

Nov 1 Ch 8 (cont'd)
 ⇒ physical properties

boiling point (physical meaning)

(1) more polar molecule typically has higher b.p.

	$\text{CH}_3-\overset{\text{O}}{\text{C}}-\text{CH}_3$	$\text{CH}_3-\text{CH}_2-\text{CH}_3$
dipole moment	1.31 D	0.08 D
b.p.	-23.7°C	-42.1°C

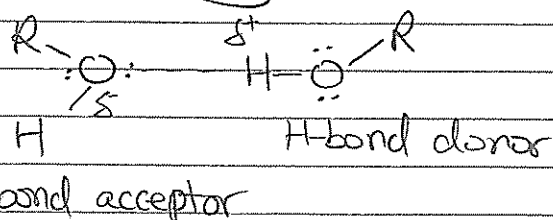
(2) larger molecules have greater intermolecular (van der Waals Force), thus higher b.p., which explains

that: R-Cl have about the same b.p. as alkanes of similar molecular weight

R-Br, R-I have lower b.p. than alkanes of same molecular weight

	$\text{CH}_3\text{CH}_2\text{Br}$	$\text{CH}_3(\text{CH}_2)_5\text{CH}_3$
m.w	109	100.2
b.p.	38.4°C	98.4°C

(3) hydrogen-bonding




$\text{CH}_3\text{CH}_2\text{-OH}$
 78°C (1.7 D)

CH_3OCH_3
 -24°C (1.3 D)

$\text{CH}_3\text{CH}_2\text{CH}_3$
 -42°C (0 D)

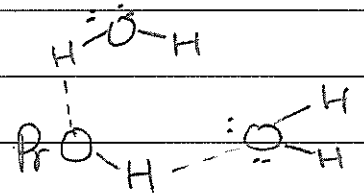
clicker Question: A (ethanol)

- Organic Solvents

Table 8.2 (p341) hexane, benzene, diethyl ether, Chloroform
 THF () , acetone ($\text{CH}_3\overset{\text{O}}{\parallel}\text{CCH}_3$), ethanol, DMSO ($\text{CH}_3\overset{\text{O}}{\parallel}\text{SCH}_3$), DMF

Solvent category	Criterion
<1> protic/aprotic	H-bond donors
<2> polar/apolar	high dielectric constant
<3> donor/nondonor	Lewis base

- Solubility: ^{rule:} like dissolves like



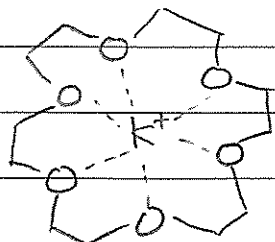
For example, water solubility: H_2O : protic/polar ($\epsilon=78$)/donor
 CH₃CH₂CH₂CH₃: virtually insoluble
 CH₃CH₂Cl: soluble
 CH₃CH₂OCH₃: miscible
 CH₃CH₂CHOH: miscible

<1>	aprotic	aprotic	aprotic	protic
<2>	apolar	apolar	apolar	polar
<3>	nondonor	nondonor	donor	donor
like water?	least			most

applications:

- cell membrane permeability (log P values) = $\log \frac{\text{Oct}}{\text{water}}$
 -1 < log P < 5 desired drug properties

- crown ethers: host-guest chemistry



[18]-crown-6 complex
 w/ K^+