25/10 chemistry
REACTIVTY
>oxide= binary compound (=made of 2 elements)
2FeO= iron oxide
>hydride=binary compound as well > in the formula the H must be in the right (n.o. of the H= +1)
2NaH=sodium hydride
>CO2=carbon dioxide (carbon anhydride)
>in a chemical equations the n of atoms on the left must be equal to the n of atoms on the right> you can place coefficients to balance
>binary acid=compound formed by 2 elements> the hydrogen must be written on the left (It has number of oxidation =-1)
>hydroxide= compound formed by 3 elements in which we have the metal and 2 groups OH
Fe(OH)2= iron hydroxide ("Fe OH two times")
>oxoacid= compound formed by three elements
H2CO3=?
>salt is a general chemical compound (1)
COMPOUND AND CHEMICAL FORMULAS
>empirical formula= all the elements present in the molecule are indicated and also you just show the ratio between the elements (you have to simplify the more you can)
>molecular formula: you still have the ratio but all the atoms present are indicated (you don't have to simplify) (2)
>structural formula: identical to the molecular but also shows information about the chemical bonds (3)
THE NATURE OF THE CHEMICAL BOND
you have these two repulsion and attraction at the same time
24 slide: 1)two atoms far away > the attractive forces win against the repulsion forces
2) atoms and near and so they attract> there is a sort of deformation in the shape of the 1s orbital , which is not a perfect sphere anymore
3)fusion between the two 1s orbital in order to form a molecular orbital(= an orbital of a molecule, which was just created)
if you compare the total energy of the system after and before the creation of the bond> the energy after is higher> and so this happens to gain energy
25slide >internuclear distance= distance between the two nuclei
as the distance start to decrease the energy decreases> from 74 on there is a repulsion between the nuclei (which became bigger than the attraction)> at the minimum of the energy (which is the maximum gain in energy> bc more energy released) there is more stability = this point is called average bond distance= for most of the time the 2 nuclei will be at this distance
>chemical bond=sharing of an electron pair: because you cannot host more than 2 electrons in an orbital. the 2 electrons for most of the time will be between the 2 nuclei
(4)
(5)> in order to have a pi bond you need at least p orbitals (not s)
pi bond: the interaction is not along the internuclear axes but above or below it
(6) you can have more than one pi orbital in the same molecule
homonuclear diatomic molecules= formed by two atoms of the same element
homonuclear molecules= formed by more than 2 atoms ARRIVATAQUA (SLIDE 21 PPT4)
why we have the formation of some compounds while others are not formed?
slide 27/28= to break a strong bond I have to spend a lot of energy
stiff bond= by providing a certain amount of energy won't change a lot

loose bond= by providing the same amount of energy of the stiff bond, the bond distance change a lot> the atoms are more free to explore different bond distances
slide 29:
molecules are able to move around in the space, especially in the gas state
and inside the same molecule we can have vibrations (by providing a small amount of energy)
for example in water the angles can change with internal vibrations
slide 36:
valence bond theory: to define how a chemical bond can be formed
>only the valence shell is considered
>you cannot have the formation of a chemical bond is one of the valence orbitals is full or empty (they both must have only 1 e= be semi occupied)
>the strength of the bond and so the energy gain depends on the overlap; the highest is the overlap the more energy is gained
>the highest is the overlap the smallest is the bond length
>direction of the overlap= the internuclear axes and so the chemical bond has a direction
slide 41:
carbon has 2 semi-occupied 2p orbitals and one empty 2p orbitals> we can use only 2 orbitals to create chemical bonds
(7)
slide 43
you must achieve the same number of orbitals by mixing all 4 of them> the shape is always the same= smallest lobe and biggest lobes (the one that do the bonds)
why do the 4 semi occupied orbitals are pointing along the vertici: because there is repulsion and they want to stay away from the others but still linked to the nucleus
slide 45
we can create different types of orbitals
2 sp hybrid orbitals: created by mixing one 2s and one 2pz> there is an angle of 180 degree always because they want to point as far from the other as possible
slide 46
3 sp2 orbitals created by mixing 2s 2px and 2py> angle of 120 degrees
slide 49
sp> the geometry of this orbital is linear = 180 degrees
sp2>the geometry is trigonal planar=120 degrees
sp3>the geometry of the molecule will be tetrahedral in order to minimize the repulsion
dsp3>we can imagine 2 tetrahedron joined by one face
dsp3>2 pyramids which base is a square joined by a square's face