Chemistry
Exo-Endo and Bonds Extra Exercise

1. Classify as endothermic or exothermic and write an equation associated with the change.

Example: The heat released by a cloud

Answer: Exothermic; $H_2O_{(g)} \rightarrow H_2O_{(l)}$ + heat

a) Shivering after stepping out of a pool on a dry day.

Evaporation---endothermic. Heat's is being taken away from the skin by evaporating liquid molecules, leading to cooling.

b) Burning hydrogen gas.

Any burning leads to products with lower potential energy, and the excess energy is released. Exothermic

c) Cooking an egg (uncooked egg has curled up proteins; after it turns white, the proteins have straightened out and formed intermolecular bonds between them.) Write the equation in words with the word "heat" on the correct side of the equation.

Endothermic

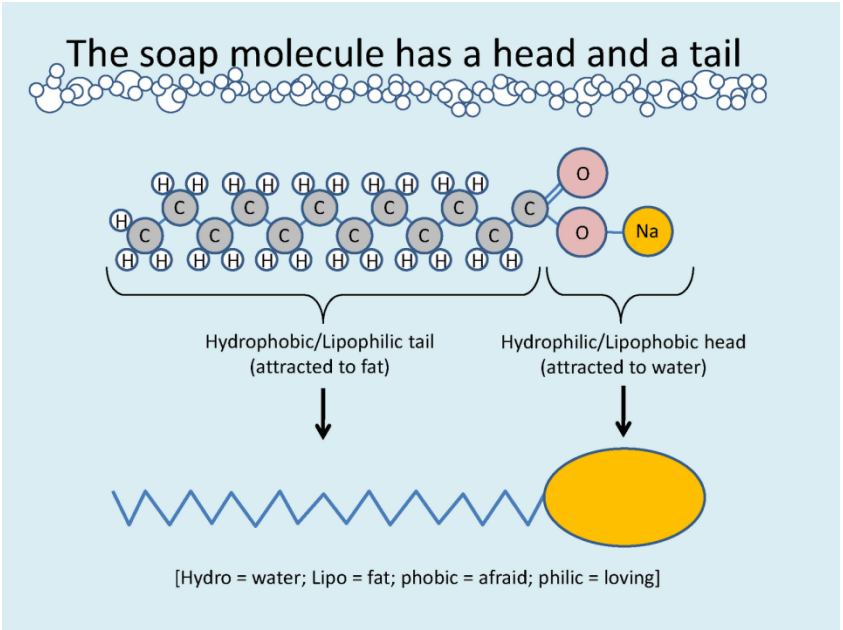
Curled proteins + heat → straight proteins

d) When C_2H_2 reacts with 2 Br_2 to produce $HCBr_2CHBr_2$, the beaker gets hot to the touch.

$C_2H_2 + 2\ Br_2 \rightarrow HCBr_2CHBr_2$ + heat exothermic

2. Intermolecular or intramolecular?

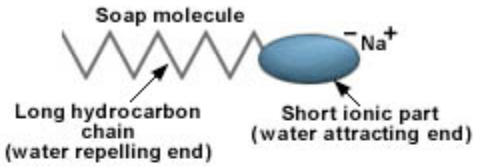
a)The diagram to the right explains how soap can clean. What kind of bonds are involved when the soap molecule attracts fat? Water?



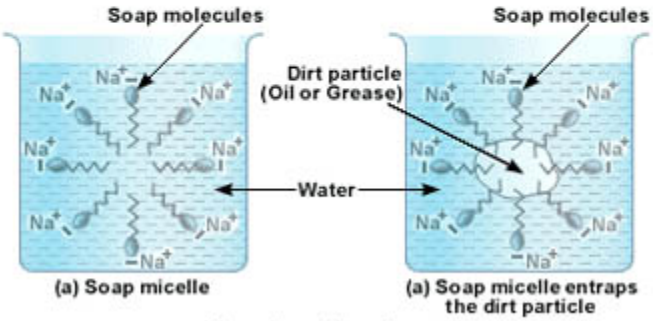
In both cases they are intermolecular bonds.

b) There is an attraction between the sodium ion of the soap molecule and CO_2^- polyatomic ion (carboxylate).

Intramolecular.

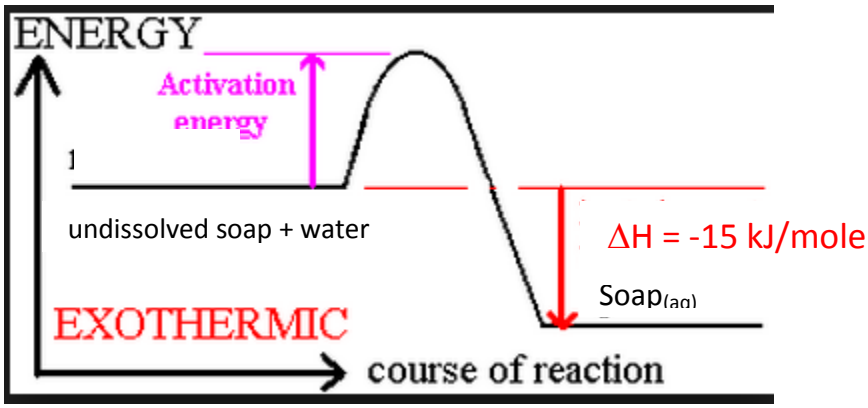


Representation of a soap molecule.



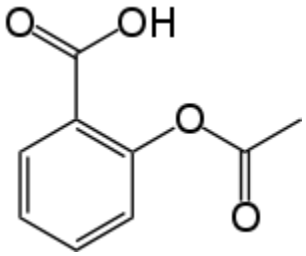
Cleansing action of soap

3. Draw a reaction profile (energy versus progress of reaction) for the soap molecule sodium lauryl sulfate dissolving in water, which is exothermic. Show where the dissolved molecule is on the diagram. Show that ΔH = -15 kJ/mole of sodium lauryl sulfate.



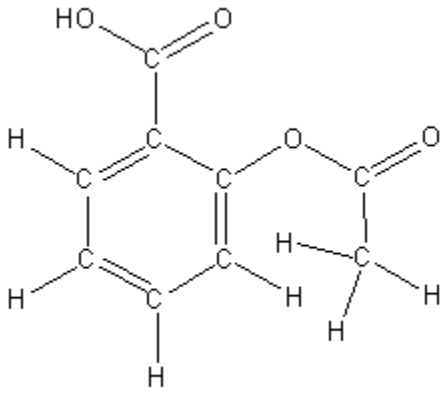
4. How many intramolecular bonds are in

a) aspirin $C_9H_8O_4$

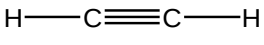


Careful! not all the atoms are shown; once you've figured out the number of bonds from the (4C+ 3N + 2O + H)/2 formula, show all the bonds in the given skeleton structure.

(4*9+ 3*0 + 2*4 + 8)/2 = 26 intramolecular bonds



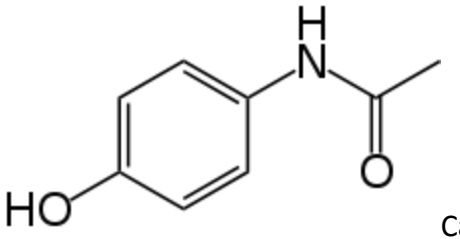
b) Acetyleyne(C_2H_2) (use the formula but also show the Lewis dot structure)



acetylene

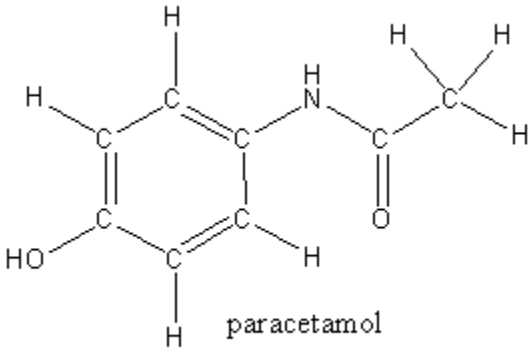
5 bonds

c) Paracetamol(tylenol) $C_8H_9NO_2$



Careful! not all the atoms are shown; once you've figured out the number of bonds from the (4C+ 3N + 2O + H)/2 formula, show all the bonds in the given skeleton structure.

{ 4(8) + 3(1) + 2(2) + 9} /2 = 24



5. $H_2 \rightarrow 2\ H$ Endo? or Exo? Why ?

When a bond is broken, the atoms are separated. The increased distance between the two atoms (it's really the gap between an atom's own nucleus and the sought-after electrons of another atom) increases potential energy. So it's an uphill climb. It's endothermic!