

**Biochemical Engineering (CHE 311)**  
**Exercise Session 1**



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1) Please list the main differences between prokaryotic and eukaryotic production strains:

Parameter	<i>Escherichia coli</i>	<i>Bacillus subtilis</i>	<i>Saccharomyces cerevisiae</i>	Chinese hamster ovary (CHO) cells
Dimensions (L x W x H)				
Cell wall structure (Gram stain)				
Cell wall				
Spore formation				
Glycosylation of recombinant proteins				
Doubling time [h]				
DNA in nucleus				
Genome size in base pairs				
Typical product				
Product inside or outside of the cell				
Optimal growth temperature				

2) **Anaerobic growth**

How does an anaerobic cell gain energy? What kind of products are produced under anaerobic growth conditions in industry?

3) **Gene regulation**

Explain and give an example for the function of gene regulation models?

- a) Constitutive gene expression
- b) Gene induction
- c) Gene repression

4) Indicate on what base a production strain may be selected in industry.

5) What kind of methods do you know in order to assess the activity of cells?

6) What are membrane bound enzymes? Why are they important? What is the relation with membrane bound enzymes efficiencies and growth characteristic of cell? Case: *E. coli*

7a) What is 5.3.1.9 standing for?

7b) In what reaction is it involved?