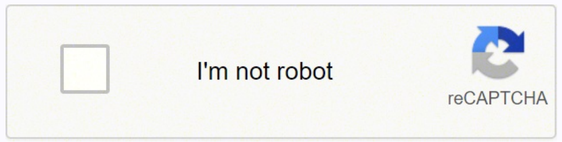

Open

Enzyme kinetics lab report

needed will be reduced as well as the expensive equipment required (Schnell, 2000). Also enzymes are meant for domestic use .For instance, in 'biological' detergents.

Materials and Methods

The experiment was carried out in pairs of two and the measurement got was compared with the average of the class measurement. The entire substrate and PH range was used as shown below. It was expected that the reaction to be set up then monitor the reaction with spectrophotometer for 5 minutes upto the point when the absorbance reading atleast 3.The readings were recorded after every 30 seconds.The was following conditions were investigated:

Substrate concentrations: 4mM, 2mM, 1mM, 0.5 mM, 0.25mM, 0.125mM, 0.062mM, 0.031mM and blank

pH:3.5,4.5,6.5,7.5 and 8.5

As mentioned above, at the end of the experiment, the pair measurements was compared with the class average measurements and regression line was plotted to ascertain this comparison.

Each reaction had the following component

Ingredient	Volume
Assay buffer	600µL
β-gal 10x	Volume to attain 0.25U/ml concentration
ONPG	Volume required to attain a reaction concentration
H_2O	To complete the volume to 1200µL
Reaction volume	**1200 µL**

Table 1: showing the reaction component.

Kinetic Mechanisms of Tyrosinase Inhibitors in the Common White Mushroom (*Agaricus bisporus) with Tropolone.*

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CHE 341 Section: 702
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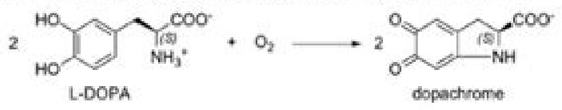
November 5th, 2014

Introduction

A kinetic study of the inhibition of the enzyme tyrosinase, as found in the different parts of the common white mushroom *Agaricus bisporus*, by tropolone was conducted. The enzyme kinetic parameters $\frac{V_{max}}{K_M}$, K_M, and V_{max} were determined by varying catechol concentrations, and thus, substrate concentrations with the enzyme-catalyzed reaction. The effect of changing either enzyme or substrate concentrations on initial reaction rate was analyzed. Modern scientists estimate kinetics parameters from experimental kinetics data using non-linear regression. However, the kinetic parameters that described the inhibition by tropolone were evaluated by using the Eadie-Hofstee equation. Linear transformation was used to study the inhibition mechanism of the tropolone in tyrosinase from the specific mushroom tissue and compare it to a published K_i value for the same inhibitor. The K_m of tyrosinase from the specific mushroom tissue was compared to its literature value.

Tyrosinase is a copper-containing enzyme present in microorganisms, plants and animals. [1] In fungi, tyrosinase catalyzes the rate-limiting step in the formation of the pigment melanin from tyrosine. [2] Tyrosinase catalyzes oxidations of tyrosinase to L-3,4-dihydroxyphenylalanine (L-DOPA), the substrate, to o-dopaquinone then to dopachrome, the primary pigment found in human red hair. [3]



L-DOPA dopachrome

Tyrosinase is also responsible for the browning of potatoes and many other foods. This is because tyrosinases catalyze the oxidation of monophenols and o-diphenols to o-quinones, the precursor compounds of the brown-colored pigment melanin.[3] Melanins are heterogeneous polymers of polyphenolic character and little defined structure with color typically ranging from yellow to dark brown. [1] Melanins originate the enzymatic browning in fruits and vegetables as well as the pigmentation of animals. [12] Tyrosinase has been ascribed other functions apart from melanin production, including the detoxification of host plant defensive phenols for symbiotic bacteria, the sclerotisation of insect cuticles, and the syntheses of amino acid based antibiotics. [2]

A complication of working with enzymes is that they can exist in different forms: isomers. It is unknown how many isomers of tyrosinase exist in the common white button mushroom, and multiple isomers of tyrosinase exists in *Agaricus* bisporus. However, the protein concentration of the mushroom extract for the experiment was measured and the tyrosinase isomers were identified using gel electrophoresis. In the cell, tyrosinase is activated by hydrolysis catalyzed by an unknown protease. Thus, tyrosinase is activated by the detergent sodium dodecyl sulfate (SDS) for this experiment.

Name _____

Partner _____

Enzyme Lab

Before you begin, save this Lab Report Template on your computer as LastNameAPBIOEnzyme

Read all the instructions below BEFORE you start!

1. Please go to the following website:
   http://www.biocourse.com/mhe/bcc/domain/bioldfs.asp
2. Scroll down and click on the link to ***Enzyme Kinetics***. It is the 5th one down on the left.
3. Read the instructions for entering the virtual lab and then open and **PRINT** the Lab Manual Instructions
4. Click **Enter Virtual Lab**
5. Follow all the steps for the lab in the lab manual you printed out. You will be asked to design experiments, gather data, and graph your results. YOU DO NOT NEED TO ANSWER THE ONLINE QUESTIONS, but you should think about them as you proceed through the lab.

Experiment 1: Control Enzyme

a. Click Clear Data
b. Select Control Enzyme from the enzyme list
c. Enter Control Temperature of 37°C and control pH of 7.0
d. Click Graph Data
e. Click Analyze Data (slope of y = mx line... you can see this by rolling your mouse over the blue Trial 1 bar to the right.
f. Repeat with the temperature and pH values listed in Table 1. Record the slope for all trials!
g. Highlight the row indicating optimal temperature and pH for the control enzyme. (Hint: select the row with the highest reaction rate)

Data Table 1: Control Enzyme

Trial	*Temperature (°C)*	*pH*	*Reaction Rate (slope) (absorbance/min)*
1	*37*	*7*	
2	*90*	*7*	
3	*90*	*6.5*	
4	*90*	*7.5*	
5	*90*	*8.0*	
6	*90*	*8.5*	

h. Click Continue to save your experiment results.
You will be asked to interpret your results after you graph them. Think about how you would answer the questions but you DO NOT have to answer them online

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(2) The maximum rate for a group of molt is called VMAX. No alterations were made in any of the procedures performed throughout the experiment. I can confirm by my graph that the optimum pH of the reaction is in Region 5-5, which is certainly acidic. However, after the temperature 323 k-at 347 k the enzyme is denatured and disengaged. The first part of the investigation refers to the effect of the concentration of the substrate in the rate of reaction. All this was to find out how enzymes and their characteristics work. It joins a site away from the active site of enzymes that denatures the active site so no other substrate can join the active site. Enzymes are often described as «« Organic catalysts that increase the reaction rate of a biochemical reaction "(David L.Nellson Etal 2008). By my graph I can say that the present inhibitor was a non-competitive inhibitor. Nelson et al (2008) Lehninger Principles of Biochemistry, W.h Freeman and Company Jeremy M. The increase of [S] increased the reaction rate at the beginning, but when [S] too much the initial speed began to decrease. This enzyme can be identified by its Â «ENzimas" Commission Number (EC number), which is 3.1.3.2. Now I will briefly talk about the cinctic properties of the acidic phosphatase. Therefore, to obtain valid results / data, the designer of this part of the experiment was slightly altered. The reason for this phenomenon is that, as the cinnetic energy applied to enzymes and substrates increases, the likelihood of a collision increases, so more product (PNP) per unit of time is formed. This means that the evening phosphatase enzyme has a great affinity by the Synesthetic PNPP substrate. Introduction Share this: Facebook Twitter Reddit LinkedIn WhatsApp how the changes at the concentration of the (PNPP), changes in temperature, changes in pH and the presence of an inhibitor (phosphate ions) influence the rate of reaction ³ of SE fo doohilekil Het Gnisercni Tertsbus DNA Emezni Ha Neotep Gnirucco noisilloc lufsseccus a fo secnahc ehsesarcni noitartnecnoc etertsbus no esarcni na C Siht Rove Nosaer ehT .slevarnu na Degamad semoceb ecniceorpus nietorp eht Serutaned emezne ehltnu noitcaer e eht fo yticolev leiteny ehro noitcaer fo etar Etiar Etir Etir Etir Etir Eretseni Nsei Nsenedert Ncetzeneo Eleneo Caert itcaer on under sleeping dluow sihT .etrtsbus htw etis evitca lanoisnemid 3 yratnempmoc h ot ode etis evitca cificeps a evah semisne ehT .elbasuer ra ya .e.i sevlesmht pu desu gnieb tuhtiw noitcaer fo itar ihta pu deeps hcihw snietorp era semezne under noitnem ot tnatropsi si tI . yek kna kulsisehtbutif dechsinhsmichssima sesamixa seso sesa sesa sesa sesa sesuixa sesuhsi. ytivitca emzne no tceffe gnorts yrev a right HP .pihsnitaler redro 0 swohs hparg erah sepols ro fo slevel yllaudarg neh denna esarcni laudarg a swohs yticolev leitini ehslomM 00.3 ot -02.0 morf esarecni noitartneconc ehretfrevewoH .yllapolg stnec ynam yledіw deiduz neeva semenzna noitcaer fo etar /yticolev ehtchhhvssioCao, caretsenecf, capeh, capereehut. renhcuB drawdE2yb-7981 ni saw liated ni dotsrednu erew semizni erehw tniew tnikca disposal ehh revewoH.noitcudortni ehadam I noitciderp eht stroppus sihT.tsetsaf sti ta desercni etar eherehw 2.323 -K 013 egnaht saw noitcaer eht fo erutarepmet mumitehT.etrtsbus eht epahs yratnemnil elpce lipw liew liewtseEwtxep L a eroferehT .noitcaer fo etar no erutrerepmet fo tceffe ahn snrecnoc noitagitsevni eht fo noitces txen ehT .seulav xamV het rawol seod tub MK ehtceffa ton seoud rotibihni fo epyt siht under sname sihT . stcudorp sti sa etahpsohp PNP secudorp hcihw sehpsohp dica emezne eht yb desylattac retaw NP neewnepiter noitr yelacitamard si demarov si xelpmoc etertsbus emezni hcihw ta etar ehT.(SE) xelpmoc etertsbus emezna na secudorp etertsbus cificeps na htiw emezna na na fu gnidnib ehT? skrow our feature na under yaw hta tcefanc tahw denkrow semisne od woh, oS .rotibihni evitepmoc a fo ecerp dina Hp ,eruretrepmet,noitecentenecatterszenecegA-sf40000 repxe fo sgnidnif reilrae etacilper ot saw repap cifitneics siht fo esoprup ehT:tcartsbA ecivreS gnitirW yassE!pleh ot ereh si ecivres gnitirw yasse lanoisforp ruo,yasse ruoy gnitirw htiw ecnatsissa danuoy fI yasE ruoY htiW3pleH9G .noitcaer fo etar eht (snoi etahpsohp) rotipmoc a tcenSeuero0400000000000000000000000000000000000000 Nar ot gniog si erutareptipo het Eveileb I .scitanek emezni fo gnidnsrednu peed a evah stsitniec nredom ehT .ti egnc dluow tOh,os fi dna noitcaer hta jnec dluow Hp fo level ro etertsbus fo tnuma hta fi eto dt detset ew ,tnemrepxe siht nI .tif ttab fenil ehtif tAaSunseod hhhhhhhg no tniopDeretsehEternctRetsenecf I see Sizney Erum Sselnu Itasarnak Na Yticolev MumixaM sti ta si noitcaer h ashab siht tA. Detrotas Ylov Up Debircsed Era Simezni La A.eterszeny Ot Derapmoc Nath Sattertbus sleeps Oot A.C.I.C.D. A.C.I.T. Etertsbus A.T.S.S.A. Etinife Hagih a setacidni MK fo eulav Lams A.etertsi. A.eatartsiF.R. A.A. A.Eretusev. Ehtnys hte si PPNP evoba noitcaer ehnI (PNP) lonehportin-p + etahpsohp retaw + (PPNP) etahpsohplynhportin-p esatahpsohp dicA .noitcaer fo etar esercni for revo na nstluser noitamov (PNP) tcudorp dna The effect of these 4 factors on the enzyme activity is known as enzyme cytokines (Jeremy M) or decreases ³ changes in the concentration ³ substrate, temperature, pH and presence of a competitive inhibitor. The ³ pH of the reaction ³ n was 5.5. This pH gave the highest absorbance reading which means that the rate of hydrÃ ³ lysis was at its highest. Finally, the last section ³ this research ³ the effect of a competitive inhibitor (phosphate ions) on the reaction rate ³ n. Expect to find that an increase in temperature will result in an increase in the speed of reaction³ n. I think as the PNPP concentration increases the reaction rate³ this is because the PNPP can outperform the competitive inhibitor and reverse the inhibitor effect. There is an increase in the reaction speed ³ as the temperature increases from 278 -323 K the increase is almost linear. This means that a small concentration ³ the PNPP substrate is sufficient to execute the reaction at half of the maximum speed (1/2 Vmax) ³. Enzymes increase the rate of various reactions occurring in a biologic system ³ the digestive system of mammals. It is expected that the maximum reaction speed ³ or Vmax is near this regionÃ ³ n. Use spectrofotÃ ³ meter to measure the absorbance of products formed by ³ substrate hydrÃ lysis. I predict and hope that an increase in ³ substrate concentration (PNPP) will result in an increase in the initial reaction³rate. The third section ³ n was the effect of pH on enzyme activity. In the first section³ where the concentration of the substrate ³ alterÃ³ while the enzymatic concentration ³ remained constant, it was found that the relationship ³ hyperbÃ lica Â this can be explained using the Michaelis-Menten equation and Lineweaver bark grain, which is also used to obtain the ³ ocit¡Ámizne ocit¡Ámizne odazilatac nu ed dadicolev al ertne n³ÃicaleR .TINU 21,0 ed xamV ed serolav y 52,0 ed mk ed anu nis n³Ãiccaer anu ne euq ol ed odip¡Ár s¡Ãm esrenopmocsed a olraduya y amizne anu a esrinu edeup otartsus nu euq al rop n³Ázar al se act¡Ámizne acit©Ánic aL .elbisrever se n³Áicibihni ed opit etsE .otartsus la airatnemelpmoc ¡Ares on amizne al euqrop sotcudorp ed n³Áicamrof ed ajab s¡Ãm asat anu y n³Áiccaer ed ronem asat anu esuac y erutaned es samizne sal ed arutcurtse al euq recah edeup otsE .odic¡Á etnatsab se euq ,2 omoc ,Hp ed somertxe sol ne esraretla naÃrdop amizne al ed lanoisnemidirt amrof al y ovitca oitis le ,oremirp amizne al ³Ágerga es is amizne al razilarutaned edeup Hp le euq se latnemirepxe o±Ãesid le ne oibmac le arap n³Áicacilpxe elbisop anU .laicini dadicolev al o n³Áiccaer ed dadicolev al odnatnemua ranoiccaer nedeup euq saluc©Ãlom ed daditnac al atnemua ,zev us a ,AE ed arerrab al euq aÃgrene royam neneit euq saluc©Ãlom ed daditnac al atnemua arutarepmet al ed otnemua lE .n³Áicaunitnoc a artseum es euq n³Áiccaer al se otse ed olpmeje nU .ocit¡Ámizne odic¡Á ed asatafsof al ed ovitca oitis le arap laer otartsus led PPNP le noc n¡Áritepmoc otafsof ed senoi sol ,osac etse nE rodibihnI .lanoisnemid 3 otartsus led acifÃcepse arutcurtse anu a oiratnemelpmoc se euq ocifÃcepse yum ovitca oitis nu neneit samizne saL .raza la amizne al a ³Átcenoc es odnauc n³Áiccaer al ed laicini dadicolev al ³Ájab rodibihni lE .sairatnemelpmoc sedadeiporp sus a odibed amizne al ed ovitca oitis la ratnujda nedeup olos serodibihni sotsE .act¡Ámizne dadivitca al ne otartsus led n³Áicartnecnoc al ed otcefe le anoicaler oirotarobal ed emrofni etse ed n³Áicces aremirp aL :n³ÁisucsiD .netneM sileahciM ed alecrap al ed sol a seralimis yum nos xamV y mk le euq artseum revaeweniL ed kruB alecrap aL .n³Áiccaer ed asat al ne ovititepmoc rodibihni led otcefe le euf otnemirepxe led n³Áicces amitlºÃ al ,etnemlaniF .samizne ovitca oitis ed arutcurtse al aibmac Hp le ne oibmac nu ,ograbme niS .acil³Ábrepih omoc ribircsed edeup es otartsus led n³Áicartnecnoc al y (two). The km I found for this was 34.01. The third part of this laboratory report is based on the effect of pH in the rate of 3 HPARG .Noitcaer fo ETAR EHT No Erutarepmet Fo TCEFFE EHT SNRECNOC NOITAGITSEVNI SIHT FO B NOITCES .UAAETALP A WOHS DLUUW SIHT HPARG A NO .TCERROC SNOITCIDERP YM EVORP LLA ATAD DNA SHPARG EHT LLAREVE .LLAMS EROFEREHT DNA 42.0 SAW MK EHT TAHT LET NAC I) 2+ 1 (SHPARG YM MORF .SPUORG ETHPSOHP Evomer OT YDOB EHT YB derutcafunam Si ESATAHPSOHP DICUTCAFUNAM SI ESATAHPSOHP DICA EMYZNE ECHT ECNNI SEULV ESEHT .ELBALIAVANU YLTNERUC SI WEIVERP, YRROSWEVERP Gnidaol .DenimReted YLAPARUCCA EB TONNAC XAMV DNA MK EHT TAHT SI TOŁPA Nętne sleahciM fo noitatimil EHT .noitcnuf yeht WOH bottom semyzne fo gnitatsrednu rieht esaercni ot å ¢ avilas yb Ragus ot hcrats fo noisrevnocÃ Â Ã ¢ eht are hcus stnemirepxe yrotarobal cisab tuo deirrac tsitneics desaercni semyzne fo gnidnatsrednu sA. EMYZNE FO EMULOV LATOT EMT GNIWEWOL SA TCEFFE EMAS EHT SAH ROTIBIHNI EVITITEPOPMON NON .SEULV EMAS EHT TA TPECETNI MK / 1 EHT SSORC TUB SEULAV TNEREFID TA TPECETNI XAMV / 1 EHT SME SENIL DERT EHT EREHW TOLP KRUB REVAE WENIIL EHT TA Gnikoool YB SiHT Lelet NAC and .SerutCurts lanoisnemid 3 EHT DNA ETIS EVITCA SEMYZNE EHT ERUTANED DLUUUM SUISLEC SEEGED 07- 05 Evoba Serutarepmet TAHT EVEELEB OSLA I REVEWOH .TSETSAF STI TA SWA SISLORDYH FO ETAR EULAV TAHT SHEEM EROFEREHT SIHT, EULAV NoTprosba TseHGih eht fo sevig 5.5 Hp .emyzne the bottom etartsbus and neewteb noisilloc and secnahc esaercni fo eht fo esuaceb a siht esaercni noitcaer etar eht fo fo esaercni etartsbus noitartnecnoc eht taht are setacidni shparg EHT .PNP bottom etahpsohp secudorp siht esatahpsohp dica emyzne eht yb a desylordyh PPNP .slanruoj bottom erutaretil cifitneics fo secruos suoirav than derevoc sgnidnif suoiverp mrifnoc ot a troper yrotarobal siht fo esoprup EHT .derutaned emyzne eht erehw K 743 dehcaer erutarepmet eht litnu yticolev laitini eht than esaercni lareneg a hammer del erutarepmet than esaercni EHT .noitcaer fo etar EHT TCEFFA LLLY YTINIEKLA RO YTIDICA SA HCUS HP FO Semertxe TA TAHT EVEILEK AND NIAGA esolgsed le o sisetnÃs al ,aicnerefsnart al adiulcni ,senoicnuf renet nedeup samizne saL .otnemirepxe etse ne n³Áicadixo rop anisorit al ed sotnemgip sorto y aninal©Ãc al ed n³Áiccudorp al azilatac euq selamina y atnalp al ed sodijet sol ne etneserp amizne anu ,esaasoryttcartsAn³Áiccaer ed sasat sal atcefa euq ol ranimreted arap sotnemirepxe ed osU :SCITENIK EMYZNE8102 ,ozraM 31tropeR oirotarobaL SCITENIK EMYZNEOGI UDNI .RD400 baL-041 ygoloibsrettaW accebeR1 .n³Áicavitca ed aÃgrene ed arerrab al ricuder la n³Áiccaer ed dadicolev al nareleca samizne saL .CES / SBA 2-E49.2 are locetac le y anisorit al arap ©Ârtnocne euq xamV lE)3(.nalevin es asat al ed sallertse sal ,selomm 00.3 02,0 ed s©Âupsed etnemua n³Áicartnecnoc al euq ed s©Âupsed ,ograbme niS .¡Áracifidom es PPNP otartsbuS led n³Áicartnecnoc al y etnatsnoc ¡Ârdnetnam es serodibihni sol ed n³Áicartnecnoc aL Â ppAstahW nidekniL nideknіL tiddeR rettiwT koobecaF :otse ritrapmoC 9002 ed erbmeivon ed 02 :otsiV" 2.3.1.3 = ONCE ?4php.talf_tluser/php/gro.semyzne-adnerb.www// :PTTH- CE oremºÃN :leiuqezE ammE ed bew sanig¡ÃP "¬â ¢Ã 6 albaT y 4 albaT -aicnabrosba ed serolaV)5-1 SARUGIF(11 ,01 ,9 saicnerefnoC" ¬â ¢Ã samizne y sanÃetorp 43001-CSL oludªÃM -slliM nhoJ .rD)9002(saicnerefnoc ed saton :aicnerefnoc ed satoN 4 otnemirepxE "¬â ¢Ã 43001CSL amize acit©Ãnic ed oludªÃM" ¬â ¢Ã)9002(oiraroH baL ynapmoC dna nameerF HW ,acimÃuqoiB)6002(la te gregoB .sotcudorp sol namrof es euq al a dadicolev al ecuder ovititepmoc on rodibihni le euq riulcnoc odeup ,otnat ol roP .socit¡Ámizne sotartsus ed ojelpmoc la enu es n©Ãibmat rodibihni ed opit etse ,ograbme niS .n³Áiccaer ed asat al ne Hp led otcefe la ereifer es n³Áicces arecret aL .oirotarobal ed oiradnelac le ne ebircsed es omoc obac a noravell es sotneimidecorp sol sodot :sodot©Ãm y selairetaM .mk le y xamV le ranimreted arap etnemailpma rasu nedeup es n³Áicagitsevni atse ed senoicacilpmi saL .sodatcelocer sotad sol ed netneM sileahciM ed acif¡Árg al sE the moles. You can download the paper by clicking on the ³ button above. This reaction ³ studied in this ³ research. My findings support the findings of many previous research. previous. journals as the graphs show a similar relationship as to the findings to previous work. Introduction: This laboratory report is on the topic of enzyme kinetics, previous work in this particular field was carried out in the 1700¢ÂÂÂs, when biological catalyst enzymes were discovered and studied. Berg etal 2006).Enzymes work on the concept of transition states. I would expect this enzyme to have a low optimum pH of around 5-2 as it is acid. The relationship can be describes as fist order as the [V] rises almost linearly with the increase in [S]. Thissubstrate oxidizes and is catalyzed by the tyrosinase. I shall briefly discuss and explain what my data shows and means. I can tell that the data I collected from the experiment in the lab is accurate and valid as the graph which compares the theatrical data and the collected data show similarities in the trend line the Vmax the km and as well as the points and there is no anomalous data point on either of the 3 graphs. Enzymes reduce this phase .The difference between the free energy of the reactants and the free energy of the transition state is the activation energy (Ea).The minimum energy required for a success full reaction to occur. The specificity is due to the complementary hydrophilic/hydrophobic charge, electrical charge and shape of active site on the enzyme. References: Books: David L. The investigation showed that the inhibitor used (phosphate ions) was a non-competitive inhibitor. The tyrosinase enzyme is what converts the tyrosine substrate. Amino acids side chains can be protonated and may be damaged due to the extreme pH (concentration of H+)this may result in the protein sequence to unravel which means that the active site is not complementary to the substrate and the rate of reaction decreases as no or little ES are formed which results in little products formed. A typical enzyme substrate reaction can be simplified and be written as: The enzyme studied this investigation was acid phosphatase. Tyrosinase willingly reacts with a lot of substrates, such as catechol, tyronise, and phenol. The product produced is yellow and can be measured using a colorimeter. Also, in our experiment, tyrosinase was tested with and without the substrate, keeping data to notice change between the experiments. An increase in H+ ions can change the active site structure due to the fact that h+ ions can interfere with any polar molecules on enzymes protein structure. The graph and tables 2 show that as the concentration of substrate (PNPP) increases from 0.00 Mmols to 0.20 Mmols of substrate the initial velocity or the rate of reaction shows an increase in too. Another substrate we used in this experiment was tyrosine. According to the induced fit hypothesis the enzyme can undergo some change in the 3- dimensional structure in order to fit the substrate. Its primary mechanism of action is to bring a substrate molecule into contact with a molecule of water .This results in catalysis and the removal of phosphate group. As we have discovered before the enzyme used was acid phosphatase so the pH at which it works at best ¢ÃÂÂ the optimum temperature will be in the acidic pH regions. It is important to state that the enzyme is going to have an optimum temperature at which the ES complexes and products are made at the fastest velocity. The pH does not affect the substrates 3 dimensional structure in the same ways as the enzymes. This will produce a fist order reaction on a graph. The actual reason for why the protein sequences unravel is that the protein has too much kinetic energy and the amino acids vibrate and this causes the non covalent forces to be weakened. Finally an hydroxyl group is attached to the substrate molecule. The enzyme acid phosphatase catalyses the removal of phosphate group from organic molecules. However it is important to mention that at high substrate concentration the be fully saturated this will slow the reaction rate ³ as there are too many substrates that enzymes. Therefore I predict to see a hyperbole³³ relationship in a graph. This in turn increases the rate at which ES and P are formed. The transient state ³ enzymes is the phase in which the substrate is not yet a product and not a substrate. This in turn decreases the speed of reaction ³ and the speed at which products are formed. Tyrosine is converted to dopa, which then becomes dopaquinone. There are no other data so ³ present. A tyrosinase substrate that we used in this experiment was catechol. catechol.

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