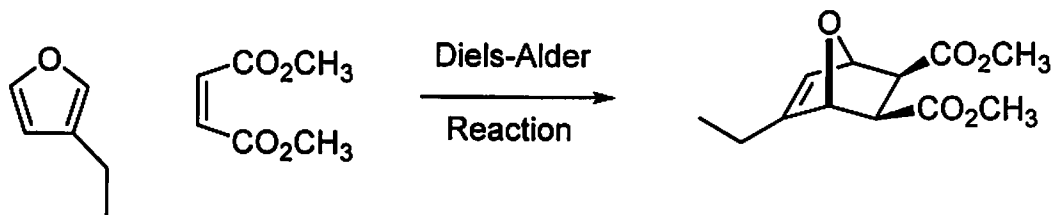


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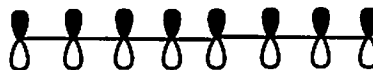
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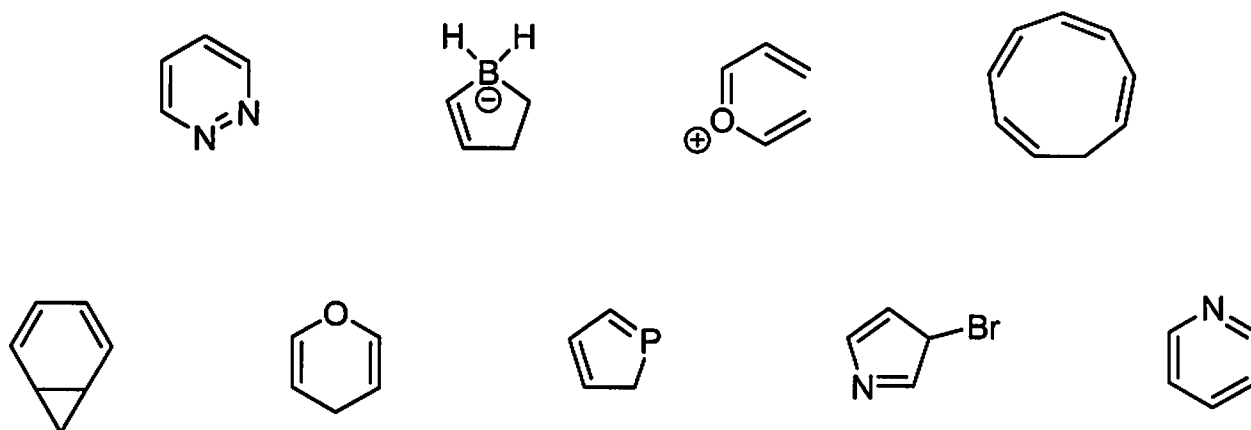
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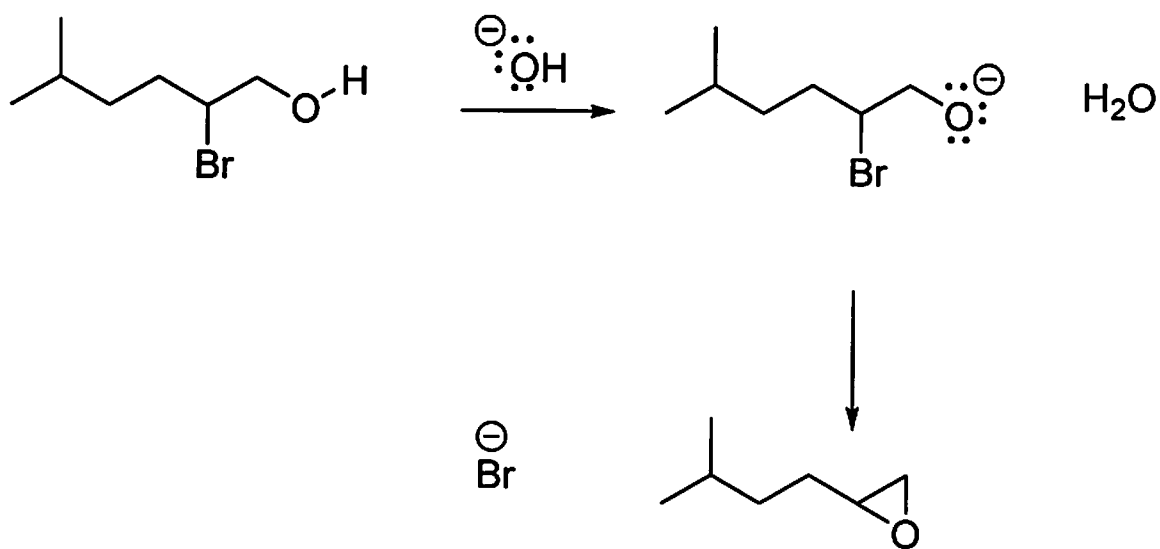
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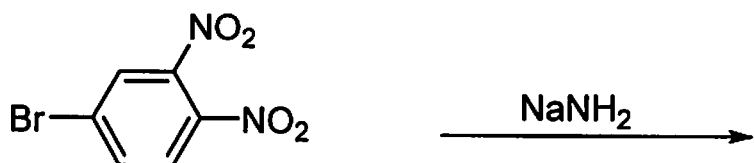
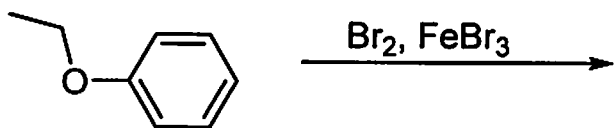
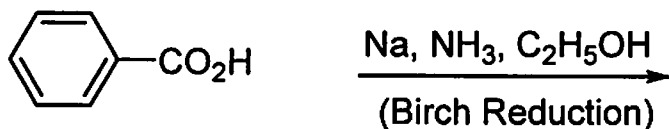
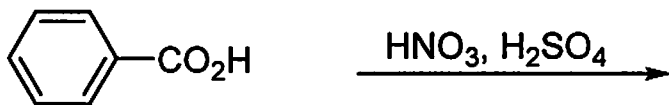
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13) (4pts) Draw in the curly arrows to complete this mechanism.

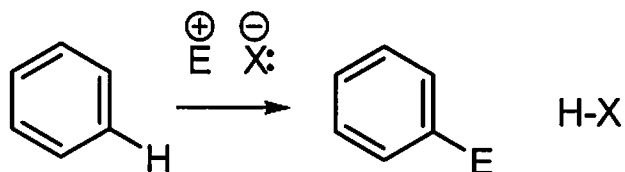


14) Predict the major products in the following reactions (if you believe **no reaction** will occur, indicate this!), paying attention to regio/stereo-chemistry where applicable. (5x2=10pts)



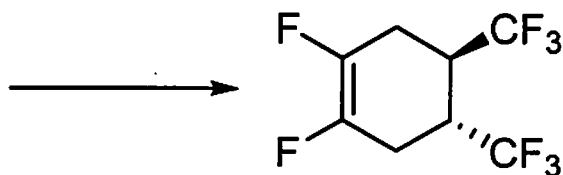
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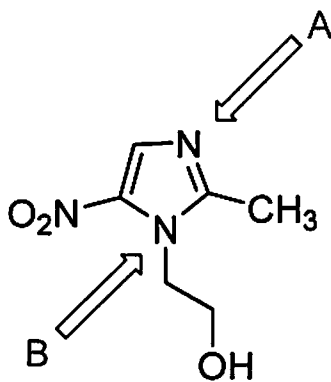


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Draw the diene and dienophile which could be reacted in a Diels Alder reaction to produce the following cyclohexene.



18) (6pts) “Metronidazole” or “Flagyl” is an antibiotic medication often used to treat bacterial vaginosis or other pelvic inflammatory diseases. Tens of millions of prescriptions for this molecule are written every year in the US. The structure of Metronidazole is shown below:



a) What is the molecular formula ($C_wH_xN_yO_z$) of this molecule? (2pts)

b) Is this a 6π aromatic molecule? (1pt)

c) How many chiral centers are in this molecule? (1pt)

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*****BONUS Points (up to 3 points)*****

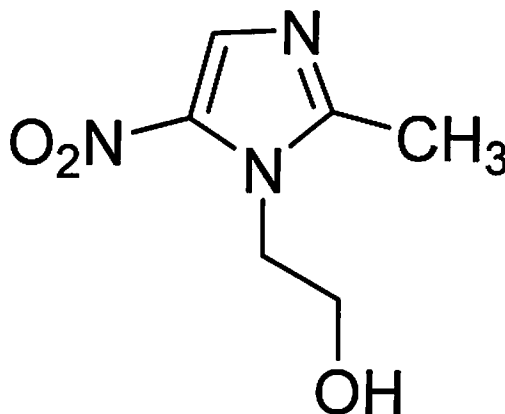
The IUPAC name of the below medication is 2-(2-Methyl-5-nitro-1H-imidazol-1-yl)ethanol. But in Q18 we see that it is more commonly referred to as "METRONIDAZOLE", which comes from joining the terms METHYL, NITRO and IMIDAZOLE.

Circle on the below molecule the following parts:

methyl

nitro

imidazole



hydrogen H 1 1.0079 litium	beryllium Be 4 9.0122 magnesium		helium He 2 4.0026 neon
Li 3 6.941 sodium	B 5 10.811 boron		carbon C 6 12.011 silicon
Na 11 22.990 potassium	Al 13 26.982 gallium		nitrogen N 7 14.007 phosphorus
Mg 12 24.305 calcium	Si 14 28.086 germanium		oxygen O 8 15.999 sulfur
K 19 39.098 rubidium	P 15 30.974 arsenic		fluorine F 9 18.998 chlorine
Rb 37 85.468 cesium	S 16 32.065 selenium		Cl 17 35.453 bromine
Sr 38 87.62 barium	Ca 20 40.078 strontium	Ga 31 69.723 indium	Br 35 79.904 iodine
Ca 20 40.078 strontium	Sc 21 44.956 yttrium	Ge 32 72.61 antimony	Kr 36 83.80 xenon
Ca 20 40.078 strontium	Ti 22 47.867 zincum	As 33 74.922 tellurium	Xe 54 131.29 radon
Ca 20 40.078 strontium	V 23 50.942 vanadium	In 49 114.82 thallium	
Ca 20 40.078 strontium	Cr 24 51.996 manganese	Sb 51 121.76 bismuth	
Ca 20 40.078 strontium	Mn 25 54.938 iron	Pb 82 207.2 uranium	
Ca 20 40.078 strontium	Fe 26 55.845 cobalt	U 92 238.03 actinium	
Ca 20 40.078 strontium	Co 27 58.933 nickel		
Ca 20 40.078 strontium	Ni 28 58.693 copper		
Ca 20 40.078 strontium	Cu 29 63.546 zinc		
Ca 20 40.078 strontium	Zn 30 65.39 gallium		
Ca 20 40.078 strontium	Ag 47 107.87 cadmium		
Ca 20 40.078 strontium	Cd 48 112.41 mercury		
Ca 20 40.078 strontium	Hg 80 200.59 thallium		
Ca 20 40.078 strontium	Rh 45 102.91 platinum		
Ca 20 40.078 strontium	Pd 46 106.42 gold		
Ca 20 40.078 strontium	Au 79 196.97 mercury		
Ca 20 40.078 strontium	Pt 78 195.08 uranium		
Ca 20 40.078 strontium	Ir 77 192.22 mercurium		
Ca 20 40.078 strontium	Os 76 190.23 helium		
Ca 20 40.078 strontium	Re 75 186.21 beryllium		
Ca 20 40.078 strontium	Mo 42 95.94 tungsten		
Ca 20 40.078 strontium	Ta 73 180.95 niobium		
Ca 20 40.078 strontium	Nb 41 92.906 tantalum		
Ca 20 40.078 strontium	Zr 40 91.224 hafnium		
Ca 20 40.078 strontium	Hf 72 178.49 rutherfordium		
Ca 20 40.078 strontium	Lu 71 174.97 berkelium		
Ca 20 40.078 strontium	Lr 103 260.11 actinium		
Ca 20 40.078 strontium	Ra 88 226.075 actinium		
Ca 20 40.078 strontium	Fr 87 223.021 actinium		

* Lanthanide series

** Actinide series

lanthanum La 57 138.91 actinium	cerium Ce 58 140.12 thorium	praseodymium Pr 59 140.91 protactinium	neodymium Nd 60 144.24 uranium	promethium Pm 61 144.91 neptunium	smarium Sm 62 150.36 plutonium	europium Eu 63 151.96 americium	gadolinium Gd 64 157.25 curium	terbium Tb 65 158.93 berkelium	dysprosium Dy 66 162.50 californium	holmium Ho 67 164.93 einsteinium	erbium Er 68 167.26 fermium	thulium Tm 69 168.93 mendelevium	ytterbium Yb 70 173.04 nobelium
Ac 89 227.03 actinium	Th 90 232.04 thorium	Pa 91 231.04 protactinium	U 92 238.03 uranium	Np 93 237.04 neptunium	Pu 94 244.06 plutonium	Am 95 243.06 americium	Cm 96 247.07 curium	Bk 97 247.07 berkelium	Cf 98 251.08 californium	Es 99 252.08 einsteinium	Fm 100 257.09 fermium	Md 101 258.10 mendelevium	No 102 259.10 nobelium

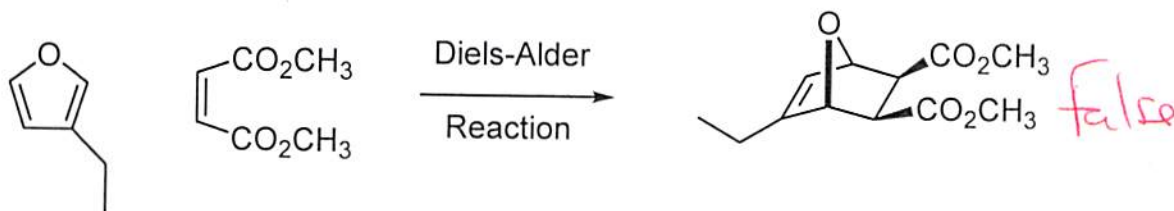
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8 Hz WAN I.P.

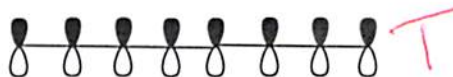
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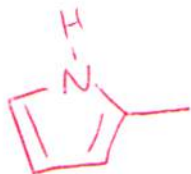


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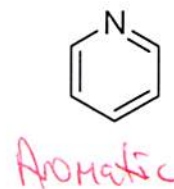
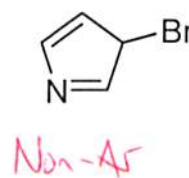
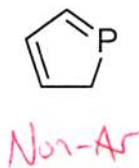
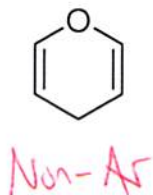
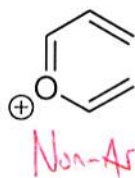
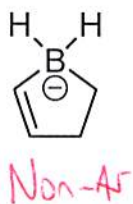
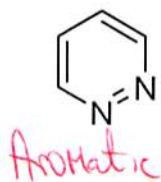


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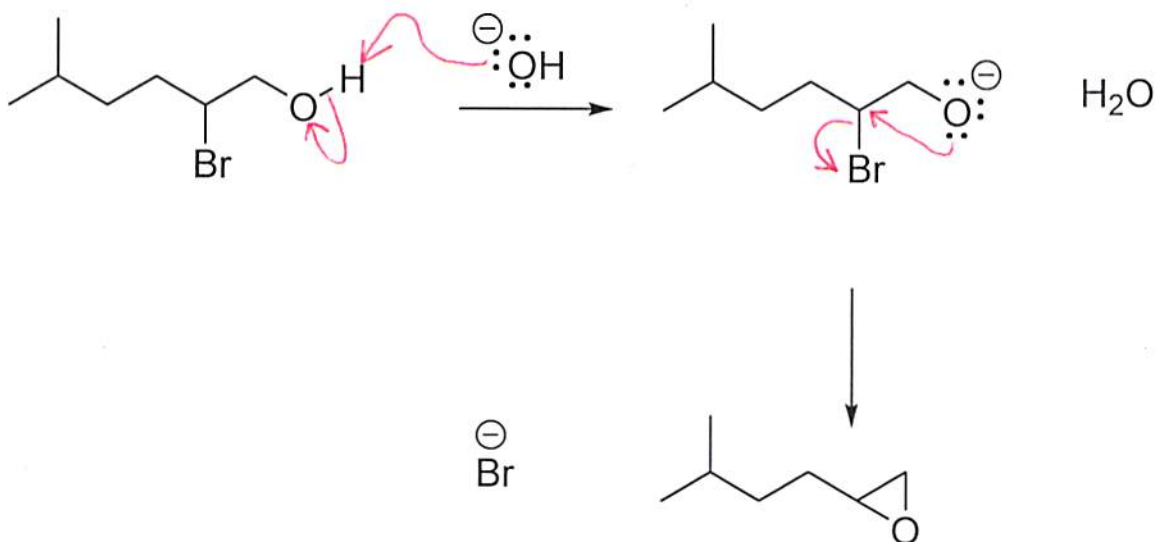
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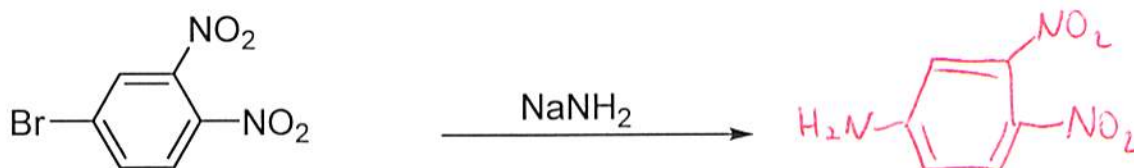
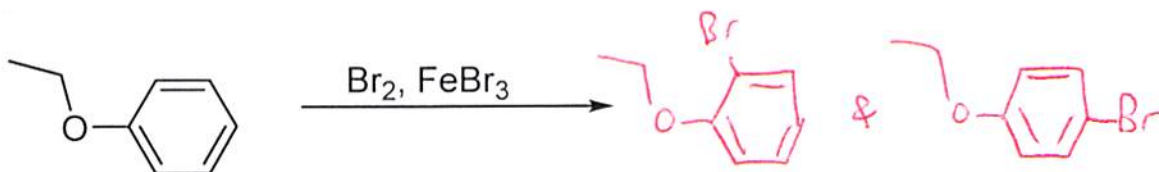
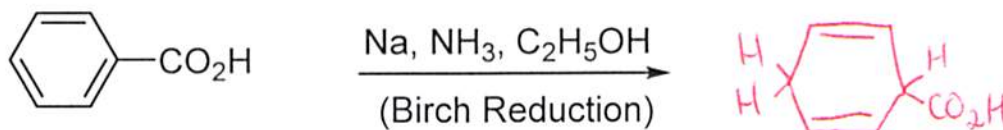
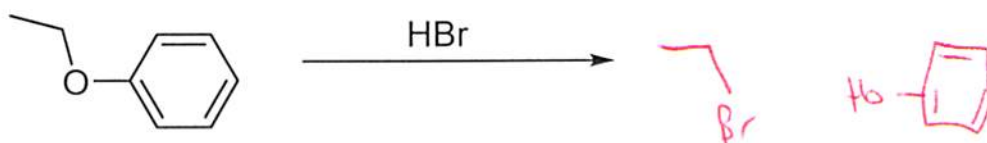
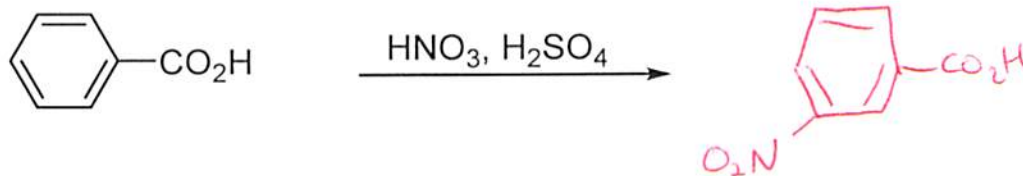
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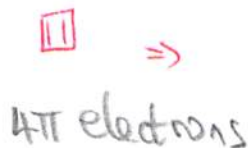
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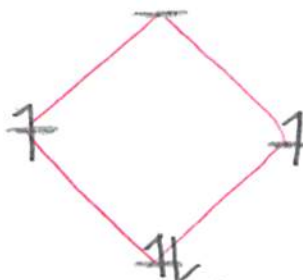
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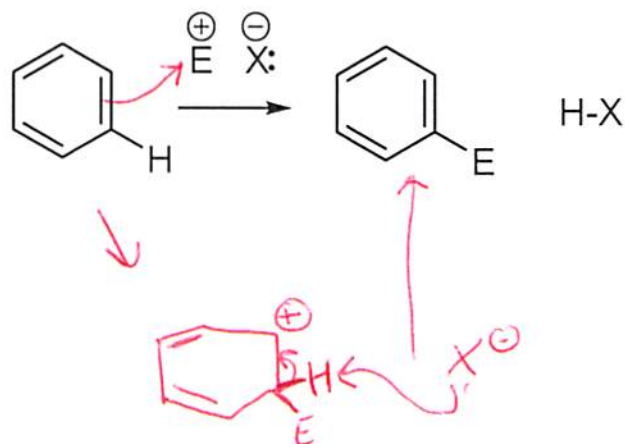


 4π electrons



TWO HIGH ENERGY
 UNPAIRED ELECTRONS
 ⇒ A.A.

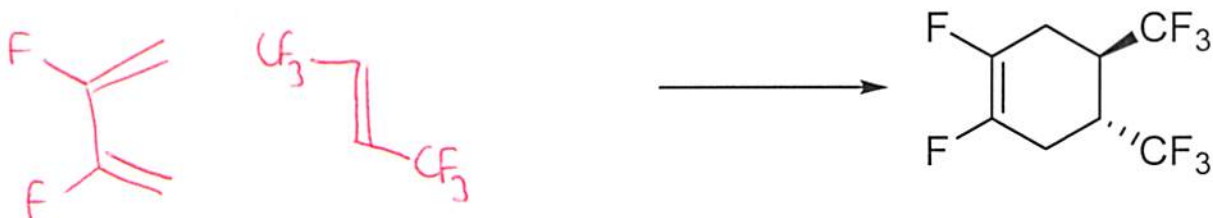
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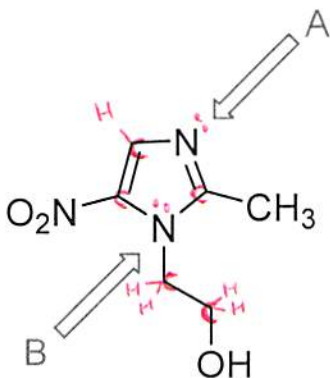
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Zero

d) Which ring Nitrogen (A or B) is more basic? (1pt)

A

e) Justify your answer to part (d) in one sentence. (1pt)

Protonation of B would destroy the aromaticity, whereas protonation of A does not impact the aromaticity.

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