Since the C=O is outside the ring, it does not affect whether the compound is aromatic. One of the oxygen e-pairs becomes part of the π-system (making it aromatic), which forces the other pair to be π to the system.

Part A: \[ A \rightarrow A' \] 166°C
Part B: \[ B \rightarrow B' \] 202°C
Part C: \[ A + B \rightarrow A' + B' \]

Below RT → kinetic product
@ RT → mix
Above RT → thermodynamic product

* There is not necessarily any connection between thermodynamic stability and melting point. Melting point is determined by the way a compound packs with itself to form a crystal, not on the energy involved to make the molecule.

In this case, since the product formed in part C at below RT had a MP close to \( A' \), \( A' \) is the kinetic product, and since the product formed @ high T (above RT) had a MP close to \( B' \), \( B' \) is the thermodynamic product. The fact that the product formed @ low T had a low MP is coincidence.
If A' is the therm. product, this can not occur, since the formation of A' would be the least reversible. If, instead, A' is the kinetic product, it could decompose to form semicarbazide (and A) which could react with B to form B', the therm. product. The reaction can be said to occur at the mp of the product differs (drastically) from the reactants.

\[
\text{C}_5\text{H}_4\text{Cl} \quad \delta 1.764, 9, 2H \\
\delta 1.557, 5, 6H \\
\delta 1.036, 4, 3H \\
\text{C}_8\text{H}_{10} \quad \delta 7.04, 5, 4H \\
\delta 2.296, 5, 6H
\]

C5H11Cl → O D.O.U.

Method #1 - Chemical shift

No \(\delta > 2\), so no hydrogens on a carbon next to Cl, so there must be 3 carbons attached.

Since there are only 5 carbons total, 4 are established using \(\delta_1\), the last carbon must be attached to one of the methyl groups established initially.
Method #2: Symmetry

Given an integration of 6, there must be at least two chemically equivalent groups; either two methyl groups or 3 methylene (-CH₂-).

Based on the small size of the molecule, it is much more likely that it has 2 equivalent methyl groups, which means there cannot be any hydrogen neighbors, which means there must only be C or Cl at that point.

Method #3: Splitting

An integration of 3 usually corresponds to a methyl group, which is useful since it is an end of the molecule.

In this molecule, there is a triplet with integration 3, only two neighbors:

The only peak that integrates to 2 is a quarter, which means it only has hydrogen neighbors on one side.
$C_8H_{10} \rightarrow 4 \text{ D.O.U.}$

$\bigcirc \rightarrow \text{Has 4 D.O.U., and } 7 \leq \delta \leq 8$

2 absorbances 4 absorbances 3 absorbances

Will not have integration of 6.

5 absorbances