

Welcome to BIO-105

Organisation of the course (2024)

- ◇ in class teaching (in class content is the reference content of the course)
Videos of previous editions not recommended.
- ◇ exercises start next week
- ◇ permitted support for the exam
 - 6 A4 sheets = 12 pages of text and/or figures
 - handwritten or printed is OK

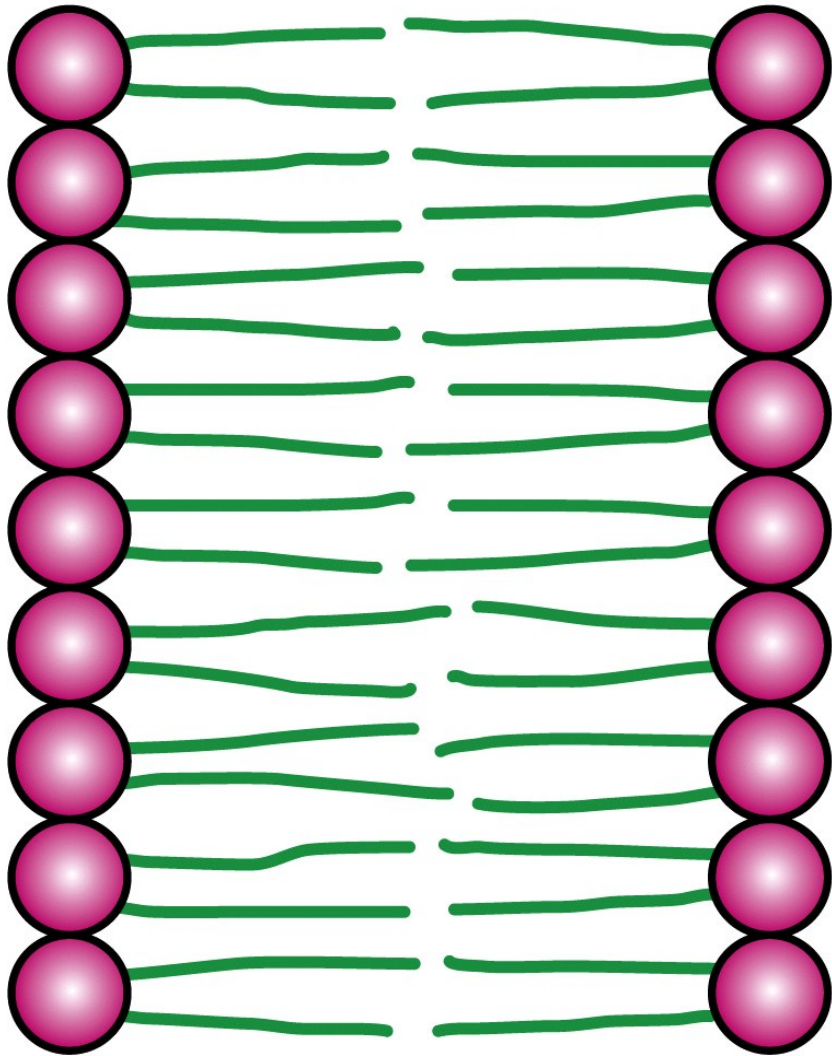
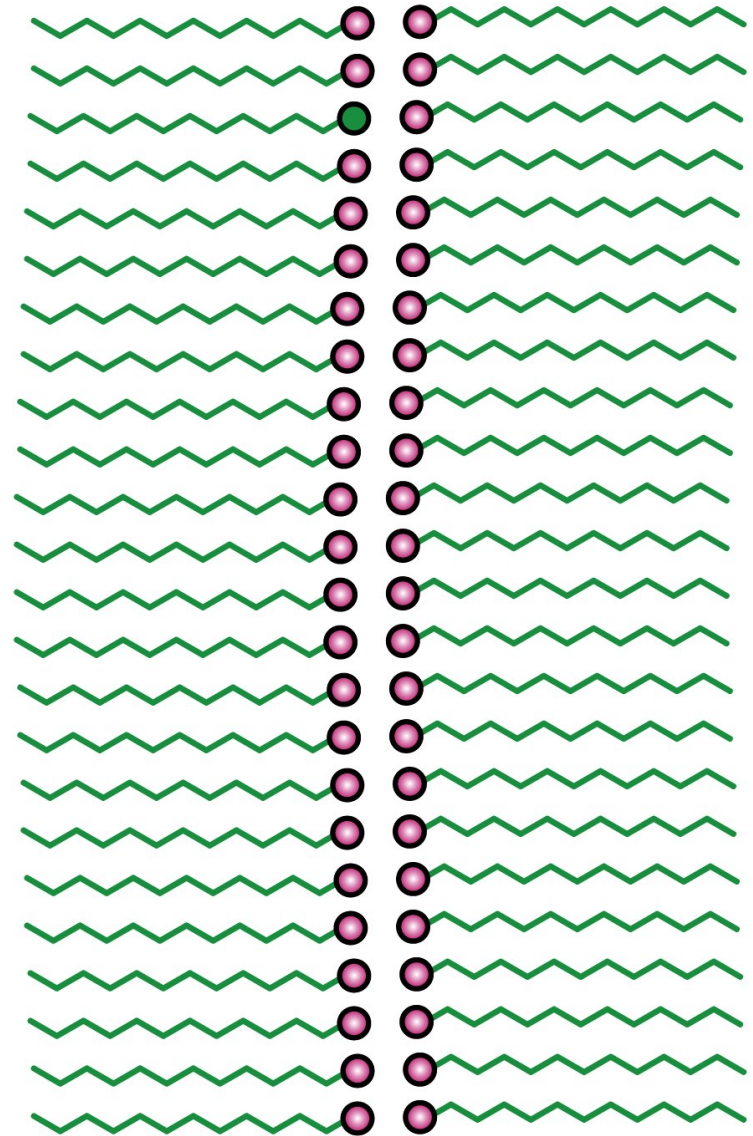
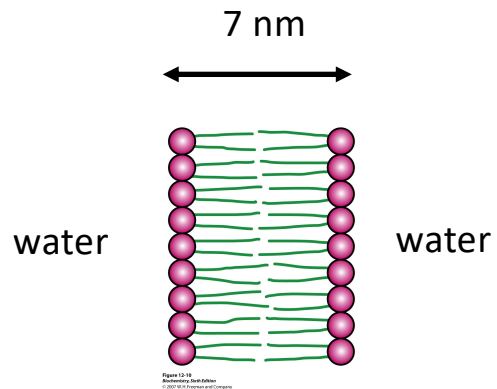


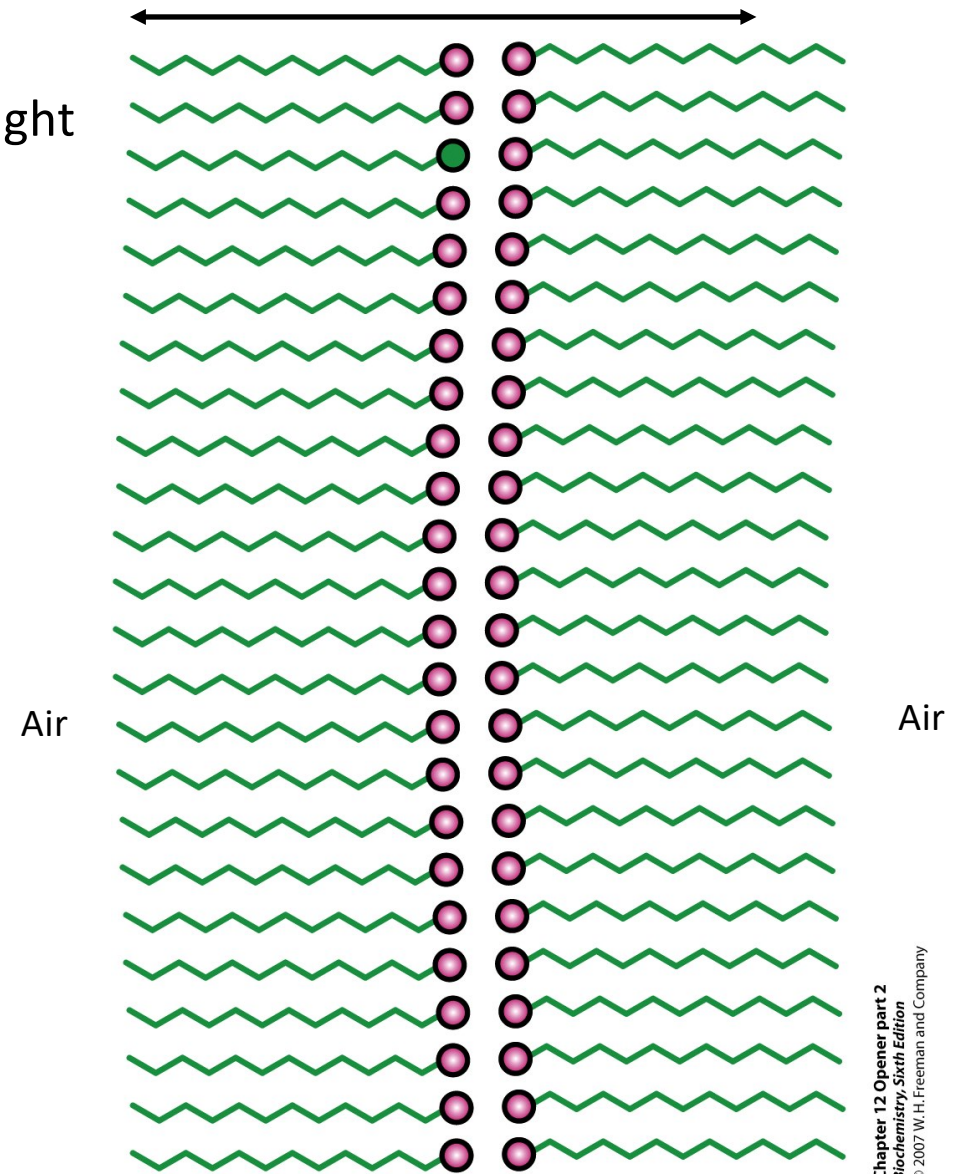
Figure 12-10
Biochemistry, Sixth Edition
 © 2007 W. H. Freeman and Company



Strayer's textbook does not have it right



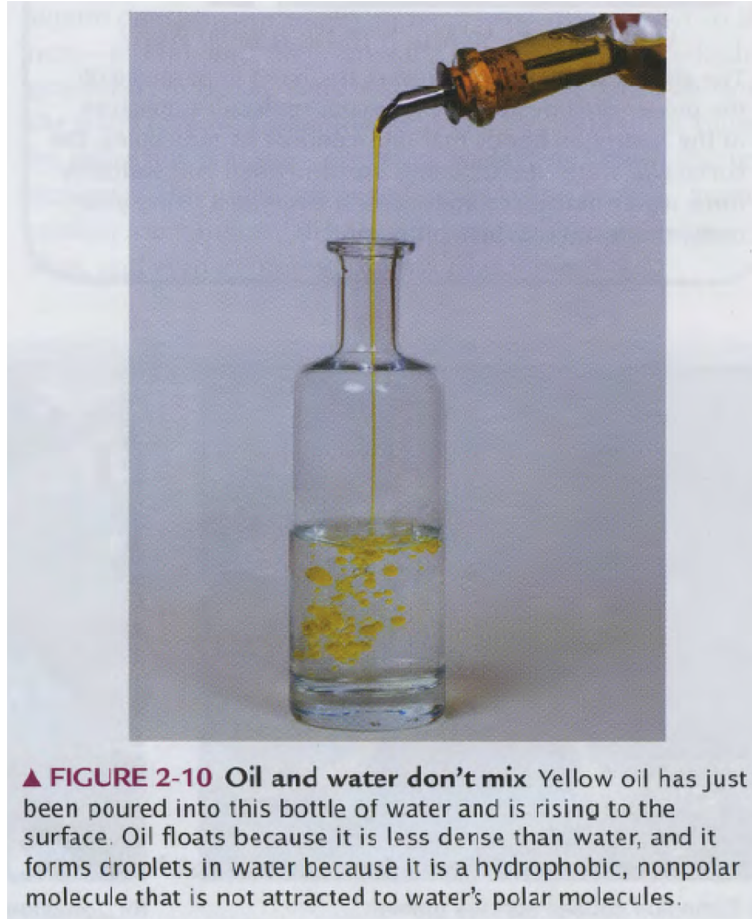
Cell membrane



Polarity and solubility

Water :

- polar
- hydrophilic



▲ **FIGURE 2-10 Oil and water don't mix** Yellow oil has just been poured into this bottle of water and is rising to the surface. Oil floats because it is less dense than water, and it forms droplets in water because it is a hydrophobic, nonpolar molecule that is not attracted to water's polar molecules.

Oil :

lipid

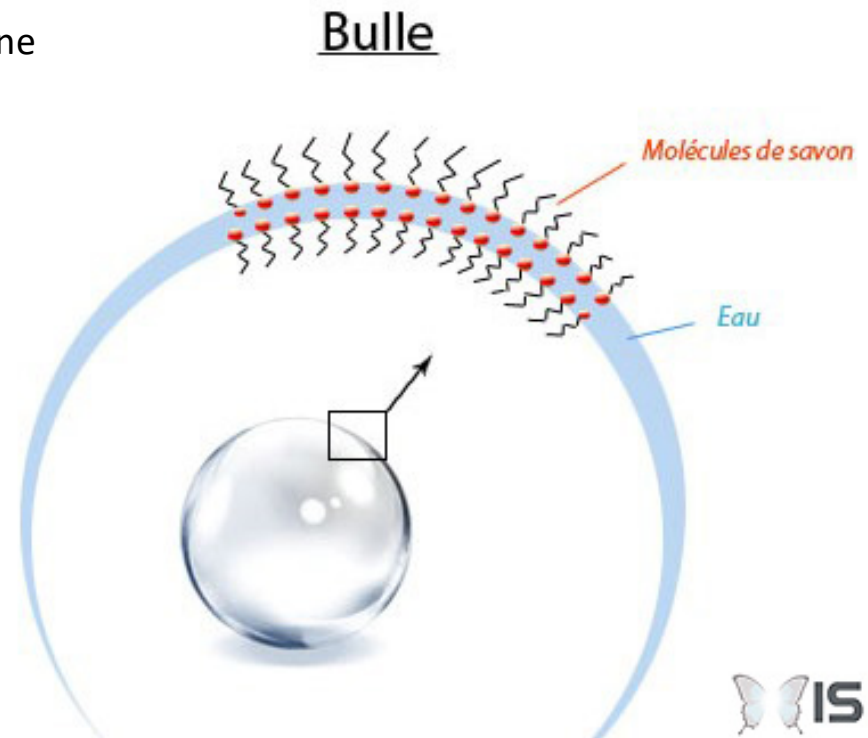
nonpolar

hydrophobic

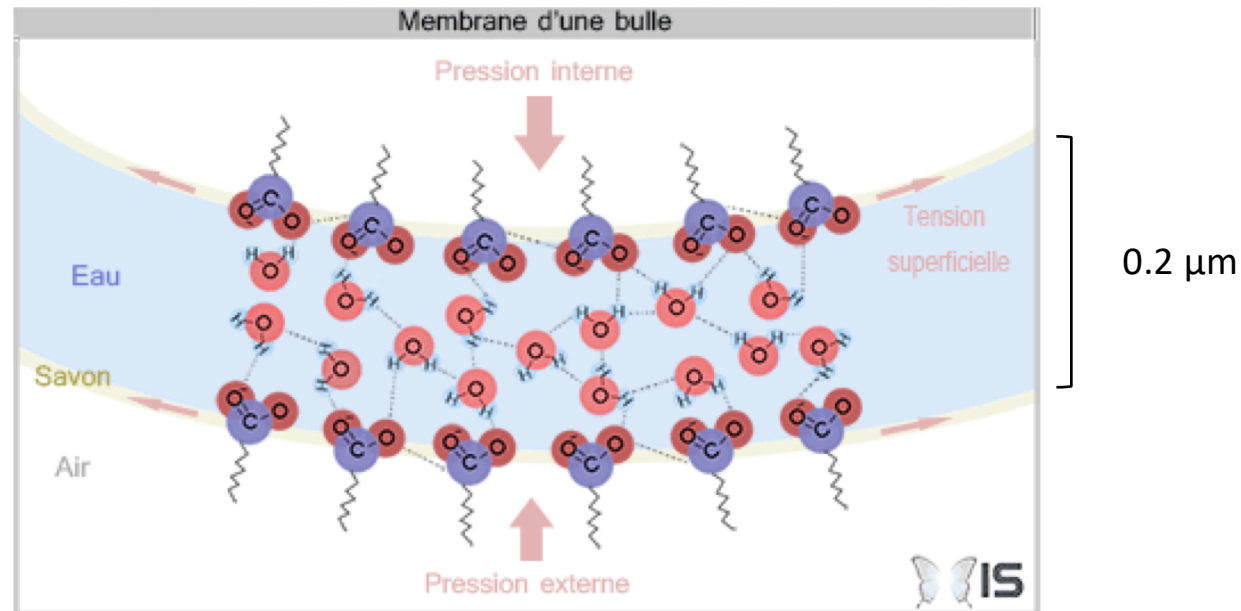
Third option : amphipathic

Soap bubble

for comparison purpose
with the plasma membrane



Soap bubble

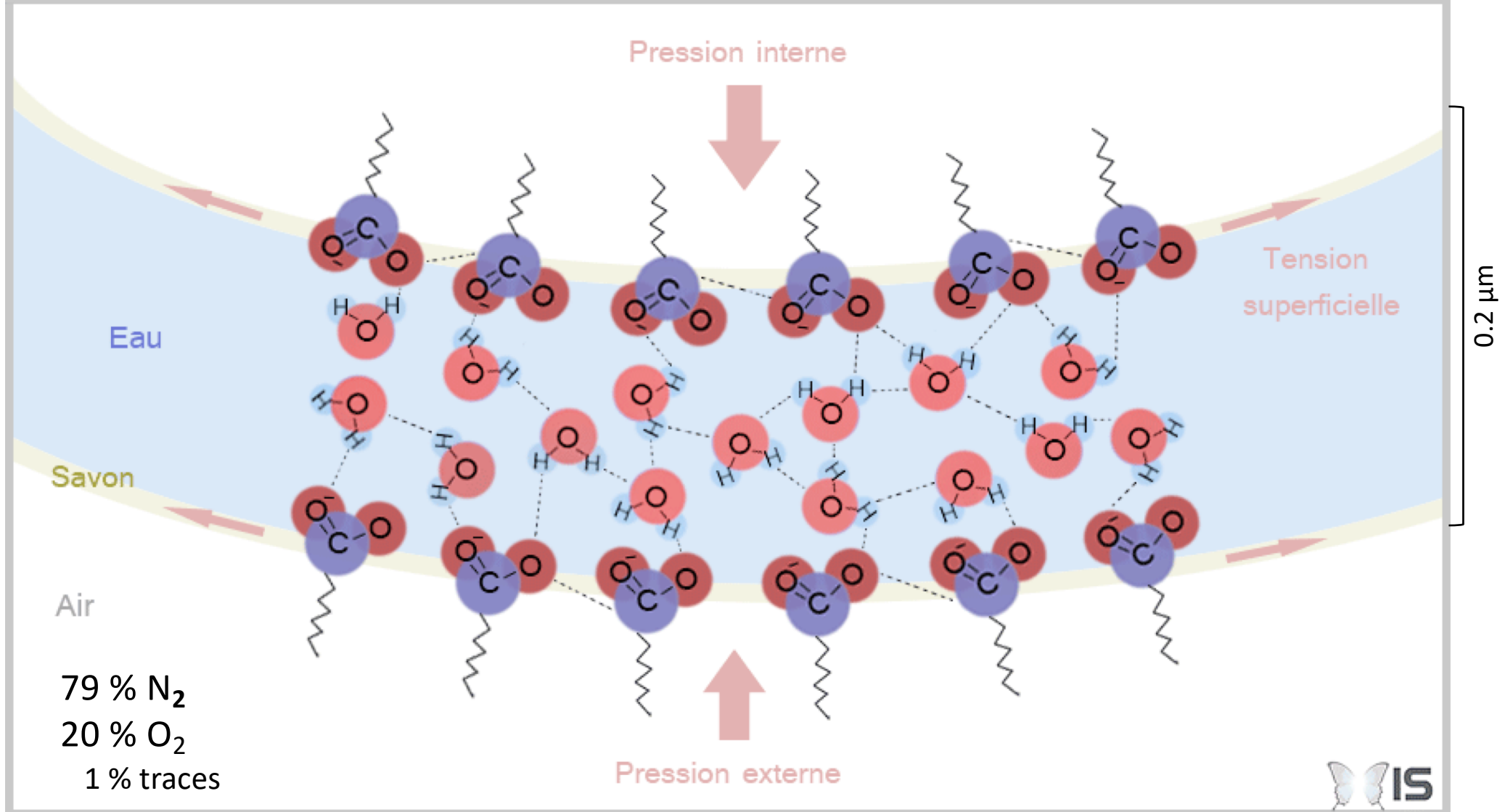


Épaisseur d'une bulle de savon

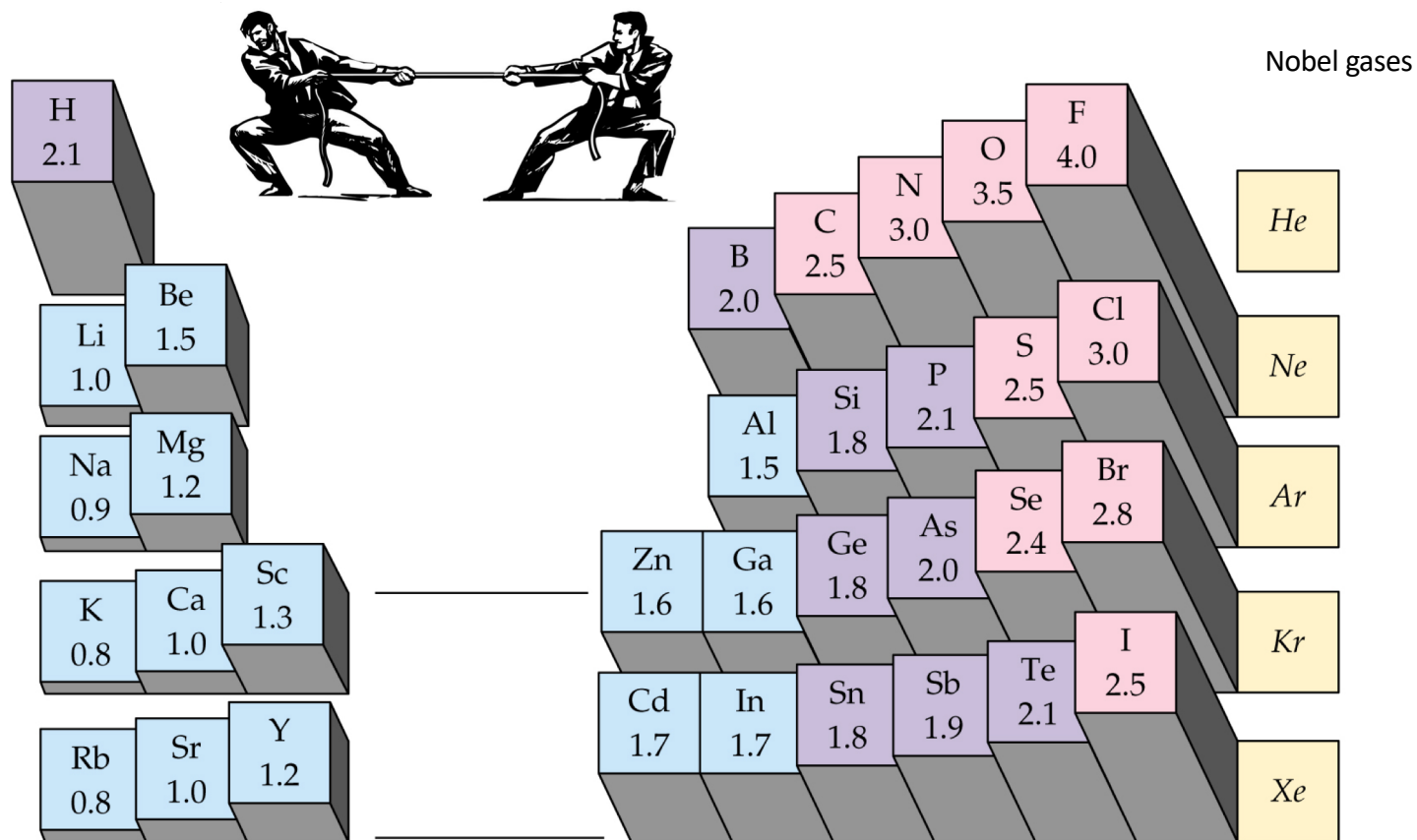
La physique de Newton explique pourquoi. Il faut savoir que l'**épaisseur** de la membrane d'une **bulle** est d'environ **200 nanomètres**, soit 0,0002 mm

<http://www.unige.ch/~fiorelli/medias/tdg02072010.pdf>

Membrane d'une bulle



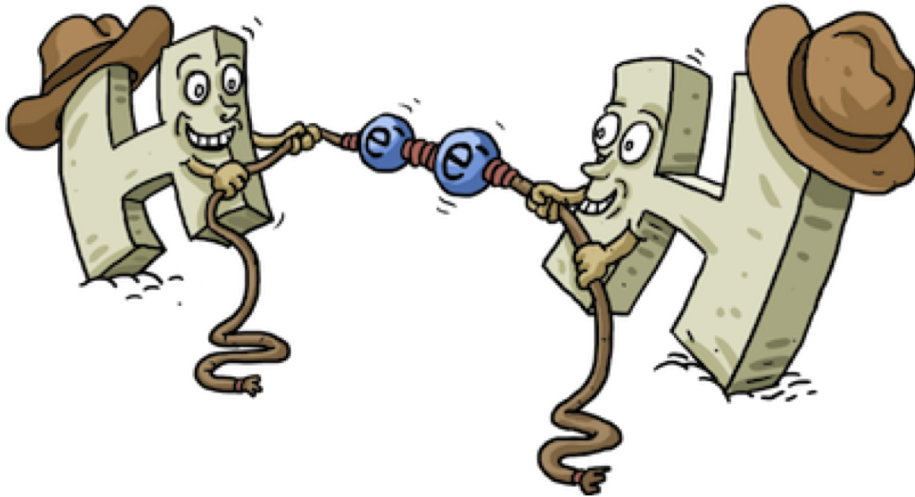
Electronegativity



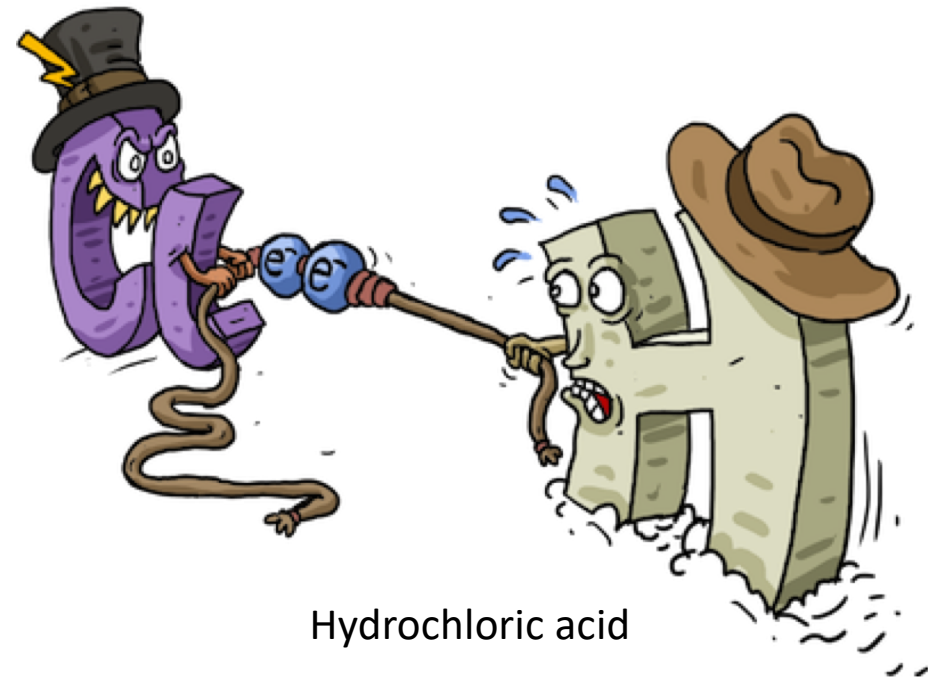
Electronegativity difference : $3.5 - 2.1 = 1.4$

Covalent bonds can be polar or non-polar.

Non-Polar Covalent Bond



Polar Covalent Bond



Hydrochloric acid



Acide chlorhydrique

Watch videos of freezing soap bubble



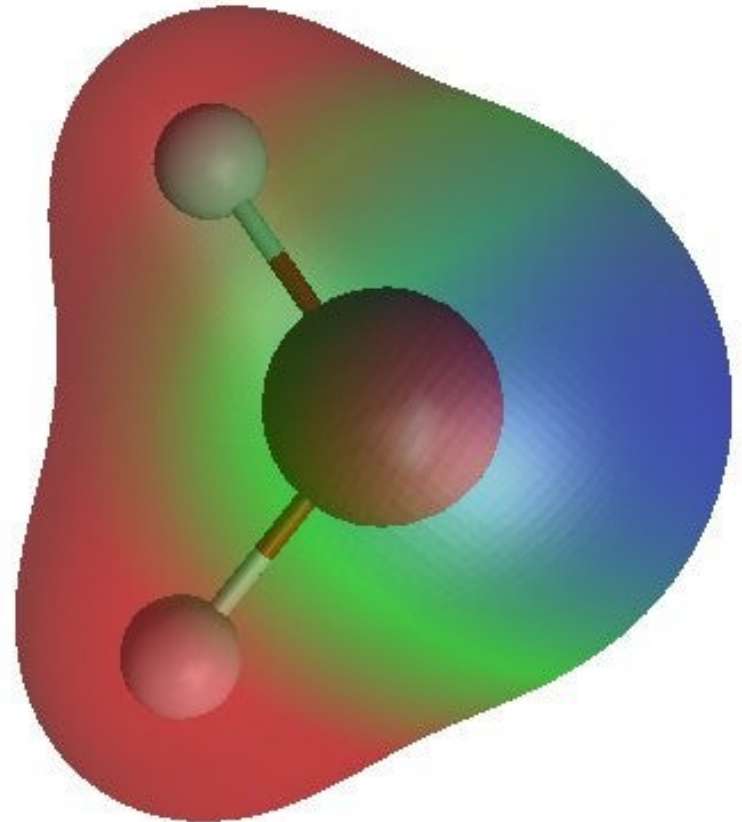
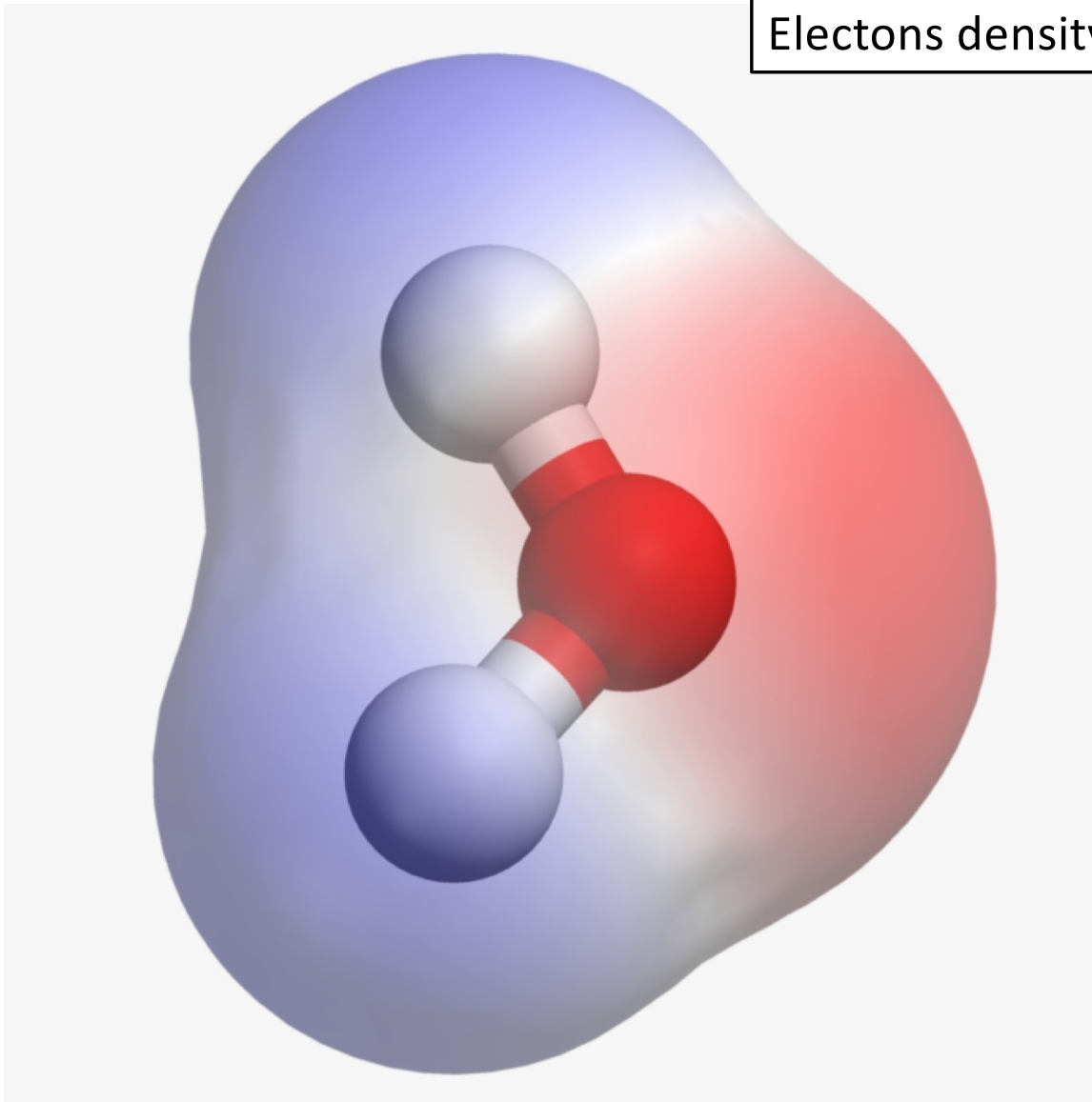
hexane

water

isopro

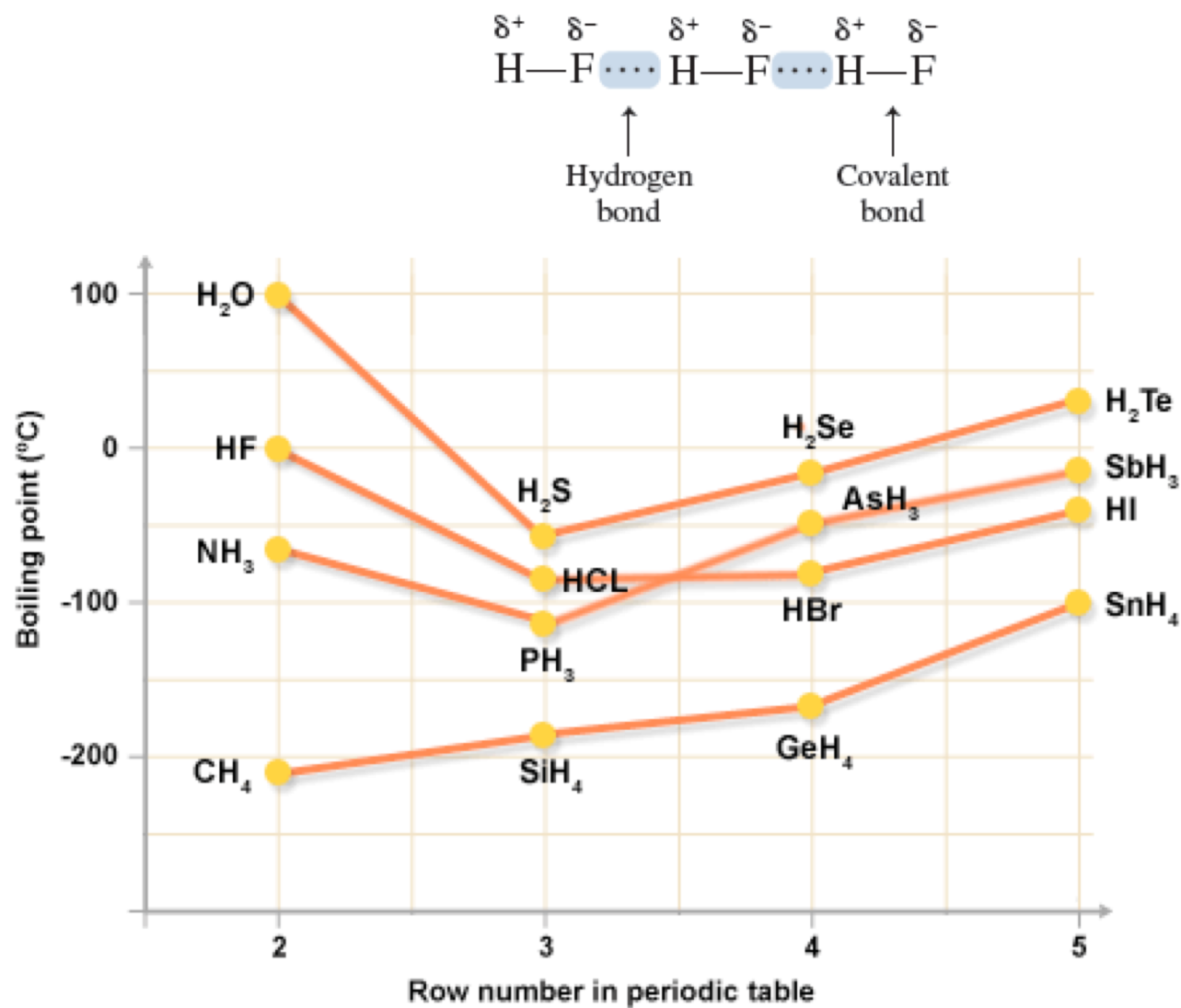


Electons density map of Water



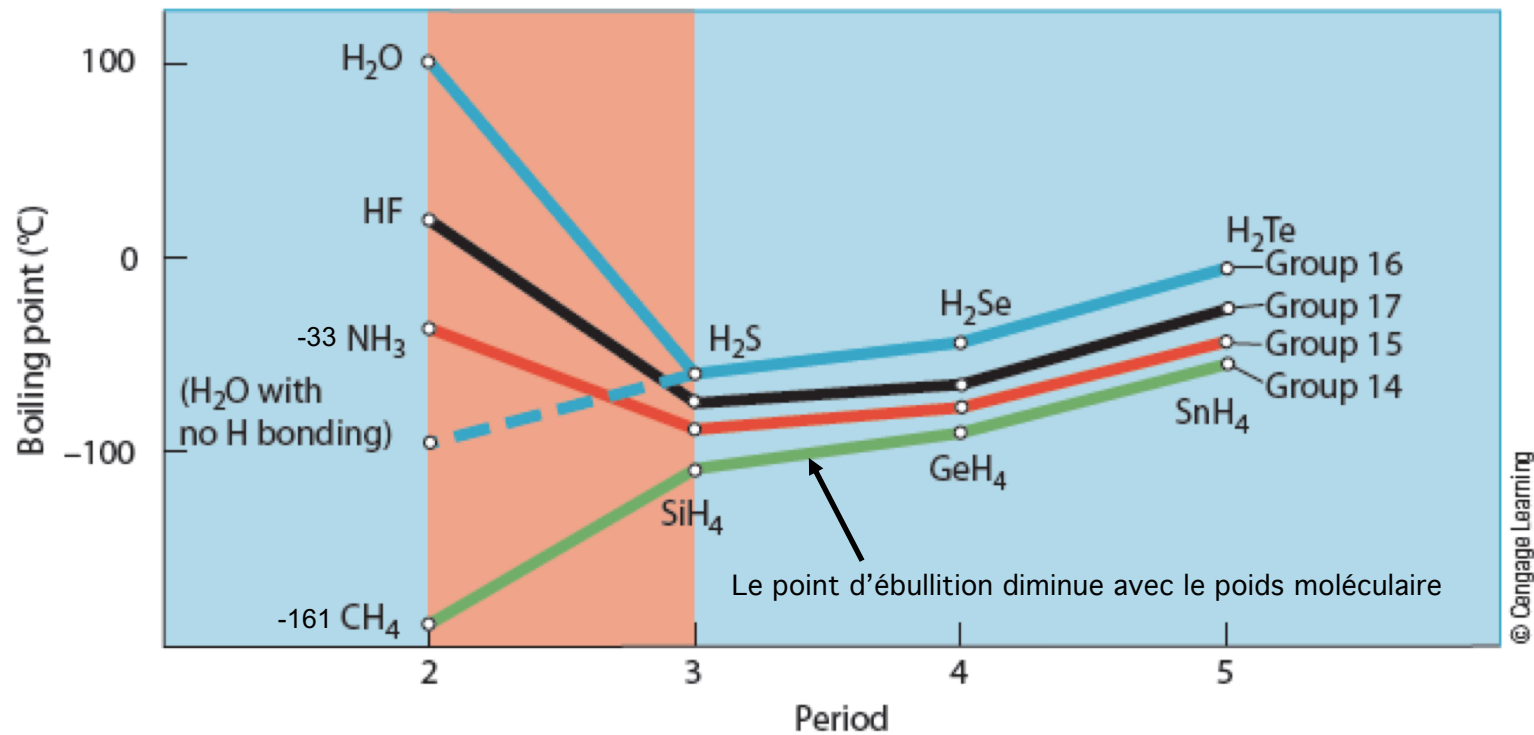
Group→ ↓Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	* 71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	* 103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo
			* 57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb		
			* 89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No		

Point d'ébullition [$^{\circ}\text{C}$]



Ponts hydrogène : ponts entre les molécule d'eau

La température d'ébullition de l'eau est 100 ° C



Sans les liaisons hydrogène la température d'ébullition de l'eau serait -100 ° C.

Hydrogen Bonding

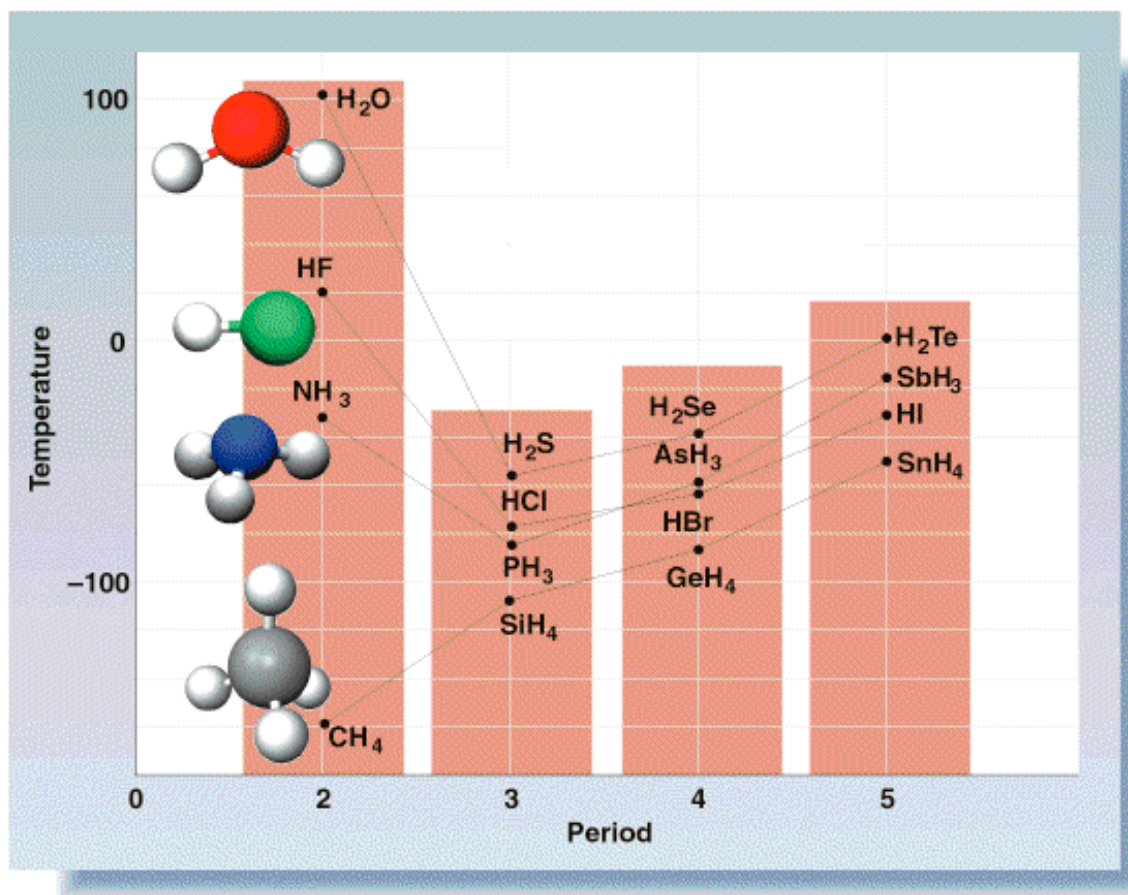


Figure 14.8

Table 2.3

A comparison of some physical properties of water with hydrides of other nonmetallic elements: N, C, and S

Property	H ₂ O	NH ₃	CH ₄	H ₂ S
Molecular weight	18	17	16	34
Boiling point (°C)	100	−33	−161	−60.7
Freezing point (°C)	0	−78	−183	−85.5
Viscosity ^a	1.01	0.25	0.10	0.15

^a Units are centipoise.