

1,4-dichlorobenzene

2. (a) triiodomethane
 (b) 3-chloro-2-methylpropene
 (c) dichloromethane
 (d) 1,2,3-tribromopropane

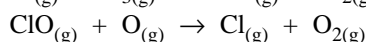
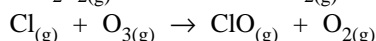
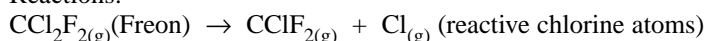
PRACTICE

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Understanding Concepts

3. flow chart: Freon decomposed by UV radiation → reactive chlorine atoms → chlorine atoms react with ozone molecules in upper atmosphere → oxygen → ozone layer depleted, reducing protection from harmful UV radiation

Reactions:



4. late 1800s: NH_3 , CH_3Cl , SO_2 used; leakage of these toxic refrigerants caused fatal accidents
 1930: Freon used; in 1970s, ozone holes in upper atmosphere discovered, attributed to reaction with Freon
 after 1970: HCFCs and HFCs studied for use as refrigerants, readily decomposed, less time to damage ozone layer
 1995: HFC-134a most commonly used refrigerant; contains no chlorine, the atom responsible for damage to ozone layer
5. (a) $\text{HCF}_2\text{Cl} + \text{OH} \rightarrow \text{CF}_2\text{Cl} + \text{H}_2\text{O}$
 $\text{HCF}_3 + \text{OH} \rightarrow \text{CF}_3 + \text{H}_2\text{O}$
 (b) The H atoms in these molecules react with OH^- ions in the air; CFCs contain no H atoms.
 (c) Since they decompose readily (because of their weaker bonds), they exist for a shorter time and thus, are less likely to cause damage.

Explore an Issue: Role Play: Can We Afford Air Conditioning?

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- (a) (Sample answers)
- financial cost: price of air conditioner to consumer, price of added gasoline required, cost to manufacturer, added taxes;
 - social: employment from manufacture and sale of air conditioners and cars;
 - environmental: cost of damage to air quality from coolants and added fuel consumption, raw materials used;
 - political: effect on revenue to shareholders, economy, pressure on government to manage environment, etc.
- (b) (Sample answers)
- union representative: more production means more employment for members;
 - local MP: increased employment means better economy, more votes;
 - environmentalist: air conditioning an unnecessary consumption of fossil fuel as well as possible damage by coolant to environment;
 - reporter from car magazine: debate on issue provides material for articles;
 - physician: air quality directly related to health, particularly elderly or people with respiratory problems; air conditioning offers relief in very hot temperatures;
 - shareholders in car company: give consumers what they want, responsibility is to make a profit.