

06

Sem - VI

DSE - III

MONDAY

MONDAY

Green Chemistry

FEBRUARY

12

Emerging Green Technologies.

Currently, the emerging green techniques can be categorized into following parts.

1. Microwave Chemistry
2. Sonochemistry
3. Photochemistry
4. Electrochemistry.

1. Microwave Chemistry

Microwaves have wavelength between 1 cm and 1 m (frequencies 30 GHz to 300 Hz). These are similar to frequencies of radar and telecommunication devices. In order to avoid interference with these systems, the frequency of radiation that can be emitted by

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30	31					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

House hold and industrial microwave oven is regulated and most of the appliances operate at a fixed frequency of 2.45 GHz.

Reactions in microwave energy instead of conventional heating can manifest in highly accelerated reaction rates.

- (ii) improved yield
- (iii) stereo or regioselectivity in some cases.
- (iv) reduction in side products and
- (v) limited amount of solvent needed.

Reactions Conducted in Microwave.

Microwave heats polar molecules due to selective absorption of microwave radiation. Non polar molecules are inert. Reaction can be classified in two categories in microwave.

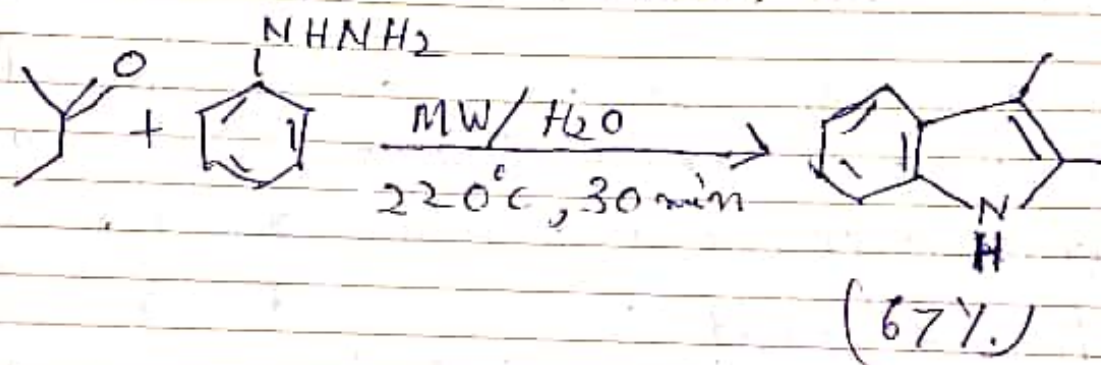
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OR WK: ~~DEFRIDAY~~

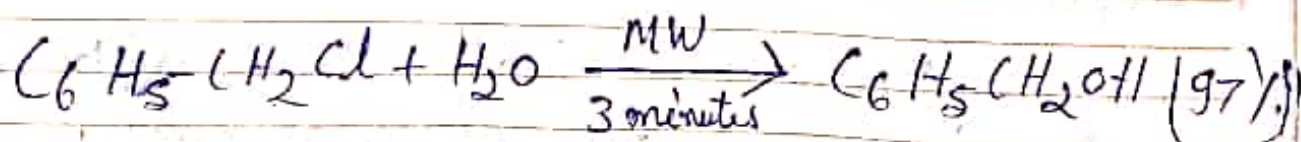
WEDNESDAY

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(A) Microwave Reactions, using Solvent
 (i) 2,3-Dimethyl indole was obtained
 from Phenyl hydrazine and butane-2-one
 at 220°C for 30 minutes.



(ii) Hydrolysis of benzyl chloride into
 benzyl alcohol takes 3 minutes in
 microwave while conventional method
 takes 35 minutes.

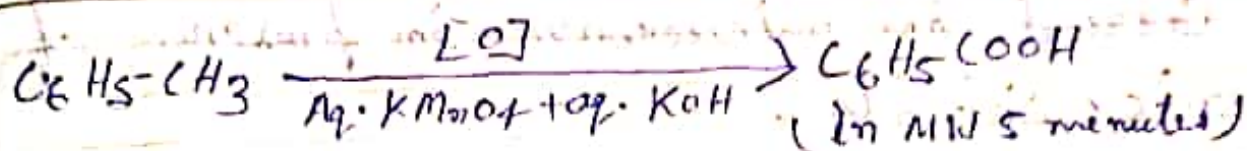


(iii) Various types of oxidations can be
 achieved in microwave in a very less time.

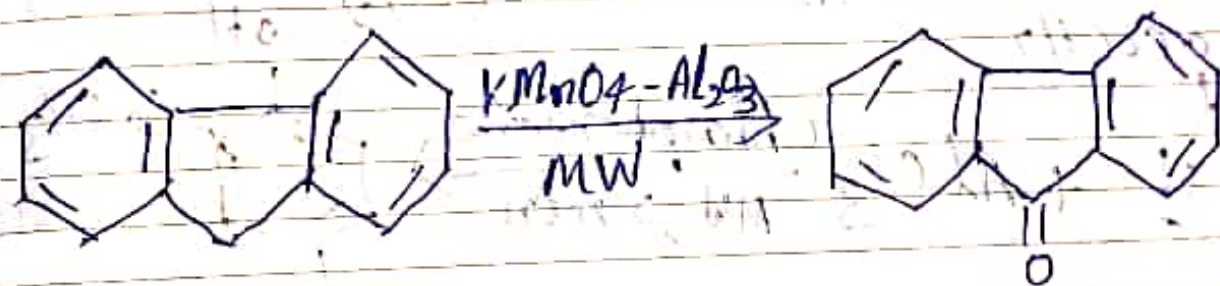
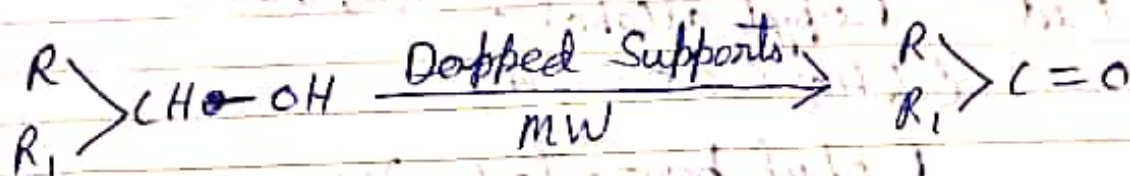
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Conventional heating 12 hours.

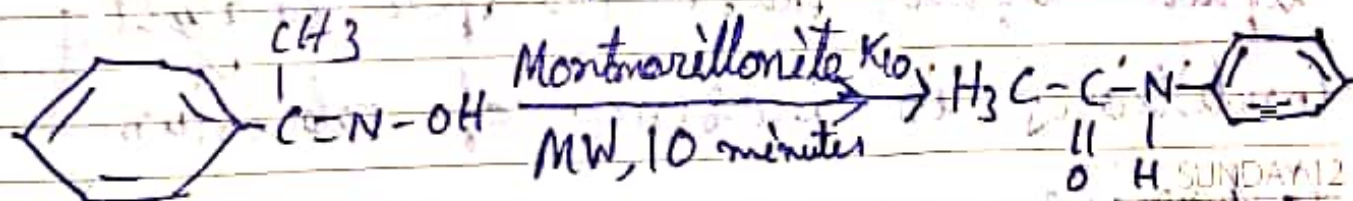


(iv) Organic reaction like esterification of alcohol, esterification of benzyl ethers using LnBr_3 , Fried rearrangement, orthoester Claisen rearrangement, Diels-Alder reaction, decarboxylation, Chalcone and aziridine synthesis can

(B) Microwave Solvent Free Reactions:

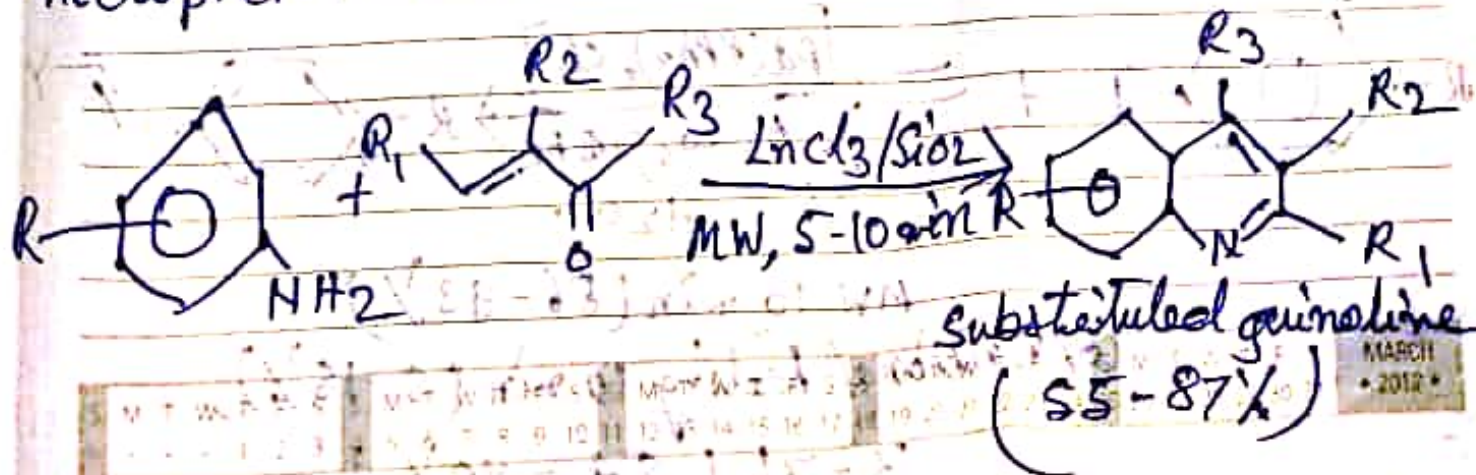
(i) Cyclo Condensation of N-(Carbo trifluoro methyl) ortho arylene diamines on dry K_{10} in dry media Under MW irradiation for 2 minutes give high yield while by classical heating, only traces of heterocycles are observed.

Beckmann rearrangement.

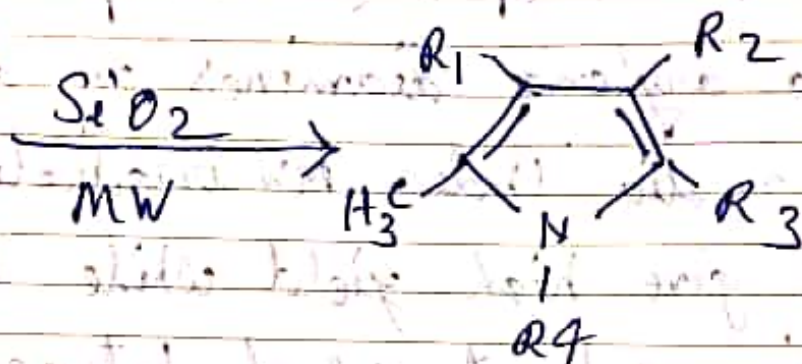
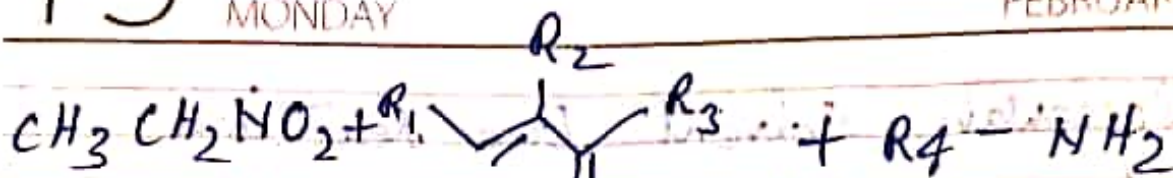


Acetophenone oxime

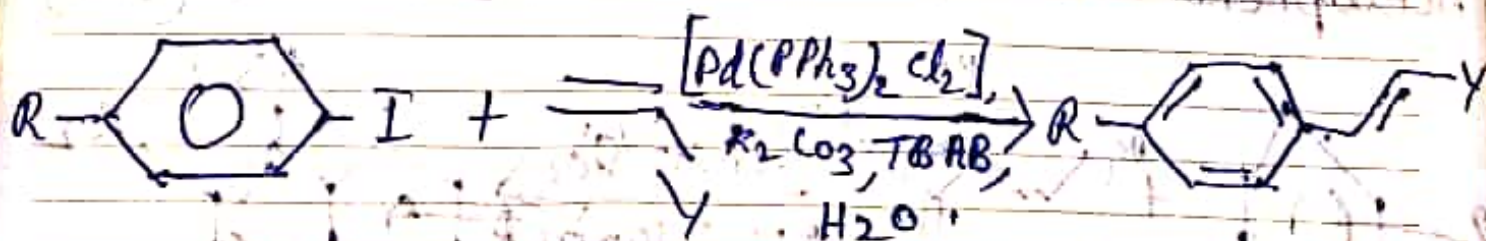
Acetanilide (91%)



Substituted guanine
(55-87%)



(ii) Heck Cross Coupling reaction can be done in same way under solventless, liquid-liquid phase transfer catalytic conditions in presence of Potassium Carbonate



MW 10 min (86-93%)

Conventional heating 10 min (5-15%)

3-7h (54-90%)

(iii) Aromatic aldoximes were converted to the corresponding nitriles in microwave oven in the presence of molecular sieve-type modified, zeolite, Ersohb, Under solvent free conditions.

