

10.012 Introduction to Biology 2D

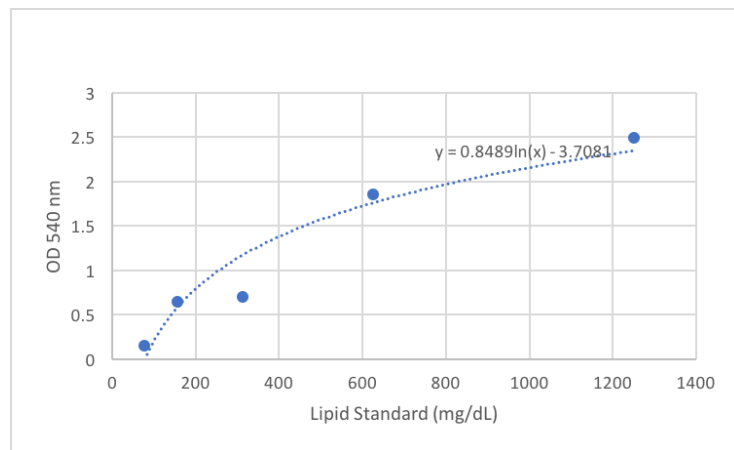
Report 2 F06 Team 06

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I. OBJECTIVES

To use the sulpho-phospho-vanillin method to determine and compare the lipid content in different algae samples. The sulpho-phospho-vanillin assay reacts with lipids to produce colorimetric products of different colour intensity. The products are analysed using a spectrophotometer and the results obtained will be matched against the graph below to determine the lipid content present in a particular sample.

II. EXPERIMENTAL RESULT



The sulpho-phospho-vanillin method will be administered on the positive controls (known lipid concentrations) to produce colorimetric products with different spectrophotometer readings. The numbers are then used with their respective concentrations to plot a logarithmic graph as shown above.

Reading 1 and 2:

Group	A1	A2	B1	B2	C1	C2	D1	D2	A1-D1	A2-D2
2	0.045	0.164	0.125	0.392	0.17	0.369	0.105	0.073	-0.06	0.091
4	0.064	0.739	0.121	0.45	0.127	0.384	0.047	0.077	0.017	0.662
6	0.045	0.77	0.215	0.285	0.432	0.247	0.047	0.073	-0.002	0.697
8	0.055	1.206	0.242	0.458	0.646	0.578	0.789	0.083	-0.734	1.123
10	0.049	2.577	0.157	0.329	0.127	0.275	0.051	0.089	-0.002	2.488

Fig. 1: A: Positive control, B: Sample 1, C: Sample 2, D: Negative control

Calculating OD values:

Group	(A1-D1) - (A2-D2)	Concentration
2	0.151	78
4	0.645	156
6	0.699	313
8	1.857	625
10	2.49	1250

$$\text{Ratio of B to C} = \frac{(B2-D2)-(B1-D1)}{(C2-D2)-(C1-D1)}$$

$$B : C = -1 : 149$$

III. ANALYSIS OF RESULT

Our calculated ratio is a negative number and upon analysis, it is highly possible that an experimental error had occur and it would be inaccurate to do an in-depth analysis using our group's results. We will be analysing group 2 results instead.

OD value of sample 1:

$$(B2 - D2) - (B1 - D1) = 0.299$$

From the graph obtained, OD value of 0.299 corresponds to a lipid standard of 112 mg/dL.

OD value of sample 2:

$$(C2 - D2) - (C1 - D1) = 0.231$$

From the graph obtained, OD value of 0.231 corresponds to a lipid standard of 103 mg/dL.

Sample one has a higher lipid content compared to sample two. Sample one and sample two are obtained from different strains of algae and this fact can be used to account for the difference.

When algal cells are exposed to light, it speeds up the process of reproduction and photosynthesis. This results in the conversion of carbon dioxide into sugar which will then be metabolised by algal cells to form lipids.

Different strains of algae require different conditions e.g. different light intensity, carbon dioxide concentration, temperature etc. to achieve optimal growth and photosynthesis rate. It is possible that both algae strains in sample one and two are subjected to the same environment which, in this case, appears to favour the growth of the strain of algae in sample one. This implies that sample one's algal cells have higher rate of photosynthesis and growth, thus explaining the higher lipid content in sample one compared to sample two.

Another possibility could be that one of the samples, in this case, sample one, has been biologically modified possibly for commercial purposes to divert the biosynthetic metabolism of the cells mainly to lipid synthesis. This accounts for the higher lipid content in sample one.

IV. REFERENCES

- McMahon, A., Lu, H., & Butovich, I.A. (2013, May). The Spectrophotometric Sulfo-Phospho-Vanillin Assessment of Total Lipids in Human Meibomian Gland Secretions.
- Hannon, M., Gimpel, J., Tran, M., Rasala, B., & Mayfield, S. (2010, September). Biofuels from algae: challenges and potential.