2nd European Union Science Olympiad

in Groningen, Netherlands

TASK A ANSWER SHEET

Task A

Investigation of Hexokinase Activity – Answer sheet

1. Make the two graphs described above (chemoluminescence vs time and chemoluminescencse vs ATP conc) on the supplied graphing paper. ***27 Marks***

2. What is the function of the solution pH 12? Pick the 2 right answers. ***3 Marks***
   - ☐ To stop the reaction
   - ☐ Hydrolysis of ATP
   - ☐ Inactivation of the enzyme
   - ☐ To activate the luciferin
   - ☐ To activate the hexokinase

3. What is the most likely explanation for the method of inhibition of hexokinase by 6-fluoro-6-deoxy-D-glucose? Pick the 2 right answers. ***3 Marks***
   - ☐ The structural similarity between glucose and inhibitor.
   - ☐ Inhibitor decreases the temperature of the reaction mixture.
   - ☐ Inhibitor increases the temperature of the reaction mixture.
   - ☐ The presence of the polar fluor atom.
   - ☐ The inhibitor inhibits the oxidation of the luceferin.

4. Use your standard ATP curve to measure the amount of ATP consumed during each hexokinase catalysed reaction and hence the amount of glucose that is phosphorylated. Using this data, you can calculate the initial specific hexokinase activity expressed as nmol ATP per minute consumed / mg hexokinase. (1nmol = 10^{-9} mol = 0.000000001 mol) ***9 Marks***

5. What else can you conclude from your results about the inhibition of hexokinase by the inhibitor 6-fluoro-6-deoxy-D-glucose and about the effect of enzyme concentration on reaction speed? To answer this question, compare the 4 graphs of the results of your experiments. ***8 Marks***