**supplement #9: Summary of Reactions to Alkyl Halides (RX)**

***Chemistry 3514 Organic Chemistry I***

Alkyl halides (RX) play a pivotal role in the game of organic synthesis we are soon to embark upon. Summarized below are the primary routes to make RX. We will be studying in detail, two of these reactions: the SN1 & SN2 routes to RX from alcohols ,and, the Markovnikoff & anti-Markovnikoff additions to RX from alkenes . Don’t worry about what these new terms mean for now. You are required to get list below into your permanent chemical memory. Note that the phase and critical conditions under which these reactions occur are part of what you should know.

**Synthetic routes to RX**

***1) from alkanes (RH)***

***notes & names***

**X2**(gas phase)/ uv

**RH RX {free radical route }**

or neat with HOX/uv we’ve already studied this one

***2) from alcohols (ROH)***

reflux

**2.1) ROH + HX**  (or w/NaX/H2SO4 & reflux) **RX + H2O {SN1/SN2 route } Classic route**

**(not so fast, not that efficient,**

in pyridine or KHCO3 rearrangements sometimes…but `classic’)

(weak bases)

**2.2) ROH +SOCl2 RCl + SO2 + HCl**

**Modern routes**

neat w/ bubbling (fast, efficient, no re-arrangements…& trickier)

**2.3)** **3ROH + PX3 3RX + H3PO3**

( phosphorus trihalides) or in ether/35 C

***3) from alkenes (C=C)***

HX or NaX/H2SO4

**3.1.) C=C** (with heat) **C-C-X (Markovnikoff/anti-Markkovnikoff addition)**

X2/gas or in CCl4

**3.2) C=C X-C-C-X Dihalide addition (halonium or bridgehead mechanism)**

X­2/H20

**3.3) C=C X-C-C-OH Vicinal Halohydrin addition (halonium/bridgehead)**

**| NBS/CCl4 |**

**3.4) C=C-C- C=C-C- allylic substitution (radical mechanism)**

**| light |**

**H Br**