Liquefying paint – answer sheet

Retrieval practice and quick-fire questions to revise your chemistry knowledge

3. Now test yourself by answering as many of these 10 quick questions as you can.

a. Two p orbitals overlap to form a \( \pi \) orbital

b. **Acid:** C=O 1680-1750 cm\(^{-1}\); O-H (acid) 2500-3000 cm\(^{-1}\) (broad); C-O 1000-1300 cm\(^{-1}\)
**Ester:** C=O 1680-1750 cm\(^{-1}\); C-O 1000-1300 cm\(^{-1}\)

c. Fluoromethane is the most polar due to the strong dipole in the C-F bond.
   In methane the small dipoles of the individual C-H bonds cancel out, so methane is non-polar.
   In dichlorodifluoromethane there is a dipole symmetrically between the two C-Cl bonds and a bigger dipole
   in the opposite direction directly between the two C-F bonds. Overall, this results in a small molecular
   dipole directly between the C-F bonds. However, it is smaller than the dipole in fluoromethane because the
   two C-F dipoles are vector quantities and cancel each other out in one direction.

d. **Initiation:** \( \text{Cl}_2 \rightarrow 2\text{Cl}^* \)
   **Propagation:** \( \text{CH}_2\text{Br}_2 + \text{Cl}^* \rightarrow \ast\text{CHBr}_2 + \text{HCl} \)
   \( \ast\text{CHBr}_2 + \text{Cl}_2 \rightarrow \text{CHBr}_2\text{Cl} + \text{Cl}^* \)
   **Termination:** \( \ast\text{CHBr}_2 + \text{Cl}^* \rightarrow \text{CHBr}_2\text{Cl} \)

e. **Reduction:** \( 3\text{e}^- + 4\text{H}^+ + \text{VO}_2^+ \rightarrow \text{V}^{2+} + 2\text{H}_2\text{O} \)
   **Oxidation:** \( \text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^- \)
   **Redox:** \( 8\text{H}^+ + 2\text{VO}_2^+ + 3\text{Zn} \rightarrow 2\text{V}^{2+} + 4\text{H}_2\text{O} + 3\text{Zn}^{2+} \)

f. 3-phenyl pentanedioic acid
g. benzyl propanoate

h. Products:

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\begin{align*}
\text{H}_3\text{C}_17 & \quad \text{O}^- \text{Na}^+ \\
\text{H}_3\text{C}_17 & \quad \text{O}^- \text{Na}^+ \\
\text{H}_2\text{C}_17 & \quad \text{O}^- \text{Na}^+ \\
\text{HO} & \quad \text{OH} \\
\text{HO} & \quad \text{OH}
\end{align*}
\]

i.

\[
\begin{align*}
\text{O} & \quad \text{C} \quad \text{C} \quad \text{C} \\
\text{C} & \quad \text{C} \quad \text{O} \quad \text{C} \\
\text{H} & \quad \text{H} \quad \text{H} \quad \text{H} \\
\text{H} & \quad \text{H} \quad \text{H} \quad \text{H}
\end{align*}
\]

j. A central transition metal ion surrounded by ligands. Ligands are ions or molecules with a lone pair of electrons that form a coordinate bond with the transition metal ion or metal.