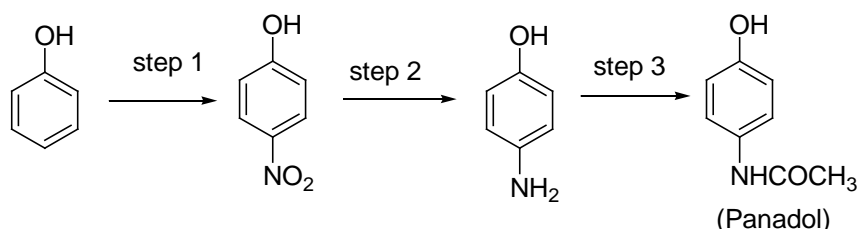
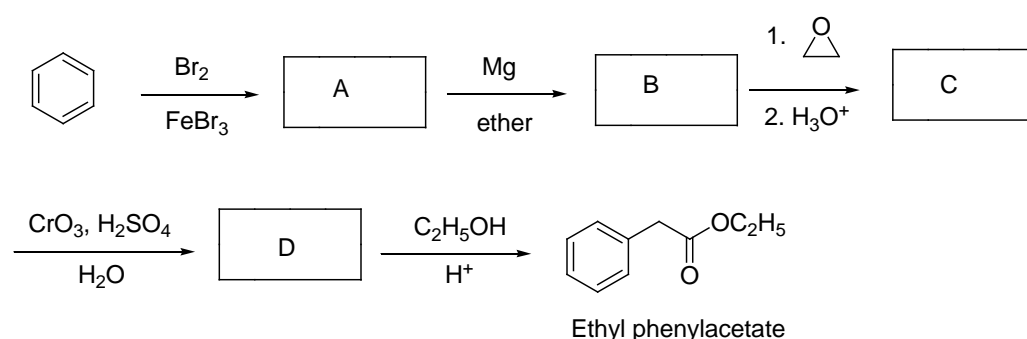


請務必於試卷紙上作答，違者該科不於計分。

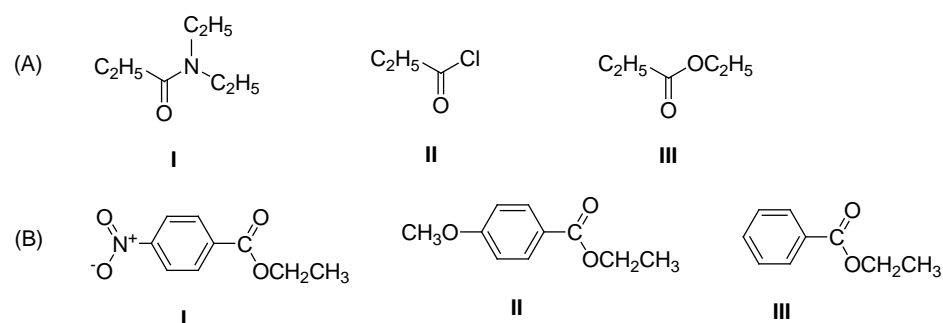
1. Acetaminophene (trade name, panadol) an antipyretic analgesics can be synthesized through the following reactions. Give the reagent(s) for each step (9%)



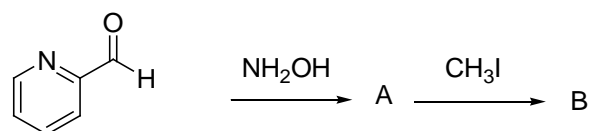
2. Ethyl phenylacetate, a pleasant smelling compound used in perfumery. Give structure for each intermediate in the blank (A-D) for the synthesis of ethyl phenylacetate (12%)



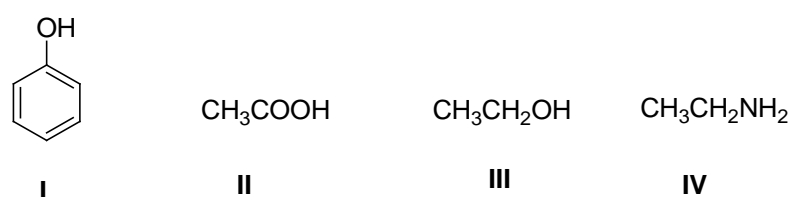
3. What is the order of *decreasing* reactivity towards nucleophilic acyl substitution for the carboxylic acid derivatives? (most reactive first) (6%)



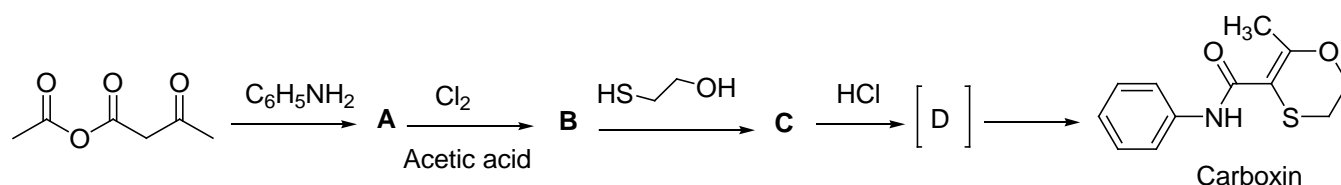
4. Pralidoxime iodide (B) is a general antidote for poisoning by many insecticides. The drug is made in two steps starting with pyridine-2-carbaldehyde. What is the structure of A and B? (6%)



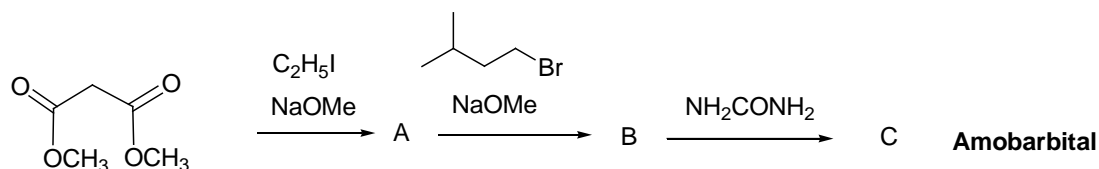
5. Rank the following compounds in order of *decreasing* acidity? (most acidity first) (6%)



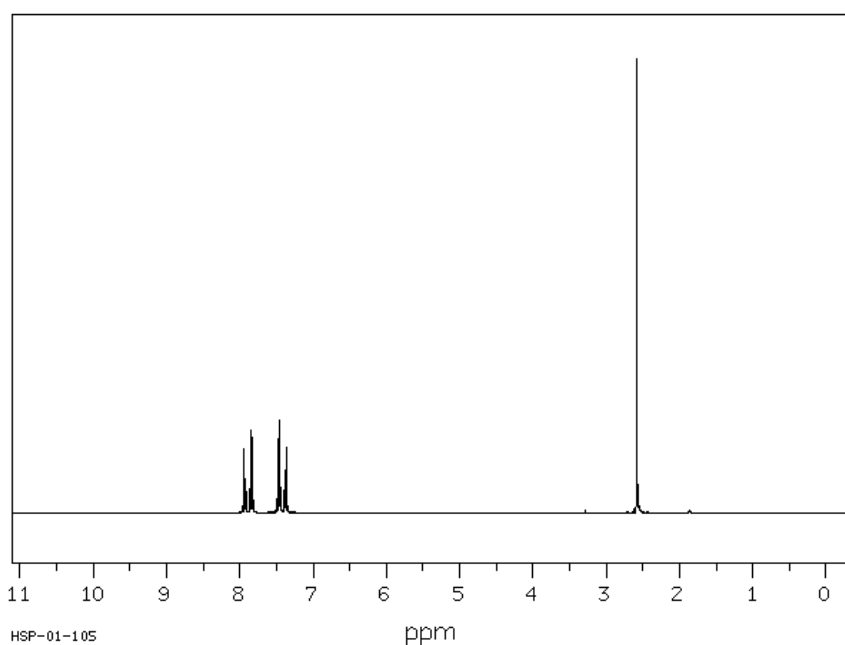
6. Carboxin, marketed as Vitavax, is a fungicide used on corn and wheat. A synthesis of carboxin is shown: What is the structure of **A**, **B**, **C**, and **D**? (12%)



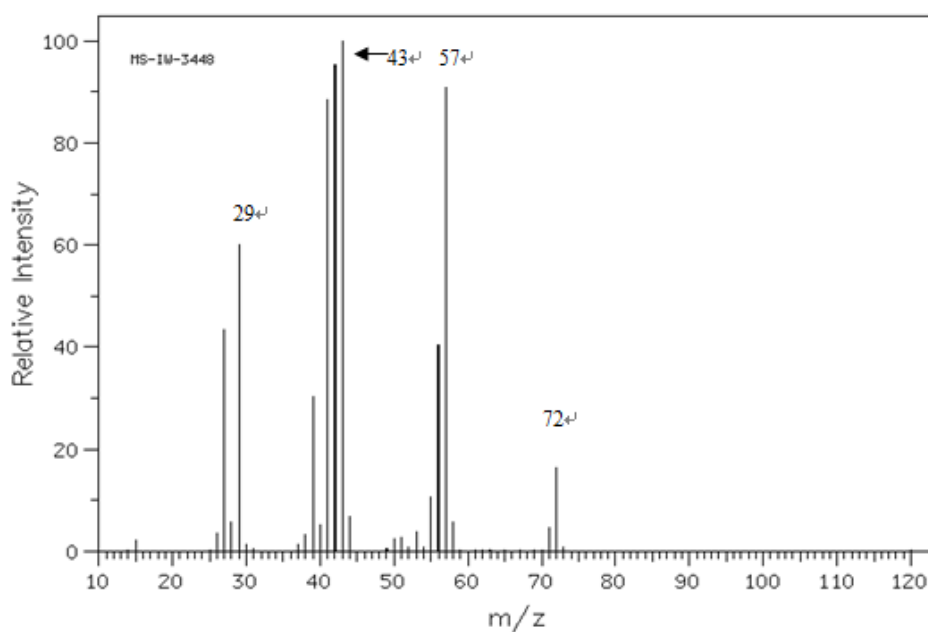
7. Amobarbital, a hypnotic and sedative drug, can be synthesized by following sequential reactions. What is the structure of **A**, **B**, **C**? (9%)



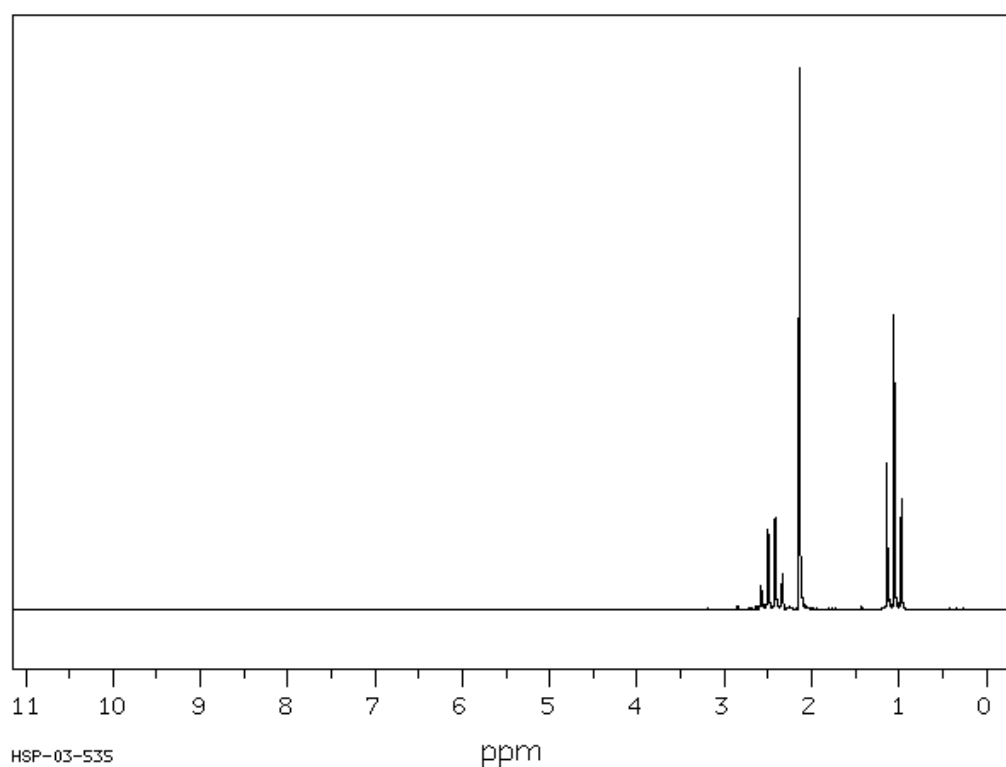
8. Propose structure for compound ( $C_8H_9Br$ ) that fit the following  $^1H$ -NMR data:  $\delta$  2.0 (3H, d,  $J = 7$  Hz);  $\delta$  5.0 (1H, q,  $J = 7$  Hz);  $\delta$  7.3 (5H, s). (5%)
9. A compound, molecular formula  $C_8H_7ClO$ , has  $^1H$ -NMR spectrum shown below. Propose a structure for this compound (5%)



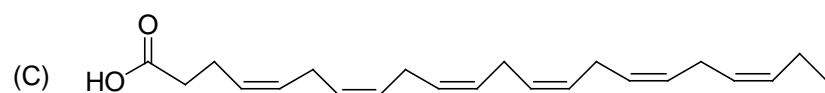
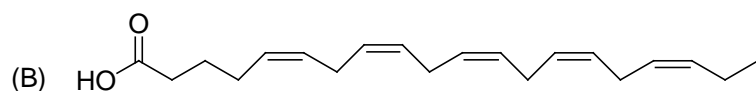
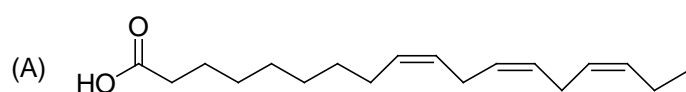
10. Refer to the mass spectrum of 2-methylbutane shown below to answer the following questions. (a) What peak represents  $M^+$ ? (b) What peak represents the base peak? (c) Propose structures for fragment ions at  $m/z = 57$ , 43, and 29. (10%)



11. A compound, molecular formula  $C_4H_8O$ , has  $^1H$ -NMR spectrum shown below. Propose a structure for this compound (5%)



12. Refer to the structures of  $\omega$ -3 fatty acids (A,B,C) shown below to answer the following questions. (a) What position in the carbon chain of A, B, and C represents  $\omega$ -3? (b) What is the structure of EPA? (c) What is the structure of DHA? (6%)



13. Draw a separation flow sheet to show how to isolate each compound from the a mixture of A + B + C. [A = benzoic acid, B = aniline, C = isobutyl benzene] (6 %)
14. The reaction of *n*-hexyne with catecholborane yields A which is followed to react with *o*-methoxybromobenzene in the presence of  $Pd(PPh_3)_4$  and sodium ethoxide to yield B. What is the structure of A? (3%)

