**Exercise 2.2.2 Halogenoalkanes**

1. **Structure and isomerism**
2. Deduce the molecular formula of the first four members of the homologous series of chloroalkanes.
3. Draw and name the first two chloroalkanes.
4. How many chloroalkanes are there with three carbon atoms? Draw and name them.
5. How many chloroalkanes are there with four carbon atoms? Draw and name them.
6. How many dichloroalkanes are there with three carbon atoms? Draw and name them.
7. **Hydrolysis of halogenoalkanes**
8. Define the terms:

|  |  |
| --- | --- |
| Substitution |  |
| Nucleophile |  |

1. Explain why halogenoalkanes react with nucleophiles.
2. Write an equation for the reaction of bromoethane with sodium hydroxide and state the conditions required for the reaction.
3. Show the mechanism for the reaction of bromoethane with sodium hydroxide.
4. Using structural formulae, write equations to show the following reactions and name the organic product:
5. 1-bromopropane with potassium hydroxide
6. 2-bromopropane with hydroxide ions
7. 2-iodomethylpropane with sodium hydroxide
8. Describe and explain an experiment which could distinguish between 1-chlorobutane, 1-bromobutane and 1-iodobutane. State what you would see and write an equation for one of the reactions taking place.
9. Which of the three halogenoalkanes would react the fastest? Explain your answer.

**3. Uses and dangers of halogenoalkanes**

1. Draw two repeating units of polychloroethene and state a use for this polymer.
2. Draw two repeating units of polytetrafluoroethene and state a use for this polymer.
3. Explain why halogenated plastics are particularly difficult to dispose of.
4. What is a CFC? Draw and name one example.
5. State three uses of CFCs and state the three properties of CFCs which made them useful for this purpose.
6. Explain why CFCs are now banned.
7. State three chemicals which are now widely used instead of CFCs.
8. Explain two advantages of using CO2 instead of CFCs as a blowing agent for expanded polymers.