MEASUREMENTS OF METABOLIC RATE

THE COMPENSATORY (DIFFERENTIAL) CALORIMETRY METHOD

Name: .....

Group:.....

Date: .....

1. Goal of the experiment: .....

.....

2. Mass *m* of the animal (in kilograms):

$m \pm \Delta m$ = ...

3. Amount of heat *Q* liberated by the animal, calculated on the basis of Kleiber's equation:

$$\log_{10}\{Q\} = 5.44 + 0.756 \log_{10}\{m\} \pm 0.05 = ...$$

Q = ...

Q_{min} = ... Q_{max} = ...

ΔQ = ...

$Q \pm \Delta Q$ = ...

4. Power of the animal (in watts):

P = ...

ΔP = ...

$P \pm \Delta P$ = ...

5. Your metabolic rate at rest:

a) in watts: .....

b) in kcal (Cal) per day: (1 joule = 0.239 cal): .....

c) your oxygen demand at rest during one minute: .....

6. Measurements of animal's power (the metabolic rate):
   a) resistance *R* of the heater:

      $R \pm \Delta R$ = ...

   b) measurements of the current intensity *i*:

succeeding steps of the measurement	current intensity *i* ..... unit	position of the indicator: left/right
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

   c) the current intensity at which the compensation of the animal power was attained:

      $i \pm \Delta i$ = ...

   d) experimental value of animal's power (the metabolic rate):

      $P \pm \Delta P$ = ...

Conclusions: .....

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MEASUREMENTS OF METABOLIC RATE

THE RESPIRATORY CALORIMETRY METHOD

Name: .....

Group:.....

Date: .....

1. Goal of the experiment: .....

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2. Mass *m* of the animal (in kilograms):

   $m \pm \Delta m$ = ...

3. Amount of heat *Q* liberated by the animal, calculated on the basis of Kleiber's equation:

   $$\log_{10}\{Q\} = 5.44 + 0.756 \log_{10}\{m\} \pm 0.05 = ...$$

   Q = ...

   Q_{min} = ... Q_{max} = ...

   ΔQ = ...

   $Q \pm \Delta Q$ = ...

4. Power *P* of the animal (in watts):

   P = ...

   ΔP = ...

   $P \pm \Delta P$ = ...

5. Calculations of the **safe time** of the experiment (oxygen concentration in the measuring chamber must not fall below 16%):
   a) volume of the measuring chamber: V = ...
   b) volume of oxygen in the chamber: .....
   c) amount of oxygen that can be consumed: .....
   d) energy equivalent of oxygen: .....
   e) time of consumption of oxygen (**the safe tame**) in minutes: .....

6. Your metabolic rate at rest:
   a) in watts: .....
   b) in kcal (Cal) per day: (1 joule = 0.239 cal): .....

7. Measurements of the oxygen consumption time.

   Volume of oxygen consumed $\Delta V_{oxygen} = (5.0 \pm 0.5)\ cm^3$.

ordinal number	time, s
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

8. Calculations of animal's power:
   a) mean value of the oxygen consumption time:

      $\bar{t} =$ .....

      standard deviation of the mean $s_{\bar{t}}$ = ...

      maximal error of the mean: $\Delta\bar{t} = 3s_{\bar{t}}$ = ...

   b) mean value of the oxygen consumption rate $\bar{v} \pm \Delta\bar{v}$ = ...

   c) animal's mean power (the metabolic rate):

      $\bar{P} \pm \Delta\bar{P}$ = ...

Conclusions: .....

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