

Name and Surname: **Edy Giovanna Moneta** Personal identifier: **10566963****Part 1. Student experiment**

<b>Product name:</b>	Insalata 3 gusti	
<b>Product description:</b>	Salad mix ( insalata riccica+invidia scarola+radicchio rosso) prewashed and ready to be eaten( note:the salad was on the expiration date)	
<b>Picture:</b>		
<b>Data:</b>		
<b>m</b> , mass (g):	250 g	
<b>V</b> , Free Volume (mL):	451 mL	
$y_{O_2}^{t_0}$ , volumetric concentration of oxygen at $t_0$ (% v/v):	0.21%	
$y_{O_2}^{t_1}$ , volumetric concentration of oxygen at $t_1$ (% v/v):	20.92%	
$y_{O_2}^{t_2}$ , volumetric concentration of oxygen at $t_2$ (% v/v):	13.58%	
$y_{CO_2}^{t_0}$ , volumetric concentration of carbon dioxide at $t_0$ (% v/v):	24.7%	
$y_{CO_2}^{t_1}$ , volumetric concentration of carbon dioxide at $t_1$ (% v/v):	0.9%	
$y_{CO_2}^{t_2}$ , volumetric concentration of carbon dioxide at $t_2$ (% v/v):	10.2%	
<b>Calculation:</b>		
$R_{O_2} = \frac{(y_{O_2}^{t_0} - y_{O_2}^{t_f}) V}{100 m (t_f - t_0)} = \frac{(20.92 - 13.58) 0.451}{100 \cdot 0.25 (3600)} = 36.77 \cdot 10^{-6} \left[ \frac{L}{Kg \cdot s} \right]$		
$R_{CO_2} = \frac{(y_{CO_2}^{t_f} - y_{CO_2}^{t_0}) V}{100 m (t_f - t_0)} = \frac{(10.2 - 0.9) 0.451}{100 \cdot 0.25 (3600)} = 46.60 \cdot 10^{-6} \left[ \frac{L}{Kg \cdot s} \right]$		
$RQ = \frac{[CO_2]}{[O_2]} = \frac{(20.92 - 13.58)}{(10.2 - 0.9)} = 1.267$		
<b>Comments:</b>	<p>calculation of free volume: applying the formula we calculated the total volume of the bag , then subtracted the volume occupied by the salad</p> $V_{tot} = W^3 \left( \frac{h}{\pi w} - 0.142(1 - 10^{\frac{h}{w}}) \right) V_{freevolume} = V_{tot} - V_{salad}$	

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## Part 2. TA experiments

## Experimental

## description:

1. fill up the containers (jar 1 & jar 3 with all plum, jar 2 with sliced one and jar 4 with salad)
2. measure the oxygen and carbon dioxide level in the room, and close the jar
3. wait one hour
4. measure the level of oxygen and carbon dioxide inside the jar

## Data:

Exp. n.	m (Kg)	V (L)		t <sub>0</sub> = 10:48	t <sub>1</sub> = 11:48
1	0.26	1	O <sub>2</sub> (%)	20.92%	20.26%
			CO <sub>2</sub> (%)	0.9%	1.1%
2	0.265	1	O <sub>2</sub> (%)	20.92%	19.35%
			CO <sub>2</sub> (%)	0.9%	3.2%
3	0.235	0.5	O <sub>2</sub> (%)	20.92%	19.09%
			CO <sub>2</sub> (%)	0.9%	3.4%
4	0.040	1	O <sub>2</sub> (%)	20.92%	19.84%
			CO <sub>2</sub> (%)	0.9%	1.4%

## Calculation:

	EXP 1	EXP 2	EXP 3	EXP 4
$R_{O_2} = \frac{(y_{O_2}^{t_0} - y_{O_2}^{t_1}) V}{100 m (t_f - t_0)}$	$= \frac{(20.92 - 20.26) 740 \cdot 10^{-3}}{100 \cdot 0.26 (3600)}$ = 0.005 $10^{-3}$	$= \frac{(20.92 - 19.35) 735 \cdot 10^{-3}}{100 \cdot 0.265 (3600)}$ = 0.012 $10^{-3}$	$= \frac{(20.92 - 19.09) 265 \cdot 10^{-3}}{100 \cdot 0.235 (3600)}$ = 0.0057 $10^{-3}$	$= \frac{(20.92 - 19.84) 729 \cdot 10^{-3}}{100 \cdot 0.04 (3600)}$ = 0.054 $10^{-3}$
$R_{CO_2} = \frac{(y_{CO_2}^{t_1} - y_{CO_2}^{t_0}) V}{100 m (t_f - t_0)}$	$= \frac{(1.1 - 0.9) 740 \cdot 10^{-3}}{100 \cdot 0.26 (3600)}$ = 0.0015 $10^{-3}$	$= \frac{(3.2 - 0.9) 735 \cdot 10^{-3}}{100 \cdot 0.265 (3600)}$ = 0.017 $10^{-3}$	$= \frac{(3.4 - 0.9) 265 \cdot 10^{-3}}{100 \cdot 0.235 (3600)}$ = 0.00783 $10^{-3}$	$= \frac{(1.4 - 0.9) 729 \cdot 10^{-3}}{100 \cdot 0.04 (3600)}$ = 0.025 $10^{-3}$
$RQ = \frac{[CO_2]}{[O_2]}$	$\frac{1.1 - 0.9}{20.92 - 20.26} = 0.303$	$\frac{3.4 - 0.9}{20.92 - 19.35} = \frac{2.3}{1.57} = 1.46$	$\frac{3.4 - 0.9}{20.92 - 19.09} = \frac{2.5}{1.83} = 1.46$	$\frac{1.4 - 0.9}{20.92 - 19.84} = \frac{0.5}{1.08} = 0.46$

## Comments:

All the free volumes had been calculated with the following formula:

$$V_{freevolume} = V_{tot} - \frac{W_{veg}}{\rho_{veg}}$$

Obtaining the following free volumes:

$$\text{jar}_1 = 740 \cdot 10^{-3}; \text{jar}_2 = 735 \cdot 10^{-3}; \text{jar}_3 = 265 \cdot 10^{-3}; \text{jar}_4 = 729 \cdot 10^{-3}$$

for plum has been done an approximation, putting its density equal to the water one.