Solutions for EXPERIMENTAL EXAMNINATION

BIOLOGY

1. [2.0 Points]
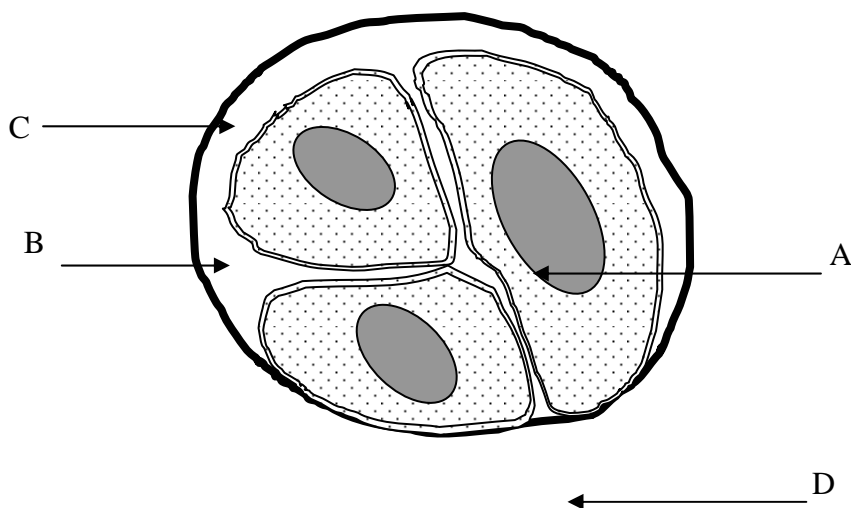
2. a. **(1.0 Point)**

The maximum amount of sugar in 250 g salak:

| 20/100 X 250 g | = | 50 g | (0.5 point) |

The maximum percentage of sugar content in salak in 1L solution of salak:

| 50g/1000 g X 100% | = | 5 % | (0.5 point) |

b. (**2.0 Points**)

The real amount of sugar cane added to 1 L of salak solution:

| 15/100 X 1,000 g | = | 150 g | (0.5 point) |

| 97/100 X 150 g | = | 145 g | (0.5 point) |

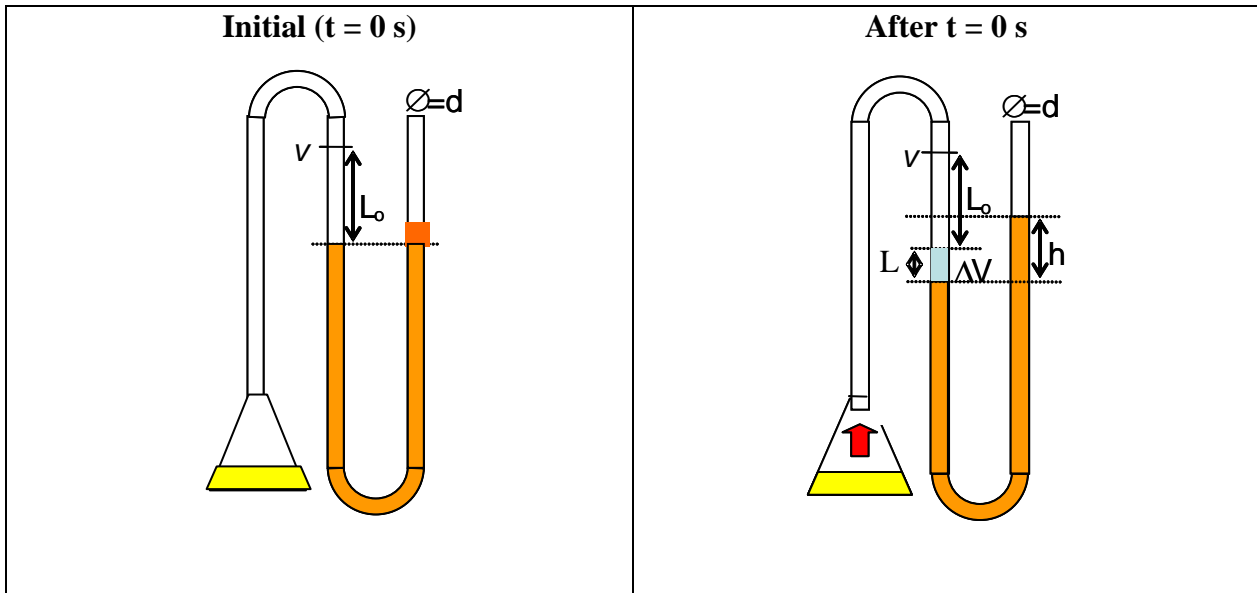Sugar content in the solution (maximum):

| 145 g + 50 g | = | 195 g | (0.5 point) |

Percentage of total sugar (maximum) in 1 L salak solution which is used for fermentation on this experiment:

| 195 g/1,000 g x 100 % | = | 19.5 % | (0.5 point) |

Physics

Solution:
Total Mark = 9.0 Points

<table>
<tr><td align="center">Initial (t = 0 s)</td><td align="center">After t = 0 s</td></tr>
<tr><td>

⌀=d
V
L_o

</td><td>

⌀=d
V
L_o
L ΔV
h

</td></tr>
</table>

Typical Experimental results:

1. **[0.0 Point]** Level of the palm oil when the level in right and left side is same. Depend on the experimental set up.
   31.0 cm

2. **[0.0 Point]** The initial level of the palm oil (t = 0s). Depend on student's experiment.
   $L_o = 21.0$ cm

3. **[1 Point]** Formula for initial volume: $V_{initial} = v + \{(\pi d^2/4)\,L_o\}$, L_o is the length between v and the initial level (t = 0 s)
   $V_{initial} = 0.000083$ m^3

4. **[0.5 Point]** Formula for the total gas pressure: $P = P_o + \rho gh$

   where: P_o = pressure of the atmosphere, ρ = density of the palm oil.
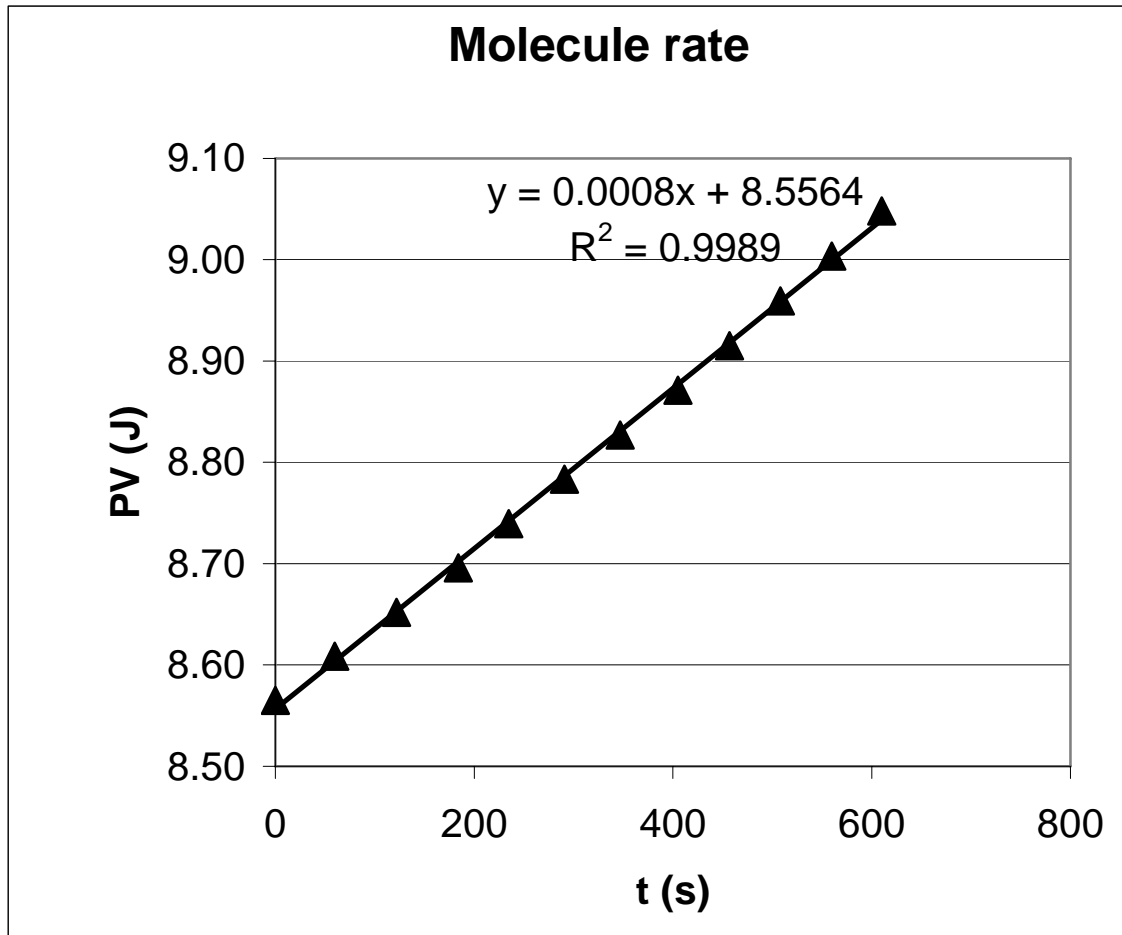
   [2 Points] Tabel of Physics Experiment

Start: 10:30

No.	h (cm) (left side)	T (s)	V (m3)	P(Pa)	PV(J)
0	21.0	0	0.0000831	1.030E+05	8.57
1	20.0	60	0.0000834	1.032E+05	8.61
2	19.0	122	0.0000837	1.034E+05	8.65
3	18.0	184	0.0000840	1.036E+05	8.70
4	17.0	235	0.0000842	1.037E+05	8.74
5	16.0	291	0.0000845	1.039E+05	8.78
6	15.0	347	0.0000848	1.041E+05	8.83
7	14.0	405	0.0000851	1.043E+05	8.87
8	13.0	457	0.0000854	1.044E+05	8.92
9	12.0	508	0.0000856	1.046E+05	8.96
10	11.0	560	0.0000859	1.048E+05	9.00
11	10.0	610	0.0000862	1.050E+05	9.05

5. **[1 Point]** A graph of Volume (m^3) vs. Time (s) in a graph-paper.

Volume rate

$y = 5E-09x + 8E-05$
$R^2 = 0.9991$
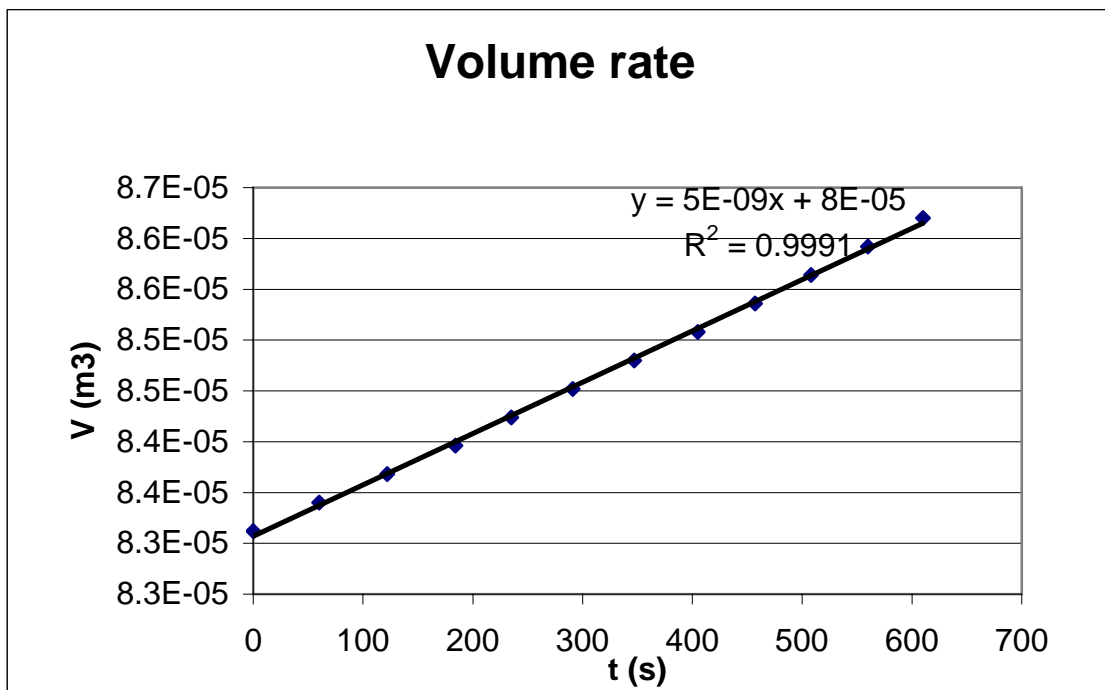
6. **[1 Point]** Idea of determining Volume rate of the gas, $\Delta V/\Delta t$, gradient of the graph of V vs. t.
7. **[0.5 Point]** Gas volume rate: $\Delta V/\Delta t = 5.05$ E-09 m^3/s.

8. **[1 Point]** A graph of PV (J) vs. time (s) in a graph-paper or any other suitable graph.

Molecule rate

$y = 0.0008x + 8.5564$
$R^2 = 0.9989$

(graph: PV (J) on y-axis from 8.50 to 9.10, t (s) on x-axis from 0 to 800)

9. **[1 Point]** Idea of determining the average gas production rate:
   Ideal gas: PV = nRT , from the graph PV vs. t we find the gradient m, therefore
   PV = mt,
   so, nRT = mt $\rightarrow \Delta n/\Delta t = m/RT$.

10. **[1 Point]** Average gas production rate: $\Delta n/\Delta t = 4.34$ E-07 mol/s.

Chemistry

Section I (3.4 points)

1. Observation sheet (0.9 point)

Test Tubes	Solution	Observation	Result	
			Yes	**No**
A	$Ca(OH)_2$	is there any white precipitate?		
B	$Ba(OH)_2$	is there any white precipitate?		
C	NaOH	is there any white precipitate?		

2. The white precipitate(s) is(are) probably………. ……..   **(0.5 point)**

3. The gas produced from fermented Salak fruit solution is probably ………   **(0.5 point)**

4. Reactions : . **(1.5 points)**

$Ba(OH)_2$ (aq) +   →

$Ca(OH)_2$ (aq) +   →

$NaOH$ (aq) +   →
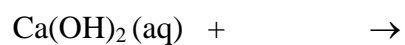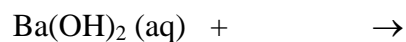
Section II (2.6 points)

1. Observation sheet: mark on the proper color (1.0 point)

Test Tube	Indicator	Color changed to		
D	Methyl orange	red	orange	yellow
E	Methyl red	red	orange	yellow
F	Bromothymol blue	yellow	green	blue
G	Phenolphthalein	no change	pink	red

2. The pH range of fermented Salak fruit solution is ………………………..   **(1.0 point)**

3. Based on the pH range of the fermented Salak fruit solution, what is the product of fermentation (choose the true one of A, B, or C)   **(0.6 point)**

   A. acid
   B. base
   C. salt