1. Which of the following compounds gives a new product on reaction with H₂CrO₄ and decolorizes Br₂ in CCl₄?

(a) [Diagram of compound]

(b) [Diagram of compound]

(c) [Diagram of compound]

(d) [Diagram of compound]

2. Give the IUPAC name for the following compound.

2-methylbutanal

3. Draw the structure of 2,3-dimethylcyclopentanone.

4. Predict the product of each of the following reactions.

(a) [Reaction diagram]

(b) [Reaction diagram]

5. Propose a synthesis of each of the compounds indicated from the given starting materials and any other needed reagents.

(a) [Synthesis diagram]
6. Propose a mechanism for the reaction shown.

\[
\text{CH}_3\text{CO}_2\text{CH}_3 + 2 \text{C}_2\text{H}_5\text{MgBr} \rightarrow \text{CH}_3\text{OMgBr} + \text{CH}_3\text{C(C}_2\text{H}_3)_2
\]

7. An unknown has the formula \( \text{C}_4\text{H}_6\text{O} \) and a strong peak in the IR spectrum near 1690 cm\(^{-1}\).

The \( ^1\text{H} \) NMR spectrum is:
- doublet, \( \delta 2.0, 3\text{H} \)
- multiplet, \( \delta 6.1, 1\text{H} \)
- multiplet, \( \delta 6.9, 1\text{H} \)
- doublet, \( \delta 9.5, 1\text{H} \)

Give the structure of this unknown.