

Final Exam in Organic Chemistry for 2nd Year (Biology) Students

Answer the following questions:

Question [1] Outline each of the following synthesis:

- 4-hydroxy pentanoic acid from acetoacetic ester.
- 2-Ethyl-1,3-butanediol from acetoacetic ester.
- Succinic acid from 1,4-butanediol.
- Adipic acid from cyclohexanol.
- β,β -dimethylacrylic acid from ethylcyanoacetate + acetone.
- Acetyl acetone from ethyl acetate.
- Racemic tartaric acid from fumaric acid.
- Maleic anhydride from malonic acid.

Question [2] Outline all steps in each of the following synthesis:

- Fumaric acid from malonic acid.
- 1-Phenyl-3-methylpyrazol-5-one from ethylacetoacetate.
- 2,4,5-trimethyl imidazole from ethyl methyl ketone.
- Pyrrole from hexa-1,5-diene.
- Ethyl-2-methyl butanoate from diethyl malonate.
- 2,5-dimethyl thiophene from acetyl acetone.

Question [3] Illustrate by mechanistic equations each of the following:

- Maleic acid + Br_2 .
- Lactic acid + I_2/NaOH .
- Fumaric acid + Perbenzoic acid.
- Urea + Maleic anhydride.
- Acrylic acid + HCl .

Question [4] Give the structures (including configurations) of compounds (A) through (E)

