**Table 16-7: General Methods for the Preparation of Aldehydes and Ketones[^a]**

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| 1. oxidation of alkenes with ozone, $\text{ROH} + \text{HCHO} + \text{H}_{2}\text{O}$ | See Section 11.7A, of limited preparative use, mainly used to locate position of double bond in structure determination.
| 2. oxidative cleavage of 1,2-diol, $\text{ROH} + \text{HCHO} + \text{H}_{2}\text{O}$ | The 1,2-diol may be generated from alcohols in 1-[1] see discussion in Section 16.4A and Method[3], Table 16-8.
| 3. oxidation of primary alcohols, $\text{ROH} + \text{HCHO} + \text{H}_{2}\text{O}$ | See Section 16.4B, useful for the preparation of aldehydes; because with formic acid, further oxidation can be prevented by dialysis of the product out of reaction mixture.
| 4. oxidative cleavage of alicyclic ketones, $\text{ROH} + \text{HCHO} + \text{H}_{2}\text{O}$ | See Section 16.4A, often used to isolate alkyl aldehydes that can be distilled out of reaction mixture, thereby preventing condensation reactions. Aluminum amalgam or benzyl bromide can be used as catalysts; carbon-carbon double bonds are not attacked.
| 5. reduction of ketones with lithium aluminum hydride | See Sections 16.7A and 16.1C.
| 6. addition of Grignard reagents to 1,1-dimethylethylene (ethyl vinyl ether) | Ethanol and LiAlH$_4$ produce L-(1-haloalkan-1-ol) which is either than LiAlH$_4$ the amide must be tertiary (---) where R = -OH.
| 7. addition of organometallic compounds to 1,1-dimethylethylene | The reducing agent is prepared from LiAlH$_4$ and cyclohexylamine--it is easier to use LiAlH$_4$ see Method[3]; the preferred solvent is diethylene glycol dimethyl ether.
| 8. hydration of alkenes | A commercial synthesis of ethanal; see Section 10.5A.
| 9. hydration of aldehydes derivatives includes hydrogen sulfide addition compounds, acetics, oximes, Schiff's bases, hydrazones, and semicarbzones | More useful for the purifications than for preparation of aldehydes.
| 10. addition of carbon monoxide and hydrogen to alkenes | See Section 16.10.
| 11. hydroboration of alkenes and carboxylation of aldehydes | See Section 16.10, $\text{R}_2\text{B} + \text{HCHO}$.

**[^a]: Preparations of enantiomeric aldehydes are described in Chapters 22 and 25.**

**Table 16-8: General Methods for the Preparation of Ketones[^a]**
Contributors