Name_____Period_____Assignment Number_____

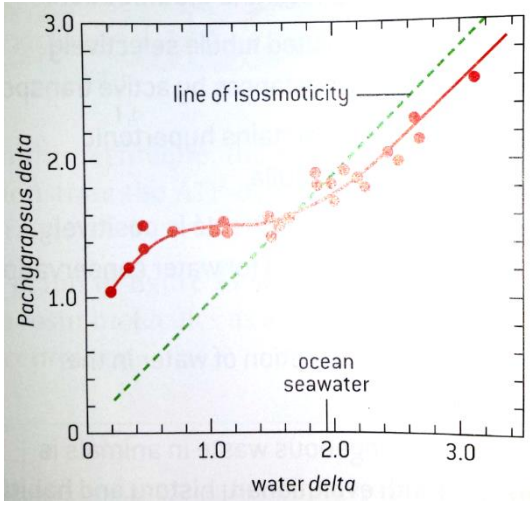
Data Analysis: Osmoregulation

Necessary background knowledge:

1) Osmosis (Question #11 Lecture)
2) Permeability of plasma membrane (Question #'s 11 and 12 Lecture)
3) Active and passive transport
4) Role of ATP (Question #5 Lecture)

The striped shore crab *Pachygrapsus crassipes* is found on rocky shores over the west coast of North and Central America as well as in Korea and Japan. *P. crassipes* is often exposed to dilute salinities in tide pools and freshwater rivulets, but it only rarely encounters salt concentrations much higher than that of the ocean. Samples of crabs were placed in water concentrations of varying osmolarity and samples of blood were taken to determine osmolarity of the blood. In this experiment, the unit of osmolarity is measured in units based on freezing point depression. When solutes are added to water they disrupt hydrogen bonding. Freezing requires additional hydrogen bonding so adding solute lowers the freezing point. 2 delta is equivalent to about 100% ocean seawater, 0.2 delta is equivalent to about 10% ocean seawater, and 3.4 delta is equivalent to about 170% seawater.

1) Explain why adding solutes decreases the temperature at which water freezes.



2) What does water delta measure directly?

3) What does water delta measure indirectly?

4) Determine the solute concentration of crab blood at which the concentration of surrounding water is 1 delta.

5) Determine the range over which *P. crassipes* is able to keep its blood solute concentration fairly stable.

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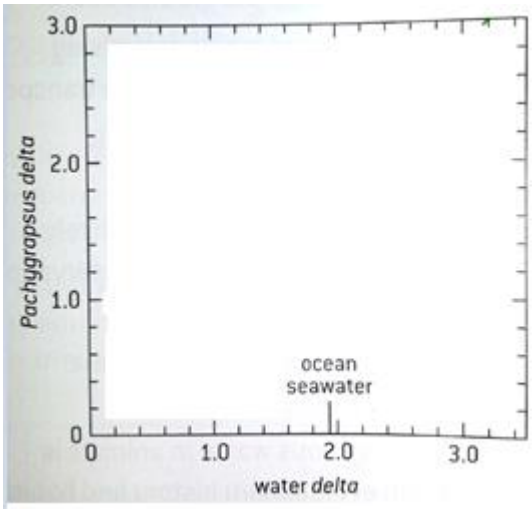
6) Predict what the graph would look like if *P. crassipes* was not able to osmoregulate (use the graph to the right).

7) Justify your prediction. Justifications have 3 components: 1) theory or established knowledge, 2) data from analysis related to the theory or knowledge, and 3) an explanation of the HOW the data supports the theory or knowledge.



8) Hypothesize why *P. crassipes* doesn't osmoregulate well above 2.0 delta or below 0.2 delta.