This handout summarizes some reactions that involve converting between compounds in different chapters (Ch 4-14). Most of these (but not all) are reversible.

This is not intended to be complete, especially for details. It is an overview of some ideas, to help you organize.

I encourage you to make yourself a version of this with structures.

A. Alkenes and alcohols

```
          addition of water ("hydration") (Ch 4)
alkenes                   ⇄                          alcohols
          elimination of water ("dehydration") (Ch 8)
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(Elimination with alcohols can also give an ether; not discussed in book.)

B. Oxidation-reduction (redox) reactions

```
               [O]                 [O]
Ch 8 compounds ⇄ Ch 10 compounds ⇄ Ch 12 compounds
               [H]                 [H]

alcohols, of        aldehydes,        carboxylic
various degrees     ketones           acids
```

The first oxidation (Ch 8 → Ch 10) involves removing two H atoms. The second oxidation (Ch 10 → Ch 12) involves adding an O atom.

The reaction differences between the kinds of Ch 8 alcohols and between the Ch 10 carbonyl (>C=O) compounds are inherent in their specific structures. Look for the key features: Does the alcohol C have an -H available to be removed? Does the carbonyl C have an -H available to oxidize to -OH?

It is a good exercise to figure out the oxidation number for the C in the various compounds. Try the set of C_1 compounds: methane, methanol, methanal, methanoic acid, carbon dioxide. In these compounds H and O are "normal" (+1 and -2, respectively). (See Ch 12 quiz at web site.)

C. Combining things with the -OH of carboxylic acids (and reverse)

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alcohols (Ch 8)                                  esters (Ch 12)
                + carboxylic acids (Ch 12) ⇄
amines (Ch 14)                                   amides (Ch 14)
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There are a variety of special situations here, but this summarizes the logic.

(Simply mixing an amine and a carboxylic acid gives a salt; p 422.)