BIO3124: Notes from Tuesday

207) after 5 hours, what is the n value? Ans: n=15

208) if u r not good with logs, use the formula given

Values u use should be in exponential phase.

g: time it takes to double.

209) g does not represent speed. Speed has 2 units (km/h). g has only one unit.

The shorter your g, the steeper your growth is going to be

μ= slope during the exponential phase

210) Preferred formula: μ= ln2/g where ln2= 0.69

These calculations are important: one of the question on quiz this week

211) K= represents how many g do I have in 1 hour? Example) if g = 30 min, K= 1

212) no more cell growth

Population is not happy anymore

Yg: used by industries. Ex) industry is interested in making yeast. They want maximum yield for minimum cost. Scientists find this value irrelevant

Ym: it is a measure of efficiency not cost. how efficiently the given substrate can be used.

213) death is also an exponential function.

When bacteria die, they don't necessarily observe a loss in mass. Get loss in mass if you kill the cell (cell lysis for ex.) – mass will drastically go down

214) Relative abundance: means u r comparing two things. U don't get an absolute number.

Viable count: method that tells the number of live organisms.

For medical purposes, the preferred one is viable count.

215) optical density: how much light doesn't go through?

Percent transmittance: tells how much light does go through.

216) it is just a machine. Doesn't know the difference between bacteria and my finger for example.

217) The greater the optical density, the lower the transmittance.

219) Hemacytometer has counting chamber which holds a fixed volume. To get the volume you need three things: length, width and height.

220) counting chamber is divided in squares.

222) will be on exam

225) dilution is synonymous to reduction.

Reduce conc. When u do dilution

Approximate: to grow bacteria u have to know the needs of it

Live= growing bacteria in the sample

227) Take sample- make the dilution.

Then, take the sample from each dilution put it in approximate media. After incubation,

Count the number of colonies u see.

228) universal mdedium= there is no one medium that satisfies everybody. No one size that fits all.

**Control of microbial growth**

**230)** First two categories: chemical and physical= kill microorganisms

Last category= mechanical elimination= remove microorganisms.

231) no measures of cleanliness

Definition of cleanliness: absence of debris or junk.

Sterility= absence of microorganisms.

233) contaminant: menas u have a micro-organism which is present of which the presence is unintentional ( think of it like an intruder).

234) Microbial load:The greater your load, the less efficient your treatment will be.

Environmental factors: Better at high temp.

Depending on pH you used, there is optimum pH for efficacy.

235) Glycocalyx and biofilms: will reduce the efficiency of the chemical treatment

Spores: extremely resistant to chemical treatment.

236) These viruses have lipid bilayer which makes them extremely sensitive to chemical treatment.

Gram negative bacteria more resistant given thaty they have added permeability barrier.

2 characteristics that make fungi more resistant are: thick cell wall and that they make spores.

Mycobacteria extremely resistant to chmical treatment because of the presence of mycolic acid.

237) Broad action specrum: something that works on a great variety of micro-organisms, the broader the better.

Powerful: no need to disinfect the glass

Low toxicity in humans because the purpose is to kill micro-organisms not humans.

Stable= shelf life. Want to keep in cupboard for a while.

Want chemicals to have two properties: hydrophobic and hydrophilic

Easy to spread – low surface tension

Most important characteristic: odorless or with a pleasant smell.

238) Modes of action of chemical agents

Last point on slide: will remove the electrons or functional groups like amino groups, hydroxyl groups which cause the activation of proteins.

240) should know the structure of phenol

Not used as an antiseptic much.

Very broad action spectrum. Effective on bactericide, fungicide and sporicidal.

Classified as germicide

Used now a days as  a disinfectant

242) alcohol= carbon chain with an OH group.

Favours broad action spectrum but don't affect spores and naked viruses.

243) Iodine only acts on proteins which have disulfide linkages.

Other halogens are much broader spectrum and remove electrons (strong oxidizing agents)

244) peroxides release free hydroxyl radicals.

246) no micro-organism ever developed resistance to silver.

Algaecide: good agent against algae.

247) They are exclusive disinfectants not used on living tissues.

Glutaraldehyde and fomaldehyde have a very broad action spectrum

248) soaps have a long hydrocarbon chain with sodium or potassium. Soaps are good for cleaning or removing.

249) soap and detergent are not the same thing.

Detergents are much more effective.

Detergent: have a nitrogen group that has four bonds and a positive charge

251) sterilization: eliminates all microbial life including vegetative cells and spores.

Clostridium: known human pathogen. Makes spores.

Thermophiles are not human pathogens.

252) need much higher temperature for dry heat

Much lower temp. and much shorter duration for humid heat.

Exam question: Why is humid heat at lower temperature than dry heat?

Answer: Water transmits heat much better than air.

253) kills spores from fungi

254) method that will reduce the number of microbes to an acceptable level

Difference between classical, HTST and UHT pasteurization: difference is the amount of time as function of temperature u use.

255) Autoclave: analogous to pressure cooker

1) heat

2) humidity

3) pressure: operates under high pressure

256) Pasteur oven:

Much higher temp. , much longer exposure

Not used for pharmeutical processes. It destroys them

Incineration: try to destroy what u r trying to sterilize

At much higher temp.

257) TDT varies according to what temp. u used, which micro-organism u used and what condition is it in

DRT value: Amount of time u require to reduce your population by a factor of 10.

258) first graph: inverse of what u saw in bacterial growth

Second graph: shown on a log scale. Slope is negative for a death curve.

Should know the number of established standards.

259) k- rate at which something is dying.

Formula given on slide is similar to the one we used in growth.

First, calculate the inactivation factor always.

260) k has to be a negative value. If you get a positive value for k after doing calculation, u r doing something wrong.

Note: all the calculations done this week are super important. Need to know them for midterm and final exam.