Microbiology Lab Experiment Changes

Experiment #: Experiments 5 – 2, 3, 7, 11, 12, 14, 16, 18

Title: Biochemical Activities of Microorganisms

Take Home Lesson: Know this chart.

Test	Substrate	Type of Enzyme	Enzymes Involved	Product	Positive Test Result
Starch	starch	extracellular / exoenzyme	amylase	glucose	clear zone around bacterial growth after addition of iodine
Neutral Red Fat Agar	lipid (fat)	extra / exo	lipases	glycerol + fatty acids	red color in medium under fat drop
Gelatin	gelatin	extra / exo	gelatinase	amino acids	liquefaction of gelatin
Carbohydrate Fermentation: Glucose, Lactose, Mannitol	Glucose, Lactose (glu-gal), Mannitol	intracellular / endoenzyme	glycolysis / fermentation	pyruvic acid (possibly others)	red to yellow with or without gas (CO_2)
Indole	tryptophan	intra / endo	tryptophanase	indole	red color after adding Kovac's reagent
Methyl Red	glucose	intra / endo	variable	mixed acids	methyl red stays red
Voges / Proskauer (VP)	glucose	intra / endo	N/A	acetylmethyl carbinol	red / pink color after addition of alpha naphthol + KOH
Citrate	Citrate; Ammonium phosphate - $(NH_4)H_2PO_4$	intracellular	Citrate permease; N/A	N/A; NH_3 or NH_4OH	Citrate permease allows cell to absorb citrate. Citrate is only C source thus allowing bacteria to grow. As they grow, they use $(NH_4)H_2PO_4$ and pH increases. Green tube turns to blue.
Hydrogen Sulfide (H_2S)	cysteine or inorganic sulfur compounds	intra / endo	cysteine desulfurase or thiosulfate reductase	H_2S gas (reacts with $FeSO_4 \rightarrow$ FeS black ppt)	black precipitate
Urease	urea	intra / endo	urease	ammonia	fuchsia color

You will also want to include which organisms were positive or negative and make drawings of positive test results. Although you do not need to memorize the biochemical reactions involved, you should look at those reactions and see how the reagents react with products to produce the test results.