

Name

Student Code

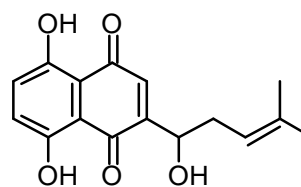
32<sup>nd</sup> IChO • Problem 1

10 points

### Synthesis of Compounds with Wound Healing Properties



Shikonin is a red compound found in the roots of the plant *Lithospermum erythrorhizon* which grows in Asia. Extracts of the root have been used for centuries in folk medicine and are used today in ointments for healing of wounds.



Shikonin

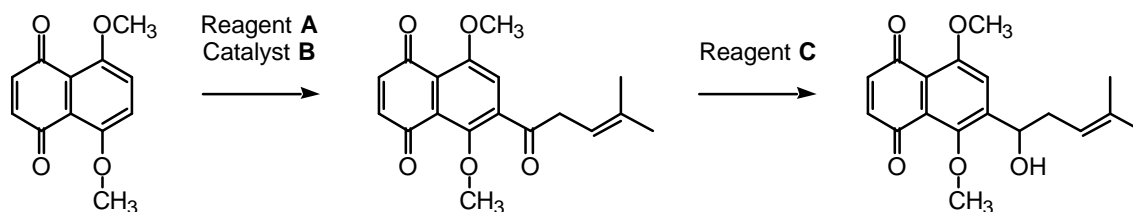
1-1 How many stereoisomers of Shikonin are possible ?

1-2 Do all stereoisomers of Shikonin have the same melting point ?

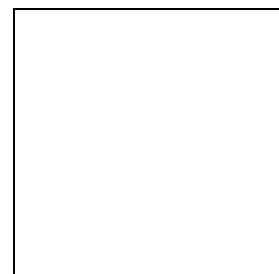
Mark with an X.

yes	no

The following sequence is part of a synthetic route to Shikonin:



1-3 Draw the structural formula of reagent A.



1-4 Indicate (by means of an X in the appropriate check-box) the correct IUPAC name for reagent A.

2-Methyl-2-pentenoyl chloride

1-Chloro-4-methyl-3-pentene

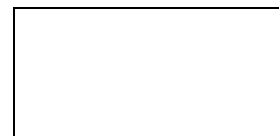
4-Methyl-3-pentenoyl chloride

4-Methyl-3-pentene-1-ol

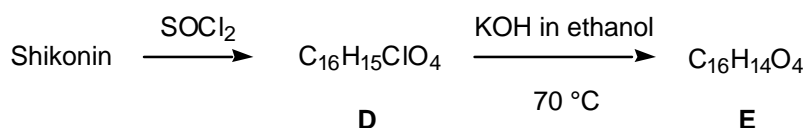
4,4-Dimethyl-3-butenoyl chloride


1-5 Write the molecular formula of reagent C.



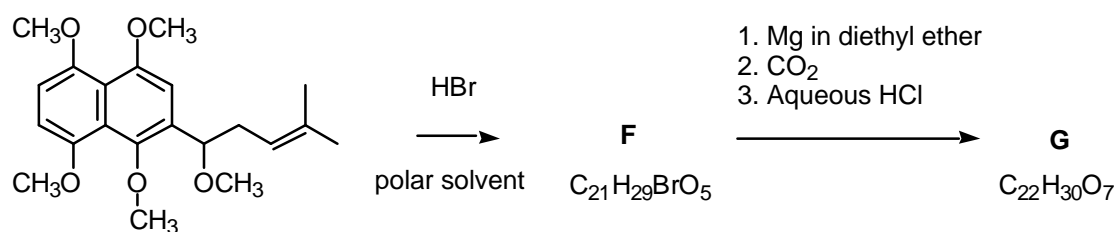
Numerous Shikonin analogues have been synthesized with a view to obtaining more potent compounds. One reaction sequence is shown below:



1-6 Draw the structural formula of compound **E**.

1-7 How many stereoisomers of compound **E**, if any, are possible

Another route to useful Shikonin analogues is the following:



1-8 Draw the structural formula of compound **F**.

1-9 Draw the structural formula of compound **G**.