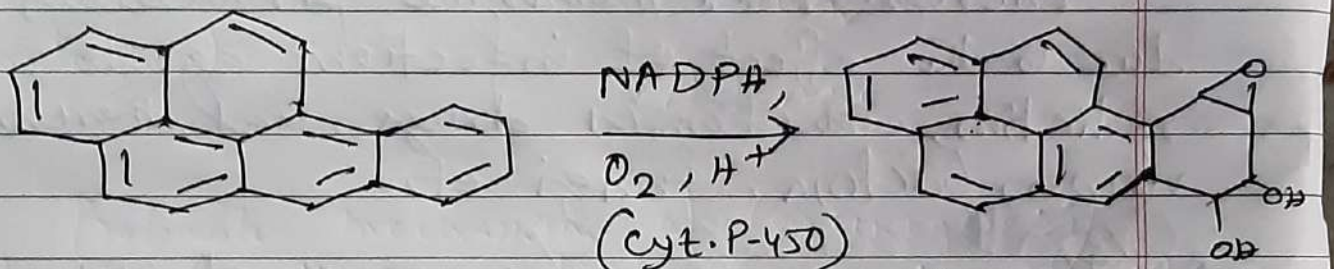
Mechanism of DNA base sequence change:

* Some chemical compounds may change the DNA-base sequence or change the DNA-structural features to cause mutagenesis and it leads to a heritable alteration. The mutagenic agents may also show carcinogenic activity in the same way.

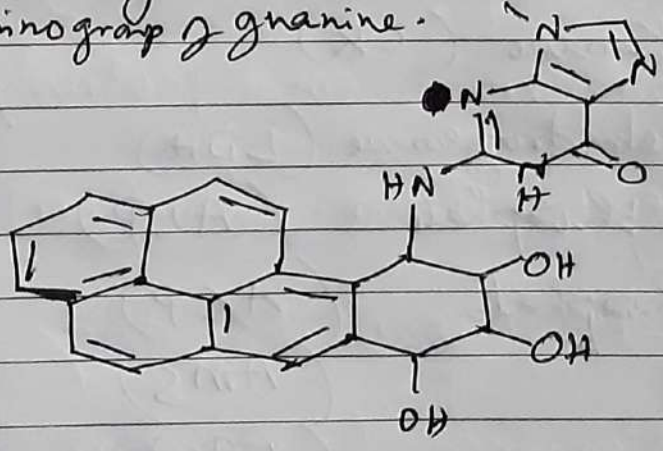
(1) Unfavourable interaction of polyaromatic hydrocarbons (PAH's):

In this regard, benzo-α-pyrene BP is most ubiquitous. It has been suggested that in the presence of O_2, BP experiences epoxidation followed by hydroxylation and the diol epoxide is the real carcinogen.



(Diolepoxide of BP)

This diolepoxide binds with the DNA bases to disrupt the genetic code reading. It can react with 2-amino group of guanine.



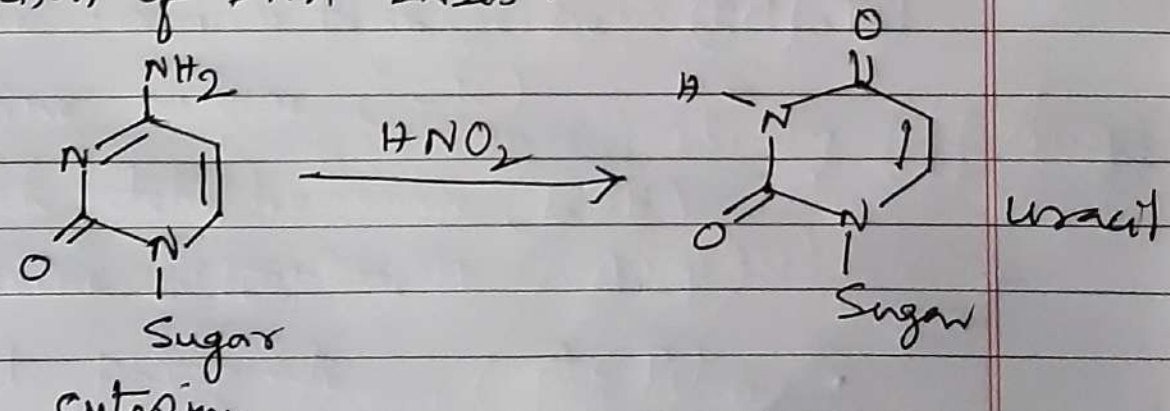
Interaction of DNA base with diolepoxide of BP.

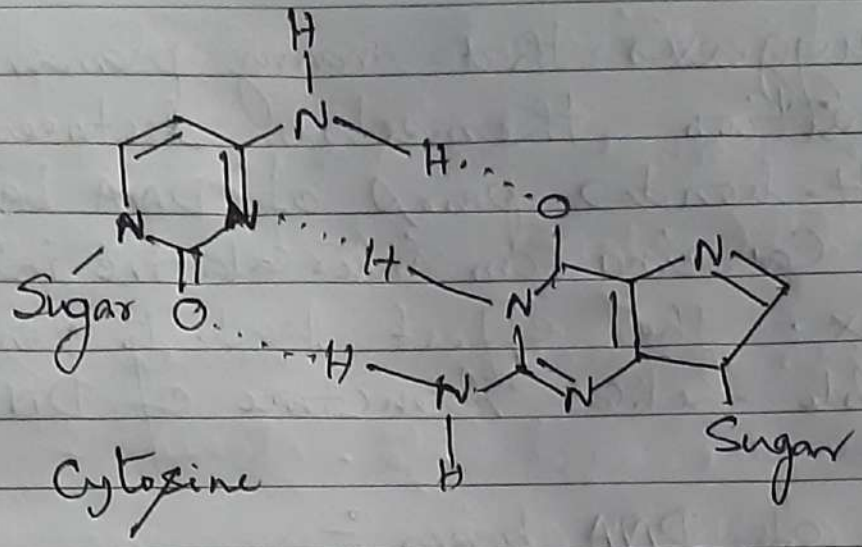
It has been suggested that many planar PAH compounds can position themselves between the flat layers of H-bonded pairs of DNA bases in double helix causing an intercalative interaction with the DNA helix. The effect leads to partial uncoiling of double helical structure of DNA.

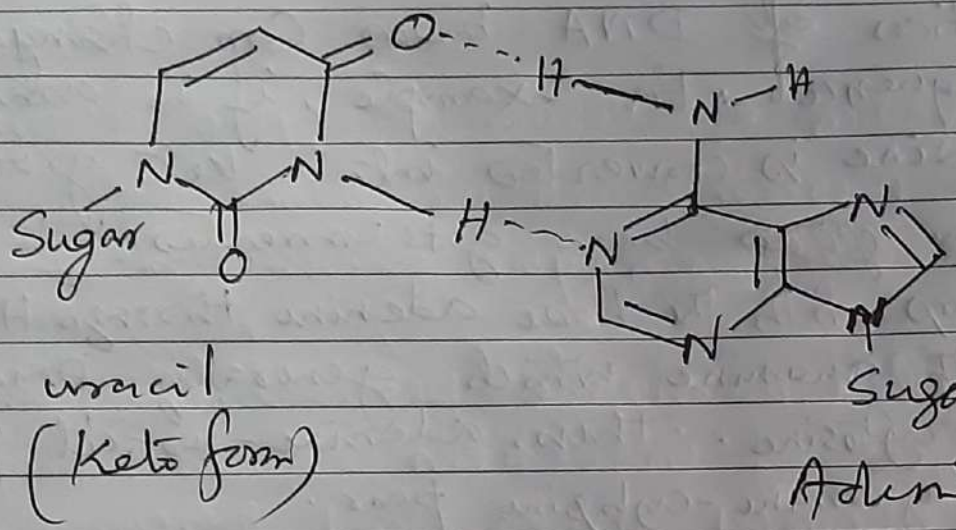
(ii) Deamination of DNA bases :-

Deamination of DNA bases can change the DNA base sequence. For example, if the amino group in cytosine is converted into a keto group, then the cytosine base gets converted into Uracil. Now uracil pairs with the base adenine through H-bonding rather than with guanine which generally pairs with the counter base cytosine. Thus, adenine-uracil pair can replace the guanine-cytosine pair.

Similar deamination followed by hydroxylation of adenine converts it into hypoxanthin. Adenine pairs up with thymin but hypoxanthine pairs up preferentially with Cytosine. $NaNO_2$ when exposed to acidic pH, produces HNO_2, which can carry out the deamination of DNA bases.







Probable mechanism of Carcinogenesis initiated by HNO_2 mediated Conversion of cytosine to uracil.