or does not grow.

Site	A	B	C	D	E	F
Growth						

Conclusion: It is – it is not possible to use this steam sterilizer.

Task 3c: Check-up of disinfection results – bacteria in hospital environment

Read the results of cultivation of hospital environment swabs and write below:

Site						
Growth						

Task 3d: Orientation detection of traces of a disinfectant using your nose

For orientation survey, whether disinfection was performed, it is often sufficient to check using your nose; for this purpose, it is necessary to know how different disinfectants do smell.

Try to identify as many as possible of disinfectants.

Result:

1	2	3	4	5

I have identified correctly _____ of _____ disinfectants.

Check-up questions:

1. What times and temperatures should be used at hot air sterilisation?
2. There exists a procedure that is recommended as a good disinfection procedure in a surgical unit. Is it possible to use the same procedure in a TB hospital without checking if it is suitable?
3. Why decontamination of endoscopes is now called „higher step disinfection“ and not „sterilisation“ as before?
4. If it is given, that at 180 °C the sterilisation should durate 20 minutes, does it mean, that 20 min is sufficient for such sterilisation, or does it require more time? If more, then why?
5. What temperatures and times shloud be used at steam sterilisation?