ALCOHOLS: REPLACING THE -OH GROUP BY A HALOGEN

1. a) You would get a violent reaction producing clouds of steamy fumes.

   b) Anything which contains a covalently-bound -OH group. Obvious examples are water or a carboxylic acid such as ethanoic acid, CH_3COOH.

2. Method 1: Heat the ethanol with a mixture of potassium (or sodium) bromide and concentrated sulphuric acid, distilling off the product..

   Method 2: Heat the ethanol under reflux with a mixture of red phosphorus and bromine, and then distill off the product.

3. a) $CH_3CH_2CH_2OH + HI \longrightarrow CH_3CH_2CH_2I + H_2O$

   b) Concentrated sulphuric acid is a strong oxidising agent and oxidises iodide ions in the potassium iodide to iodine instead of producing hydrogen iodide. Concentrated phosphoric(V) acid doesn't do this.

   c) $2P + 3I_2 \longrightarrow 2PI_3$

   $3CH_3CH_2CH_2OH + PI_3 \longrightarrow 3CH_3CH_2CH_2I + H_3PO_3$

4. a) $CH_3CH_2CH_2CH_2OH + SOCl_2 \longrightarrow CH_3CH_2CH_2CH_2Cl + SO_2 + HCl$

   b) The other products of the reaction are gases and so remove themselves from the reaction mixture.

   c) The reactions are too slow apart from with tertiary alcohols.

   d) PCl_3

   $3CH_3CH_2CH_2OH + PCl_3 \longrightarrow 3CH_3CH_2CH_2Cl + H_3PO_3$