

Microbial physiology



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Ans 1a Ans b Answer b: Glucose is preferred over lactose for growth and metabolism, as it is clearly indicated in data the activity of β -galactosidase induced after 10 h of growth. At this time β -galactosidase will cleave lactose to make glucose. *E. coli* prefers glucose over lactose and start utilizing glucose in initial stage. Once glucose gets exhausted it switches over to lactose. Similarly in case of time v/s dry weight plots it indicates biphasic (diauxic growth) growth curve. There is steady increase in dry weight as soon as culture was inoculated and reached to plateau around 10h followed by lag phase for one hour and again there is increase in dry weight. This lag phase needed for organism to switch over to new carbon source (lactose).

Answer c:

Utilization of glucose and lactose is tightly regulated at gene level. All the genes which are necessary for lactose utilization are arranged in sequence called Lac operon which is regulated by catabolic repression. The following events happen during overall process.

1) In case of glucose is presence along with Lactose:

-High level of glucose leads to higher energy production and hence higher ATP and lower AMP. In this scenario there is no free cAMP which binds with CAP(activator protein which facilitates RNA polymerase binding to promoter of Lac operon)and hence there is no expression of the downstream genes.

2) In case of lactose and no glucose:

-In case of lactose, there is high level of cAMP which binds with CAP and induces the expression of Lac operon. Similarly allolactose binds to repressor protein and inhibits its binding to operator site leads to expression of lac operon.

Answer 2:

<https://assignbuster.com/microbial-physiology/>

Viable count in untreated bottle:

Aerobic plating: 3.45×10^5 cfu/ml

Anaerobic plating: 1.22×10^5 cfu/ml

Viable count in heat treated bottle

Aerobic plating: 2.15×10^5 cfu/ml

Anaerobic plating: 0 cfu/ml

b) Here if we closely look at the data and compare the viable count of aerobic culture it indicates reduction of 1.3×10^5 cfu/ml when bottle heated at 80C for 10 min. Similarly, for untreated bottle anaerobic viable count is 1.22×10^5 cfu/ml and if heating have similar effect than there will be complete killing of anaerobic bacteria and we will not get any viable count. Based on this experiments primary evidence says that there is similar effect of heating on both aerobic ad anaerobic bacteria.

C) To prove above mention hypothesis we have to perform heat survival curve for both the sample.

The water containing both aerobic and anaerobic bacteria will be heated at 80C for different interval (0min to 10min). Sample will be drown at each time interval and plated after dilution. After 48h of incubation colonies will be counted and a graph of cfu/ml V/s time will be plotted. From this plot one can calculate time required to reduce bacterial population by one log cycle. By comparing the results of aerobic and anaerobic bacterial killing one can prove the above mention hypothesis and determines effect of heating on killing of both types of bacteria.