so in continuation with our discussion on
nitrogen containing organic compounds i stopped at the stage of aromatic nitro compounds aromatic nitro compounds means the benzene ring or a higher homologues
of benzene like naphthalene anthracene phenanthrene etcetera will be there in one part
and nitrogen should be attached either inside the ring or as as a substitution so i started with a
substituted benzene derivative or nitro benzene and i said that our main aim in the first part
was the preparation and use of aromatic amines
so how from aromatic nitro compound we can prepare
the aromatic amines that is by simple reduction and that could be used by simple reagents like
zinc commercial zinc and dilute hydrochloric acid to prepare nation hydrogen which in c2 can
convert the nitro engine to the aniline
so aromatic amine preparation
will not be difficult if i take two step that is electrophilic substitution reaction to make the carbon nitrogen bond and then reduction now electrophilic substitution
reaction is very interesting phenomena in aromatic chemistry the reason i said that benzene ring
is electron cloud or electron dense thing it will form pi complex very easily with electrophile then it will form the sigma complex and
then give the product or re-aromatize to get the product that product is nitrobenzene
now if i write the structure of nitro benzene in double bond o and o
so what i see
that you know to group a coordinate bond and a double bond being shown this n o two group
will pull electrons from the benzene ring not push
so because of this pulling electron from the
benzene thing what will happen to the benzene ring benzene ring will lose the electron
density and if it loses the electron density then its carbocation character will be developed
in the binging ring and you know if there be more nitro group in the benzene ring one simple
example i am writing here a known compound is two four six tri nitro tolvin this is toluene one
two position there is a nitro group four position there is a nitro group and six position there is
a nitro group
so two four six tri nitro toluene is a very important compound you know this is for
other purpose being used this is called tnt for dynamite in in dinamite or other ah compound these are the compounds being used and these
nitro highly substituted nitro aromatics are explosive in nature
so this is another
interesting features of carbon containing nitrogen compounds or nitrogen containing organic compounds
where the nitro substituted aromatic ring the electron density of benzene ring gets reduced as

a result it becomes a carbocation in character and you can see one very interesting features
if there be more nitro substitution the as the electron density is decreasing the explosive
nature is also growing one such example is t n t many other derivatives are there and you know
another compound that is also very interesting in the nitro substituted thing that is phenol when
being nitrated with sufficient amount of nitro group that ends up with two four six tri nitro
phenol similar to tnt this is called picric acid picric acid is also a very interesting compound
which is present ah which when reacted with an aromatic compound form a charge transfer complex
and this charge transfer complex where say phenanthrene or naphthalene is the donor because
does not have any substitution and picric acid is the acceptor to form a very nice color charge
transfer complex
so those things are also used for the detection of polyaromatic hydrocarbon p a h polyaromatic hydrocarbon
so what it does more electron rich benzene ring i have taken
some other derivative some unusual type structure pyrene etcetera
so that donates the electron
and nitro group containing benzene accepts the electron that means we are able to make
a benzene ring electron deficient by putting the electron withdrawing group on the benzene
ring one such example is nitro other may be fluoro or trifluoromethyl those groups are electron
withdrawing as a result what happens the benzene ring gets carbocation character and then it could
be reacted with a nucleophile to make directly the nucleophile attacks the benzene ring and
direct carbon nitrogen bond formation will be possible
so that is a way out question comes how
you can make the benzene ring electro positive answer is taking up electron with the
help of electron withdrawing group like nitro fluoro trifluoro and that will help
and more number of electron withdrawing group mode the carbocation character will be there on
the benzene ring and then the nucleophile should attack the way it was attacking with the aliphatic
system and
so in that way ah the nucleophilic substitution in the benzene ring is also possible
that is another way to make carbon nitrogen bond in the organic chemistry ok now as i want to tell
you when in binging ring there is a group being present i have taken an example of methyl group
and i want to do or i want to introduce a nitro group because we are talking about the nitro group
n o two plus introduction to the benzene ring how we did in the previous case

we
started with benzene treated with no2 plus question comes where is the source of n o two
plus you know one very interesting reaction to get the n o two plus in the textbook it is written as m a m a is the abbreviation of mixed acid
mostly nitric acid and sulfuric acid what concentrated nitric acid and sulphuric
acid is doing it is generating an o2 plus because sulphuric acid is also a good dehydrating
agent from nitric acid it takes off the water and generating a no2 plus or the electrophile so
electrophile is ready the no2 plus and the benzene ring is ready and they can form by complex sigma
complex and then the substrate
so in that way benzene getting converted to nitrobenzene very
easily by a electrophilic substitution reaction what is being substituted the hydrogen atom of
the benzene ring one of the hydrogen atom of the benzene ring who is entering n o two
plus and by that way we are able to make a nitrobenzene my question is if a methyl group
is present there and now you are doing a m a or mixed acid treatment that is n o two plus being
generated and being introduced where it will go that terminology to know where the second group
will go when there is a mono substituted benzene ring the terminology is called orientation
so what is the orientation of the group and how we can determine the orientation that
depends on several factors one of the factor is of course electrophile is a must second factor
is you are treating the binge ending with a substitution what sort of substitution
is that is it an electron donating group or it is an electron withdrawing group say
in this case methyl how should i know it is electron donating or electron withdrawing
because the carbon hydrogen bond each if i take elaborately the electronegativity
difference of hydrogen and carbon is there
so electron pair forming the bond between hydrogen
and carbon will be pushed towards the carbon atom
so three such pores will be there from three
sides
so what will happen to the carbon the electron density will increase and that electron
density it will again relay to the benzene ring so what will happen to the mean generic
so electron
density gets increased
so compared to benzene the toluene methyl substituted benzene toluene the
electron density of the benzene ring is getting increased by the inductive effect now if i bring
the nitro group that is coming from mixed acid so what it will do in which

position this n o 2 group
will enter that we can write by some structure like because of this push the carbon this
carbon's electron density is increasing
so this may be polarized in this side
so i said write a structure clearly that this double bond is now being localized and you
are ending up with the methyl group and this is this is this double bond is now polarized over
here and this can delocalized on three sides and those delocalized structures are the
resonating structure what is that this type of delocalization we can again delocalize
this negative charge on this side also and by this way we are able to make ch3 ch3 ch3
and the negative charge is getting delocalized in this side
so where we are able to put the
negative charge if i put the substituted benzene ring that is methyl group as the carbon
number one this is carbon number two this is three this is four this is five this is
six
so we are able to make negative charge or localize negative charge at two position four
position or sixth position and no other position
so what does it mean the electrophile should
enter either in two position or six position they are equivalent or in four position and
these positions are called ortho meta and para
so in this way ortho meta and para
so in one way
we are able to see that electron donating group electron donating groups are ortho para orienting
what does it mean that if in benzene ring some group is there i have taken one example that is
methyl it is not restricted to methyl any other chloro or any electron pushing group or tertiary
butyl whatever which can increase the electron density of the direct benzene rings carbon atom
where the attachment is there then it can relay the electron pair either in two position
or four position or sixth position two and two para orienting that means now it is very
simple if i start with toluene make one equivalent of the nitro group then it will end
up with ortho or para substituted benzene ring
so this is para this is ortho mixture
of ortho and para substituted and amount of ortho and para depends on several factors one
of the interesting feature is the steric factor and the reaction condition but if we do further
nitration then what will happen that means to this if i put one more nitro group n o two plus
that means sufficient amount of mixed acid now there are two functional group

already
present in the benzene ring where the third electrophile will enter though the electrophile
is similar in nature that is n o two plus
so that n o two plus will not dictate but
the groups being present in the benzene ring that is methyl and n o two plus they will say
that which position will be suitable for that that means electrophiles should enter in two
substituted or two nitro toluene or four nitro toluene in some positions let me show that
what is that ch3 group is electron donating nitro group is electron withdrawing very
interesting phenomena one is electron donating another is electron withdrawing i
have written that electron donating groups are ortho para orienting i can also
write electron withdrawing groups electron withdrawing groups are meta orienting electron donating groups are
orthopedic orienting electron withdrawing groups are meta orienting
so because of this methyl group this position will be activated this is the ortho this position is also activated that is also ortho and with respect to the nitro group
the same position getting activated because nitro group is meta orienting not orthopedic
similar fashion this nitro group is also activated because of the presence of this position
by the nitro group
so both will help if i have sufficient amount of no2 plus to activate these two position now if i take this structure that is ortho nitro toluene what will happen methyl
group is electron donating
so this will help to introduce in ortho and para position this is the ortho position this is the para position nitro group is meta orienting this also helping
to activate the same position that is meta with respect to this this is the three position one
three
so that is meta
so both the groups are helping to get the new electrophile or the same electrophile to come in the position marked as cross or right
so what will be the end
end will be you end up with ch3 no2 no2 no2 both the cases
so you get a single product
that means nitration of toluene with sufficient amount of mixed acid should produce 2 six trinito
toluene or what i have written here as tnt
so in this case two things we have discussed
one is electron donating group helping to come to enter for the entry of the electrophile in ortho and para position and electron withdrawing group is helping to
enter in the meta position if they contradict then it is very difficult if they help each

other means one is the complement of other then we get sufficient amount of one type of
product and when the competition takes place be between the electron donating and the electron
withdrawing normally electron donating groups getting little bit preference but ah that is not
the case in this case
so this is the way the nitro substituted benzene ring could be produced and as
i said then by reduction the nitro group could be converted to the amino group
so if i start with
a nitro substituted benzene ring that i stopped what will happen why this nitro benzene
will help the new electrophile to enter only in the meta position that
we can show with the help of a resonating structure because the nitro group
is electron withdrawing group it is pulling electron from the benzene ring
so what will
happen we get some sort of structure where we get the negative charge where you get the negative charge getting
delocalized on the nitro side and the positive charge is getting localized on the
ortho position and this can have in a similar way the same sort of resonating structure
if i keep the nitro group intact like this and play with the delocalized thing what i
see the positive charge getting delocalized from two to four position and by another way this
positive charge again could be delocalized in the sixth position also
so what is happening here this is the ortho
position two position this is the sixth position also or third position this is the para position
so this three position that is ortho and para is positively charged
so if you bring an
electrophile which is positively charged will not enter there where is the second possibility
that will enter exclusively to the meta position
so that is the reason if i start
with nitro benzene i will end up with two four six tri nitro benzene what
is that nitro group will deactivate the benzene ring will pull electron help the
second nitro group to come in the meta position
so i am writing another no2 and that nitro group
will be entered by this pi complex sigma complex that same methodology the three position and now
very interesting thing has happened because this nitro group will activate this meta position
and the other nitro group also will activate the same meta position
so if i do a further
nitration with n o two plus i will end up with n o two no2 no2 that means starting from these
we are able to make 1 3 5 tri nitro benzene
so benzene on nitration gives nitro
benzene nitrobenzene on further nitrogen can give one three dinite of engine one three

dinitrobenzene on further nitration should give one three five tri nitro benzene
so this is
one way out to make carbon nitrogen bonds by the help of electrophile obtained
from simple mixed acids like n o two plus that electrophile now should enter the benzene
ring in three positions and when all this thing is done if i do further nitration then question
comes where it will go actually now there is no vacant position available over there and this will
not be a good way to proceed further because this will be an ah awkward mixture of several things
will take place
so the there is no activation or help by the group already present in the benzene
ring
so this is the general rule for orientation when one group is there how the second group
is coming if the second group is there if they are complementary to each other that helps if not
then of course the electron donating groups gets little bit preference if they complement then
it is a very nice way to make the substituted compound of the products
so this is one way to
make the benzene very easily another thing i should say that nitro benzene to substituted nitro
benzene or more positions in the benzene ring more nitro groups could be attached and as i told
you that oxidation reduction steps are very simple you can convert nitro to the amine very
easily and this amine that is this aniline like the methyl amine i started with is a very
important starting material because from here you can make many interesting carbon nitrogen
compound you know one of the reaction is treatment of aniline with nitrous acid at
lower temperature say 0 degree centigrade what will happen if i treat aniline with
nitrous acid as the source of nitrous acid sodium nitrite and hydrochloric acid if i mix them
together it will form nitrous acid hno2 and nacl sodium chloride and at lower temperature
this amine when treated with nitrous acid at ice cold temperature then we see a very
interesting thing that is i should say a species like this n to plus c l minus what you
call this type of compound because in this case i can see that two nitrogen being attached and
the counter ion is the chloride as hydrochloric acid being used
so this type of compound will be
called di means two ago means nitrogen
so diaz a compound or diazonium salt
better than azonium salt and this diazonium salt is very interesting if two

alkaline betanaphthal
i am writing this is the benzene ring this is the naphthalene this is the
one position this is the two position in two position if there be an o h group
this
compound is called beta naphthol or two naphthol and this betanaphthalene
sodium
hydroxide or potassium hydroxide solution very interesting feature two alkaline
betanaphthal
either in sodium hydroxide or potassium hydroxide if we add this diagonalized
or diagra compound
diagonalized aromatic compounds very simple cases diazonium salt like this
will get a very
nice beautiful red color dye what is that a long delocalized a naphthalene ring
getting
delocalized to the other benzene ring through the nitrogen nitrogen double
bond
so long delocalized
electron cloud is being formed and because of that the compound is bound to be
deep
red in colour
so a red dye is being formed by this way
so what i should say
that aromatic amine could be detected through the formation of a red dye and
this is a very good conformative test for aryl amine especially aniline when
being
diagonalized and remember two alkaline beta naphthale were adding the
digitized compound
not the other way around under cold condition then it forms a red dye and that
red dye is
very very characteristic why this is more color or deep in color why it is
this that could be
explained by a very simple phenomena there is a very general rule if there be
a long conjugated
polyene system as in this case one mentioning second benzene ring that is
naphthalene third one
is also connected through the nitro nitrogen and nitrogen double bond
so it is a long delocalized
system
so when the electron cloud is getting spread over long or many atoms then
what will
happen if you think in this way e is equal to h nu and when a more conjugated
polyne being taken that energy to take it from the ground to the excited
state
will be much less if there be more conjugation than when it is an isolated
double
bond or simple benzene being like this what does it mean if the energy needed
is less
h is planck's constant nu1 also will be less if new one is less what is the
lambda reverse
of frequency that is nu
so lambda will be more
so what is happening in other way a simple
butane and you take a carotene tetra substituted butadiene or long polyine the
long poly not

carotene that is c40 is color red color that is being present in tomato and carrots why those are
red or orange in color but butyrin is colorless answer is because it is more conjugated more
conjugated means the more delocalized of the electron is taking place and in that case
the energy necessary to take needed to take from the ground to the excited state which is
very important phenomena for the color thing is less
so as energy is less frequency is less
frequency is less means wavelength more we can see 400 to 800 nanometer 200 to 400 is the ultraviolet
region
so the compounds getting colored
so this is another general technique by the help of carbon
nitrogen chemistry one can make a colorless to color by putting more conjugation especially
with some chromophoric group or oxochromic group that also help
so this is a offshoot or the
bonus of carbon nitrogen chemistry
so what is the advantage of that advantage is tremendous
suppose you have converted a diazo compound ah the way i said take the annealing very
simple case digitize it with nitrous acid and get the diazo compound and now you want
to remove the diazo compound and put some substitution because now the n 2 plus is directly
attached over there you can do it in very nice way there is a term i have written here c u x and h
x to plus halite or x may be many things cyanide chloride etcetera
so what will happen
the whole thing this n two plus c l minus will go and the x will be inserted straight
over there that means from this diazo compound you can get the cyano compound and in that way you
can make many many interesting aromatic compound and will take some more example later but this
type of reaction was first studied by sand meyer
so this is known as sand myers reaction
so one of
the way to make the several substituted aromatic compounds is by the help of carbon nitrogen
compound through this diazonium salt and then with the sand meijer reaction where co x and h
x be the reagent x is chloride bromide cyanide etcetera ok
so i started with amine first
aliphatic then aromatic question comes not only aliphatic and aromatic where the direct
carbon nitrogen bonds is a single bond there may be a carbon nitrogen bond as a triple
bond or a double bond let me write down a very simple case if i write this type of structure
where i am putting the substituent as h3 chd double bond of course i have to satisfy the valency as nh here the case is different that is not a single

bond but there is a carbon carbon nitrogen double bond is there and this type of compounds are also
very interesting these are called not amine but amine and they could be prepared the way i started
that you can break this molecule and get some clue as synthone or synthetic equivalent and
then ending up with the starting material as simple as acetone and say ammonia or derivative of that
so if you treat acetone now the starting materials
are amine and acetone together what will happen this is the electron rich this is
the electron deficient how did i know because carbonyl groups carbon is positively
charged oxygen is negatively charged there will be a polarization possible because oxygen is more
electronegative compared to carbon
so electron pair forming the bond will be shifted more towards oxygen
so making the carbon as electro positive
so the amine will go over there very easily and in
that process you get c h three c c h three o minus and this side is n h h two and one of the hydrogen
if i put it in this way will be picked up by the o minor
so you end up with ch3 c ch3 and
this is now oh n h h
so this is the way the amine group and the o h group has
been introduced to the acetone moiety which is coming from the carbonyl and nh2
is coming from the ammonia then what happens this type of compounds is very interesting
because simply by heating it loses water it loses water means how the one of this nitrogen
hydrogen bond leaves at the same time the o h also leaving the system
so h and oh leaving the system
at the same time what type of reaction is this one this is called an elimination reaction
elimination reaction
so in elimination reaction what is happening you get ch3 ch3 double bond n h
so one simple way to make the amine from amine ammonia in this case or substituted ammonia
also you can take is very simple reactions where a nucleophile is attacking a carbonyl carbon
the nucleophile is the ammonia or substituted ammonia and then an elimination reaction is
taking place where the hydrogen and hydroxyl group is leaving at the same time this type
of elimination is called beta elimination and one of the interesting features is
anti group means hydrogen and which this is not a very simple complicated one this is
a very simple case hydrogen in which leaving the system at the same time
so this is a beta
elimination reaction by which we are able to make the amine

so carbon nitrogen single bond we have
discussed in details carbon nitrogen double bonds also are very important and from there many
interesting compound could be prepared one interesting compound i can say that one very
reactive compound could be prepared by this way is carbon double bond n and if we put some
substituents over there could be oxidized and this oxidation is very interesting to make a oxide
d nitrogen oxygen carbon containing compound these are also very ah important and very explosive
nature compound
so this is another field which is coming originally from nitrogen containing organic compounds ok third thing what i left is a carbon nitrogen triple bonded compound that means
how to make carbon nitrogen triple bonded compound and what is the use of that i can take a very
simple example lets satisfy the valency of carbon r c triple bond n usually in organic chemistry
these are not called cyanide these are the nitrile
so this nitriles when gets hydrolyzed mistreatment with water in presence of little bit acid or alkali what will happen that means rcn treated with h2o
in presence of h plus or o h minus what will be the product nucleophile definitely
will attack this carbon and this carbon nitrogen bond out of the triple bond one will be polarized
towards the nitrogen atom
so what i see are c o h h this will be the positively charged and then one of this bond has shifted
so this will be the minus over here that is the negative recharge this sort of things will take place
so obviously this is not a very stable species
so what will
happen the hydrogen could be picked up by this n minus
so it ends up with r c o h
and this side will be double bond n h r c double bond n h and oh this type of feature again we have ended up with a triple bonded to a double
bonded thing but if i write that this can be stabilized in a way like this the electron cloud is shifting in from one to
the other and a very interesting phenomena and here i have written the reversible side
not a electron delocalization this is a phenomena where the proton is shifting from this
position to that position proton delocalization is another way to call it is tautomerism so
tautomerism is taking place and we have ended up with a compound is r c o n h two
what is that compound this is the amide
so from nitrile we have ended up with an amide how
by hydrolysis what sort of hydrolysis either acid catalyzed or base catalyzed what is happening
to rc triple bonding it has been converted to r c o n h two
so amide being formed from the
nitrile and amide is a very important structural features from here you can

make polyamide
then many other polymeric materials which are used in everyday life
so polyamide is a very
important feature where ah the starting material is coming from the nitrile
so carbon nitrogen
triple bond is also being mentioned over here carbon nitrogen single bond
carbon nitrogen double
bond and carbon nitrogen triple bond and that could be converted to r co and h
two sometimes
i ask my students that i have done this reaction from alkyl cyanide to the
amide by hydrolysis in
this way and let us take an example suppose i have given you acetamide ch3co
nh2 and i want to
create acetonite that is ch3cn how to do that people get confused but a very
general rule is
if from nitrile to amide you do the hydrolysis means breaking with water
so obviously from
amide to nitrile what will you do a dehydration and what are the dehydrating
agent
there are many phosphorus pentoxide sulphuric acid which can takes care of
the water
so as simple as that how it will proceed the same phenomena because it has
it
is having an alpha hydrogen atom it will undergo some sort of tautomerism the
way i have
shown in the previous case and then this will go this will be eliminated the
hydrogen
and which will be eliminated and you end up with c h three c triple bond n
so c h three c
triple bonding that is nitrile is coming from the amide by dehydration and
nitrile getting
hydrolyzed to the amide by hydrolysis
so this is another trick to make the carbon nitrogen
triple bond and use it for the preparation of important compounds like amides
polyamides and
all other important feature i will tell another interesting features of
nitrogen containing
organic compound that i did not mention much that is if i write a benzene ring
now
it is very clear and remove one of the carbon by the nitrogen atom then there
are five hydrogen atoms now directly attached to the carbon and one of the
ch being replaced by the nitrogen
so this type of compounds are carbon nitrogen compound but i
should say most precisely this is the heterocyclic aromatic compound
heterocyclic aromatic compound why
heterocyclic because heteroatom is present why cyclic because if i start
from the one end i am ending up at the same atom and it is aromatic
because it is just like benzene rings but one of the carbon being replaced by
nitrogen
so it follows the hogel's rule that is planar conjugated cyclic compound
having four n
plus two pi electrons
so all those rules being followed
so this is a heterocyclic aromatic

compound likewise if i write another structure where it is the five member ring where one of the member is the nitrogen and then the hydrogen atoms are there each
having one and if i look at this molecule have i seen this type of molecule anywhere
answer is yes this is a heterocyclic compound having one nitrogen in the ring and
this compound is also aromatic in nature
so we are able to get two types
of aromatic heterocyclic compounds what are those two types one is a five member
another is a six member and in each case as we are we have focused our attention on carbon nitrogen
compounds
so one of the ring member is a nitrogen
so one is called pyrrole another is called pdd
very common base very common base how did i say because if i look at the number of electrons
over there i can see this nitrogen lone pair is very easily available which it can donate to
any acidic compound
so this is a basic compound or pyridine is a very good solvent
and also very good base which is a heterocyclic compound having nitrogen in the
benzene ring one of the benzene rings carbon being replaced by n and this is basic in nature
because it fulfills the aromaticity very easily but if i ask you what is the nature of these
five member nitrogen containing compound is it aromatic yes it is aromatic how because
i am taking the two nitrogen electron plus four from the d ah conjugated system and why it
is conjugated because double single double single though two singles are coming but it is a
delocalized thing
so hokel's rule if we recapture or recapitulate it will be planar conjugated
cyclic compound having four n plus two pi electron where n is one in this case that is four into
one four plus two six pi electron and exactly it is fitting that it is planar all are
sp two hybridized carbon this is nitrogen and two plus two plus two that is six two from
two pairs of carbon and two from the nitrogen atom and
so six electrons rules is also being followed
and ah this is now fully aromatic in nature but what is happening by this process
the nitrogen in this case six member one is available the electron pair on nitrogen is
available to other substrate
so that is why i have written a term base piloting is a base
but in case of pyrrole i cannot write that term why not reason being the lone pair of
nitrogen is now being taken the the aromaticity gaining five member unit
so it is not available

so what happens it acts as an acidity
so there is a very
general question nice question is asked how come five member nitrogen containing delocalized
compound that is pyrrole is acidic in nature and pyridine which is a six member nitrogen containing
aromatic compound is alkaline or basic in nature answer is the electron density on the nitrogen
of the pyridine is available to be donated but that electron density of the pyrrole unit
which is a five membered where its the two electrons are being given to the benzene thing
or the five member ring to gain the aromaticity is not available
so it is electron deficient
in that case
so it as per lewis theory a contoner is a good base and electron acceptor is an acid
so pyrrole is acidic in that way pyridine is basic in that way if we consider
so this is another interesting phenomena where we see the carbon nitrogen compound are not
only on the side chain or directly attached to the alkyl group directly attached to the
aromatic group but it may be a part of the engineering or five membering or seven membering
or in higher series also
so nitrogens role is tremendous in biological system i did not
say anything about another important class of the carbon nitrogen compound people say that
antibiotics are as i told you that beta lactam related compounds not one class
there are many classes of antibiotics beta lactam uni is very important which is
nothing but carbon nitrogen containing compound second portion came is the amino acid which
is the building block for protein peptide polypeptide third thing is if we take the
pyrrole units together four pyrrole units being connected by carbon atom if i write it in that way it will be in in just i have written arbitrarily one
structure where four pyrrole units are there in between normally there are one
carbon or substituted one just to fill the importance of this class of compounds
where four pyrrole units are on four sides and each p roll unit in the two position and this
will be three four five position two position and five position being connected by another carbon
atom or it may be directly connected to another pyrrole unit
so that sort of structural
features makes a cavity and this cavity is very interesting to fit many metal ions and
those metal ions giving that type of compounds very interesting feature very interesting
biological activities very interesting color and if i ask you have you seen

this type of
four pyrrole units being connected through each one carbon atom or substituted carbon atom and
making a ring macro cyclic ring of that way one interesting thing is that type of
compounds in generals are called porphyrin or i should say poly p rolls four units together and this type of porphyrin in natural products we see is very much
present in two three interesting compounds what we ah do for everyday life what is that
why blood is red in color everybody knows blood contains hemoglobin heme is that poly
pyrrole unit where a metal ion is being there
so him this iron is the metal ion like why
the green leaves are there why the leaves are green in color answer is very simple that
is the chlorophyll and in chlorophyll the basic unit structural units is the for firing
and this porphyrin means that four parallel unit being connected in two and five position
through one carbon atom each
so that makes a cavity and within cavity the calcium of magnesium
or many ions could be fitted and different types of color biologically active pigments and
medicines are being produced one simple example is heme globin is the protein part second example is
the chlorophyll that is green in color and third example is cyanocobalamin little bit complicated
structure but basic unity is poly pirol that is ah that is present in vitamin b12
so vitamin
b12 is also a bicomplex very important member
so these are the important features of the
carbon nitrogen compound in everyday life or in medicinal things or in other way i should
say one more thing to end up todays ah talk that other than antibiotics other than
amino acids protein peptides other than the amides or heterocyclic
compounds like pyrrole quinoline pdd in pyrimidine those are the
building blocks of the life dna rna another important nitrogen containing organic
compounds are alkaloids
so alkaloids are by definition is alkali compound
alkaline mostly in nature obtained from natural sources having
nitrogen will have to have carbon and having some medicinal value
so medicinally
important nitrogen containing compounds are the alkaloids which are alkaline in nature
so that thing i did not mention if i ask you can you name some alkaloids yes quinine
nicotine pyrimidine there are many alkaloids and some of the narcotics also having the
carbon nitrogen unit being present
so to sum up we have discussed about the importance of carbon

nitrogen compounds and how to prepare them specially for aromatic system through the help
of the nitro group and then by reduction and to convert the nitro to amine is very simple
reduction and amine to diazo not much difficult that is sodium nitrite hydrochloric acid digestion
and then by using sand mire reaction almost any functionality could be introduced where the diazo
group will go and the new group will come and the use of those compounds in the functional
group transformation i will continue with other aspects of the carbon nitrogen compounds next time thank you you