Bio 212 LAB - Environmental Influences on Microbial Growth, pH, Temp, and Osmotic Pressure Assignment Instructions and Questions There are three chapters in this unit which are grouped together to elucidate how environmental or growing conditions can affect how microorganisms grow if their conditions are varied. These chapters are temperature, pH, and osmotic pressure effects on growth. You will need to use the lab book for some background information and definitions as well as the worksheet provided (also posted in the Lab Notes on Canvas). You will be making three graphs for this assignment and then use them to answer questions. The data you will be graphing is derived from individual test tubes filled with microorganisms grown in different pH’s, Temps, etc. Each tube is measured on a Spectrophotometer and the % T is recorded. By doing this it is possible to see which organism grows best or least in the different conditions. Please refer to the posted Lab notes and your Lab book for an explanation on this. Answer all the questions for full credit, graphs alone are not sufficient. 1) Using the worksheet please convert the values for %T to O.D. in each column for the Temperature and pH data. You then will use the O.D. values only to make column graphs with the excel program. Remember that O.D. = 2- log %T . So first take log %T ……..and then 2 minus that number for each. Once you convert these you can make the graphs on the excel program, which all computers will have. Note: on the worksheet “ Vis Read” means visual reading, referring to the turbidity of the tubes that we insert into the spectrophotometer to get the %T values. Therefore 1+ is slightly cloudy and 3+ is very cloudy, you don’t need to use these here however. Follow the directions below carefully so your graphs come out correctly. 2) To make the graphs (for those unfamiliar), open Excel and a grid will appear with numbers going down on the left (rows) and letters across the top (columns). Please always leave cell 1A blank and then (if you are doing the pH graph) write in the names of the organisms across the top in 1B, 1C, 1D, 1E and the pH values down the left side in 2A, 3A, 4A, 5A, etc,. After this simply fill in the O.D. values in the corresponding cells beneath each organism name. DO NOT put % T or “Vis Read” values on the graph and do not add extra row or columns. Click on (new) sheet 2 below for a fresh grid to do the Temperature and Osmotic Pressure graph similarly. The Osmotic Pressure graph does not require conversions, you just graph the qualitative values provided. Once you have input all the data, please highlight the whole set careful not to exceed the area of the data at all. Then click on “Insert”……then “chart” (on new version software, or chart wizard for older versions) , select “Column” for the type of graph and then you will see your graph appear. 3) Answer the following questions using the graphs. For the pH data………please indicate which organism grows best at pH 3, 5, 7, 8, 9, 10, what are their O.D. values?? Which ones prefer the neutral range? How do you know this from looking at the graph? i.e. what is the correlation of O.D. to the organisms growth? Please define Acidophile and Alkalophile. Which of the organisms are in these categories? Very few organisms tolerate the extreme pH so man learned hundreds of years ago to preserve food with vinegar (acetic acid). Give some examples of these and what else can be done with vinegar to control microbes? 4) For the Temperature data……. Which organism tolerates the warmer temperature and which one tolerates colder temperatures. Which grows best at room temp. and at 38?? Please define Thermophile, psychrophile and mesophile. Which category do most of the infectious bacteria belong in? (hint: what is body temp?). Where can you find Thermophiles in the environment? How about Psychrophiles? 5) For the Osmotic Pressure data…… First define Hypotonic, Isotonic and Hypertonic . Consider that isotonic for people is 0.9% saline, then which organism grows the best in super hypertonic conditions and which tolerates the moderately hypertonic condition? Which ones will grow in hypotonic conditions? What is a Halophile (define) and which organism is this? Where can you specifically find these in the environment? Define Osmophile as well. Finally, because of the osmotic pressure barrier created by hypertonic solutions or conditions, man has used salt as preservatives for ages. Please give a few examples of some of these.