

[17:01] <Frank> shall we begin...or wait for any others  
[17:01] <Doos> nah, begin  
[17:02] <Riniel> um....how do i get to the colour section on your website, doos??  
[17:02] <Riniel> i'm only on the news...  
[17:02] <Doos> scroll down  
[17:02] <Doos> no  
[17:02] <Frank> good cos I'll have to leave a bit sharp to go and pick up the kids...on a sleepover  
[17:02] <Riniel> ??  
[17:02] <Doos> <http://yey.be> .. my other website  
[17:02] <Riniel> oh...ok  
[17:02] <Riniel> lol....sorry ..... my mistake  
[17:02] <Doos> okay then  
[17:03] <Frank> not the monthlydoos.com one  
[17:03] <Doos> heh  
[17:03] <Riniel> hehe  
[17:03] <Doos> ok, how is your knowledge of atoms, ions and such?  
[17:03] <Riniel> it's ok i guess  
[17:03] <Frank> reasonable...we did it before and I've been revising  
[17:03] <Doos> ok good  
[17:04] <Riniel> ok  
[17:04] Crystal (~Crystal@216.98.174.193) joined #go.  
[17:04] <Frank> Hi Crystal  
[17:04] <Riniel> hihi!!  
[17:04] <Crystal> Morning everyone :)  
[17:04] <Doos> short recap: an atom is the smallest part of an element that still possesses all the properties of that element  
[17:04] <Frank> yes  
[17:05] <Riniel> agree!  
[17:05] <Doos> an atom is always neutral in charge (meaning equal amounts of protons + and electrons \_)  
[17:05] <Doos> hi Crystal  
[17:05] <Crystal> Hi Doos!  
[17:05] <Riniel> agree!  
[17:05] <Doos> an ion is an atom that has a negative or a positive charge  
[17:05] <Frank> yes  
[17:05] Last message repeated 1 time(s).  
[17:05] <Doos> ok  
[17:06] <Riniel> ok  
[17:06] <Doos> remember the old model of an atom .. a nucleus with electrons orbiting around it  
[17:06] <Frank> yes  
[17:06] <Doos> the Bohr model that resembles the planetary system  
[17:06] <Riniel> mr. bohr's  
[17:06] <Doos> indeed  
[17:07] <Doos> we are going to use that .. the real configuration of electrons is much more complex involving shells, subshells, orbitals and spin  
[17:07] <Riniel> ok  
[17:08] <Doos> if you want to persue .. google for "electron configuration"  
[17:08] <Doos> lets take an oxygen atom  
[17:08] Frank (~Guest@172.186.82.193) left irc: Frank  
[17:09] <Doos> it has 2 protons in the nucleus (and some neutrons) and 2 electrons orbiting the nucleus  
[17:09] Frank (~Frank@172.186.82.193) joined #go.

[17:09] <Doos> let me repeat that for Frank  
[17:09] <Doos> lets take an oxygen atom  
[17:09] <Doos> it has 2 protons in the nucleus (and some neutrons) and 2 electrons orbiting the nucleus  
[17:09] <Frank> did I miss anything?...lol  
[17:10] <Doos> these two electrons orbit the nucleus in pairs, not individually  
[17:10] <Frank> er....isn't that helium?  
[17:10] <Doos> they are called "paired electrons"  
[17:11] <Doos> uh yes helium  
[17:11] <Doos> sawwy  
[17:11] <Crystal> lol  
[17:11] <Riniel> lol  
[17:11] <Frank> phew...I thought oxygen had 8...no probs sorry for the interruption  
[17:12] <Doos> you are correct  
[17:12] <Doos> so the electrons travel in pairs  
[17:12] <Frank> yes  
[17:12] <Doos> paired electrons can not cause colour .. only unpaired ones can  
[17:14] <Doos> that is why most colouring elements are the "transition metals" like iron, copper, chromium etc .. they have unpaired electrons in the outer shell (the d-shell)  
[17:14] <Doos> forget about d-shells  
[17:14] <Riniel> hehe  
[17:15] <Frank> don't the transition metals have free electrons in more than one orbit?...  
[17:15] <Doos> those unpaired electrons are the most important factor in colouring of minerals  
[17:15] <Frank> or is it only some?  
[17:15] <Riniel> but the unpaired electron can jump from one orbit to another when exposed to visible light...  
[17:15] <Doos> depends Frank, some shells get partially filled first .. too complex to take into account now  
[17:16] <Doos> yes Riniel  
[17:16] <Frank> yes ...but we've not reached fluorescence yet :)  
[17:16] <Riniel> ok....sorry  
[17:16] <Frank> ok  
[17:16] <Frank> please carry on  
[17:16] <Doos> what Riniel said does not only happen in fluorescence .. it applies to all the 3 instances of the crystal field theory  
[17:18] <Doos> the crystal field theory is very difficult to explain (especially if you don't understand every thing involved like me) but it involves electric charge, symmetry, ion bonds etc  
[17:19] <Frank> ok  
[17:19] <Frank> we can do a chat on it sometimes :)  
[17:19] <Doos> the things explained by this theory are 1: idiochromatic gems, 2: allochromatic gems, 3: color centers  
[17:19] <Riniel> ok  
[17:20] <Frank> ok  
[17:20] <Doos> we need someone much smarter than me to explain what crystal fields exactly is Frank  
[17:20] <Frank> lol....we'll search someone out  
[17:20] <Riniel> you're good enough Doos!!  
[17:20] <Frank> yeah  
[17:20] <Riniel> (y)

[17:21] <Doos> The next theory is molecular orbitals .. involving charge transfer

[17:21] <Doos> then the band theory

[17:21] <Frank> can an unpaired electron in the outer orbit jump to a higher state and create a new outer shell

[17:22] <Doos> and finally the physical properties theory (like interference, diffraction etc)

[17:22] <Doos> Frank, they are defined

[17:22] <Doos> defined

[17:23] <Crystal> so no new outer shell to orbit in?

[17:23] <Doos> the higher energy levels are always there (upto 7 orso), but that is all theoretical

[17:23] <Frank> ok

[17:25] <Doos> energy levels can only accompy a certain amount of electrons

[17:26] <Doos> the first one can hold two, the second one can hold 8

[17:26] <Doos> the outer shell is used for this purpose (as they are involved in bonding with other ions)

[17:27] <Doos> and they always want to be full

[17:27] <Frank> So when the cause of colour is a transition element that colour is caused by the fact that there are free unpaired electrons in these elements

[17:27] <Doos> yes

[17:28] <Frank> ok

[17:28] <Doos> an unpaired electron absorbs energy (from visible light for instance) and gets excited to a higher energy level

[17:29] <Doos> does everyone understand that?

[17:29] <Frank> yes

[17:29] <Riniel> yup

[17:29] <Crystal> hopefully....

[17:30] <Doos> if that energy corresponds to a certain wavelength of light .. that part of the light will be absorbed

[17:30] <Doos> the rest is transmitted and seen as the colour of the gem

[17:30] <Frank> Crystal when the electron absorbs energy from visible light then that particular energy is removed from the light spectrum

[17:30] <Crystal> so it is absorbed

[17:31] <Doos> yes, you can see that as a dark line/band in the pectroscope

[17:31] <Crystal> ok

[17:31] <Frank> yes making up the spectra seen with the spectroscope

[17:31] <Crystal> thank you

[17:31] <Doos> should I explain the relationship between energy and colors?

[17:32] <Crystal> sounds good to me

[17:32] <Doos> every colour has a specific wavelength

[17:32] <Crystal> and temperature

[17:32] <Doos> like red travels at 700nm and blue at 400nm (approx)

[17:33] <Crystal> right

[17:33] <Doos> all those wavelengths all have a specific amount of energy

[17:33] <Doos> the lower the wavelength .. the higher the energy

[17:34] <Doos> that energy is expressed in eV (electro volt)

[17:34] <Crystal> so is there more energy in the blue end than the red?

[17:34] <Doos> blue has about 3eV and red about 1.6 (orso)

[17:34] <Crystal> wow

[17:34] <Doos> indeed Crystal

[17:36] <Doos> the amount of energy required to make an electron jump to a higher energy level is different for every gem/element/environment

[17:36] <Doos> so if it requires 3eV to make an electron jump to a higher level .. the blue is absorbed

[17:37] <Doos> that works the same in idiochromatic as in allochromatic gems  
[17:37] <Crystal> please define those words for me  
[17:37] <Doos> idiochromatic = colored by elements that are part of the chemical formula  
[17:38] <Doos> allochromatic = impurities  
[17:38] <Crystal> thanks  
[17:38] <Crystal> are more stones allochromatic than idiochromatic?  
[17:38] <Doos> the excited electron will always fall back to the groundstate (where it came from)  
[17:39] <Doos> I never counted Crystal, but I think so  
[17:39] <Crystal> I thought impurities caused the color, so how do you tell the difference?  
[17:39] <Doos> during the falling back to groundstate, it will release that energy mainly as heat  
[17:40] <Doos> by looking at the streak mostly  
[17:40] <Crystal> ok  
[17:40] <Riniel> how?  
[17:40] <Doos> however if some of the energy released during fall back is between 4.1 and 1.6 eV .. that is ..?  
[17:41] <Riniel> as in the colour of the streak?  
[17:41] <Frank> peridot and almandine garnet are the most common transparent idiochromatic gems  
[17:41] <Doos> yes Riniel  
[17:41] <Frank> fluorescence  
[17:41] <Riniel> so...if it has green streak in a green stone meaning it is idioC?  
[17:41] <Doos> indeed  
[17:41] <Doos> in general yes Riniel  
[17:41] <Riniel> if it's different colour means it's alloC?  
[17:41] <Riniel> ok  
[17:42] <Riniel> thanks  
[17:42] <Doos> allochromatic gems will show no streak  
[17:42] <Riniel> oh...ok.....  
[17:43] <Doos> that is the simplest way of causes in colour  
[17:43] <Doos> electron of an atom absorbs light ..  
[17:43] <Frank> also if a stone can show more than one colour (beryl, corundum etc) then they are alloC  
[17:44] <Doos> is that understood?  
[17:44] <Riniel> lol Frank, "alloC" happened coz i was lazy  
[17:44] <Frank> yes how would you define this action?  
[17:44] <Riniel> yes!!  
[17:44] <Doos> I believe Barbra names it dispersed metal ions  
[17:45] <Frank> ok  
[17:45] <Frank> thanks  
[17:45] <Doos> they are transitional elements things  
[17:45] <Frank> lol...yes surprising no one came up with a catchphrase  
[17:45] <Doos> the last thing in the crystal field theory is colour centers  
[17:46] <Doos> but I need to potty before I can explain that  
[17:47] <Frank> hope everything comes out ok  
[17:47] <Crystal> lol  
[17:47] <Riniel> lol  
[17:47] <Frank> did you get all that crystal?  
[17:48] <Doos> yes did everyone get that?  
[17:48] <Riniel> yup  
[17:48] <Frank> yes

[17:49] <Crystal> I think so, but science is not my major  
[17:49] <Crystal> I seem to get all turned around with it  
[17:49] <Frank> Annie says ... remember them as the idiochromatics are the "idiots who are full of themselves"  
[17:49] <Doos> it's not so difficult, want me to take a step back?  
[17:50] <Crystal> that's a good way to remember it, Frank  
[17:50] <Riniel> yeah  
[17:50] <Frank> yes ,,, works for me :)  
[17:50] <Riniel> i meant annie's "idiot"  
[17:50] <Crystal> love it  
[17:50] <Doos> yes nice one to remember it  
[17:50] <Frank> yes me too  
[17:51] <Crystal> I need little hooks like that to remember stuff  
[17:51] <Doos> so shall I move on or step back?  
[17:51] <Frank> it's our old brains crystal  
[17:51] <Frank> mines needs a service  
[17:51] <Crystal> mine could use a tune up  
[17:51] <Frank> I'm ok to go on  
[17:51] <Doos> ok  
[17:51] <Doos> colour centers  
[17:51] <Doos> sounds difficult but it isnt  
[17:52] <Doos> there are two types of colour centers  
[17:52] <Doos> 1. hole colour centers  
[17:52] <Doos> 2. electron color centers (or F-centers)  
[17:53] <Doos> lets take an oxygen atom  
[17:53] <Doos> it has 8 electrons orbiting the nucleus  
[17:53] <Doos> two in its first shell and 6 in its outer shell  
[17:54] <Doos> the last 6 travel in pairs and can not get excited to a higher energy level .. so can not absorb energy .. so can not cause colour  
[17:54] <Doos> right or right?  
[17:54] <Crystal> right  
[17:54] <Frank> right  
[17:54] <Riniel> right  
[17:55] <Doos> no lets so some nasty bombarding on them and bomb of one of the elctrons  
[17:55] <Doos> that leaves us with 5 electrons in the outer shell  
[17:55] <Doos> right or right?  
[17:55] <Crystal> how did we eliminate one?  
[17:55] <Riniel> right  
[17:56] <Riniel> gamma?  
[17:56] <Doos> by irradiation  
[17:56] <Crystal> I C  
[17:56] <Doos> yes mostly gamma irratioation , but could also be form UV or visible light  
[17:56] Frank (~Frank@172.186.82.193) left irc: Frank  
[17:56] Frank (~Frank@172.186.82.193) joined #go.  
[17:56] <Frank> there goes the log  
[17:56] <Doos> or electron bombardment etc  
[17:56] <Riniel> ok  
[17:57] <Crystal> so by irradiating quartz you can lose 1 electron on the outer shell and it will cause color?  
[17:57] <Doos> yes  
[17:57] <Crystal> wow!  
[17:57] <Doos> because now there are only 5 electrons in the outer shell  
[17:57] <Crystal> right

[17:57] <Crystal> do we need another element present?  
[17:58] <Doos> that means that there are 2 pairs and one unpaired electrons  
[17:58] <Doos> yes  
[17:58] <Crystal> I think I'm starting to get it  
[17:59] <Doos> and that last unpaired electron can get raised to a higher level  
and thus absorb light .. hence causing colour  
[18:00] <Doos> this bumping off of one electron leaves a gap of one electron  
(there were 6, now there are 5)  
[18:00] <Doos> so a gap, or a hole  
[18:00] <Doos> that is what is named a hole colour center  
[18:01] <Doos> is that clear?  
[18:01] <Riniel> clear!  
[18:01] <Crystal> yes  
[18:01] <Frank> like before which colour will be induced depends on the symmetry  
etc of the crystalline unit cell...right?  
[18:01] <Frank> and the element in question etc  
[18:02] <Doos> I believe so .. it all is crystal field  
[18:02] <Frank> ok  
[18:03] <Doos> tummy is acting up, hold on  
[18:03] <Riniel> lol  
[18:03] <Crystal> poor baby  
[18:04] <Doos> better  
[18:04] <Riniel> :)  
[18:04] <Crystal> good  
[18:04] <Doos> the second one is an electron colour center  
[18:04] <Doos> this is another defect in the crystal lattice  
[18:05] <Doos> lets say you have CaF<sub>2</sub>  
[18:05] <Doos> so two F's and one Ca  
[18:05] <Doos> that is ideal  
[18:06] <Doos> now take away one F  
[18:06] <Doos> that leaves CaF and is unstable  
[18:06] <Doos> because the electrical charges don't match  
[18:06] <Doos> I can't type today  
[18:07] <Crystal> we can read it don't worry  
[18:07] <Frank> okay it's understandable  
[18:07] <Riniel> yeah  
[18:08] <Doos> F ions have a valency of 1<sup>-</sup>, meaning that they accept an extra  
electron to fill up its outer orbit  
[18:08] <Doos> Ca = 2<sup>+</sup>, meaning it will donate 2 electrons  
[18:08] <Doos> so CaF<sub>2</sub> is stable  
[18:09] <Doos> the one gives 2 electrons to two others and they have a nice  
ménage à trois  
[18:09] <Doos> everybody happy  
[18:09] <Doos> if we now take away one of the F  
[18:10] <Doos> that will leave us with a gap of 1<sup>-</sup>  
[18:10] <Doos> or the equivalent of one electron  
[18:11] <Doos> that gap will be filled by a "free" electron from somewhere else  
in the crystal  
[18:11] <Doos> so an electron will fill the place of an element  
[18:11] <Doos> that is named an 'electron colour center'  
[18:12] <Doos> right or right?  
[18:12] <Riniel> right! understood!  
[18:12] <Crystal> where does this other free electron come from?  
[18:13] <Frank> yes

[18:13] <Doos> from another defect in the lattice .. probaly a hole colour center  
[18:13] <Crystal> ok  
[18:13] <Doos> in the whole the crystal needs to remain neutral, so if it takes here .. it has to give there  
[18:14] <Crystal> so a crystal with 2 holes, they would match up? What if there's only 1 hole  
[18:14] <Doos> the last example is Fluorite CaF<sub>2</sub>  
[18:14] <Doos> no  
[18:14] <Crystal> please explain that further, then  
[18:15] <Doos> 2 holes means that the crystal misses two electrons  
[18:15] <Crystal> so is that still balanced?  
[18:15] <Doos> so the crystal is not neutral  
[18:15] <Doos> no  
[18:15] <Crystal> it has two molecules with odd number electrons?  
[18:15] <Doos> protons + and electrons - have to be present in the same amounts  
[18:16] <Crystal> ok  
[18:16] <Doos> it can happen, but the "lost" electrons are trapped elsewhere in the crystal  
[18:16] <Crystal> and them being trapped does what?  
[18:17] <Doos> so if you bombard an electron from one atom .. that electron will attach elsewhere  
[18:17] <Doos> not much  
[18:17] <Frank> crystal the electrons can move from one atom to the next like electricity  
[18:18] <Doos> most likely they will attach to another unpaired electron .. which just sits there  
[18:18] <Crystal> ohhhh  
[18:18] <Frank> in some elements (matal) this is easy and they are called conductors...in other elements this is more difficult  
[18:18] <Doos> a hole colour center is the cause of many colours  
[18:19] <Doos> metals belong to the band theory  
[18:19] <Crystal> don't confuse me!  
[18:19] <Doos> heh  
[18:19] <Frank> Sorry I was just trying to pint out that electron movement isn't that rare  
[18:20] <Doos> indeed not rare atall  
[18:20] <Crystal> no, that was good for me to understand, Frank  
[18:20] <Doos> amethyst is a nice example of a hole center  
[18:20] <Frank> when you say a hole center is the cause of many colours  
[18:20] <Crystal> I didn't want to get into band theory when I don't have color theory yet  
[18:20] <Frank> do you mean many different colours  
[18:20] <Doos> yes Frank  
[18:21] <Frank> ok ty  
[18:21] <Doos> the colours produced are depended on many things .. but that involves understand the crystal field theory in full .. which I dont  
[18:22] <Frank> I thought amethyst was coloured by iron?  
[18:23] <Frank> as a transition element  
[18:23] <Riniel> iron plus irradiation  
[18:23] <Doos> indeed Riniel  
[18:23] <Frank> natural radiation ?  
[18:23] <Doos> both natural as artificial  
[18:23] <Riniel> ok

[18:24] <Crystal> so some are naturally purple from radiation while others are helped along

[18:24] <Frank> so synth amethyst is also irradiated as part of the manufacturing process to induce colour centres

[18:24] <Doos> irradiation of citrine will leave a hole colour center and produces amethyst

[18:25] <Frank> heat treatment of amethyst reverses this?

[18:25] <Crystal> so citrine is not irradiated?

[18:25] <Doos> I would expect so Frank, as it gets its colour from a hole center

[18:25] <Crystal> I thought heating made it green, as in that prasiolite

[18:25] <Doos> indeed Frank and Crystal

[18:25] <Doos> heating can turn it back to yellow .. or sometimes green

[18:25] <Crystal> ok

[18:25] <Riniel> so...there're no green amethyst, rite?

[18:26] <Frank> whether it is yellow or green is a valency thingy crystal Fe<sup>2+</sup> or Fe<sup>3+</sup>

[18:26] <Crystal> thanks Frank

[18:26] <Doos> if heating is done carefully .. you can irradiate it again to form amethyst

[18:26] <Doos> right Riniel

[18:26] <Riniel> ok

[18:27] <Doos> uhm yes Frank, but in the case of amethyst .. the colour is not produced by iron

[18:27] <Doos> but by the hole center

[18:27] <Frank> Doos...are you planning on doing the whole subject this week or spread it over a few chats

[18:27] <Doos> spread it

[18:27] <Frank> ok good...it's a big subject

[18:27] <Doos> I was planning on charge transfer next week

[18:28] <Crystal> so is there iron in amethyst, and if so, what does it contribute?

[18:28] <Frank> ok so we get more time to read up on that

[18:28] <Doos> Crystal, the iron in amethyst creates the hole center

[18:28] <Crystal> by snagging an electron?

[18:29] <Doos> in citrine it serves as an impurity (allochromatic)

[18:29] <Doos> yes Crystal

[18:29] <Crystal> ok

[18:29] <Crystal> thanks

[18:29] <Doos> yes, read up on it .. you should now have the basics

[18:29] <Doos> I hope

[18:30] <Crystal> me too

[18:30] <Doos> colour centers are very intimidating .. but they are not so difficult .. it creates an unpaired electron which can then interact with colours in light

[18:31] <Crystal> good way to put it

[18:31] <Doos> remember that is the unpaired electrons that can interact .. not the paired ones

[18:31] <Crystal> right

[18:32] <Doos> wanna know why?

[18:32] <Crystal> yup

[18:32] <Doos> ask me

[18:32] <Crystal> aww, come on now

[18:32] <Frank> lol...why

[18:32] <Doos> I really have no clue

[18:32] <Doos> :)

[18:32] <Crystal> lol  
[18:32] <Riniel> coz the electron felt lonely and needed a friend!  
[18:33] <Doos> lol  
[18:33] <Doos> nice one  
[18:33] <Riniel> so it moves around to find one  
[18:33] <Riniel> hahaha  
[18:33] <Crystal> loose electrons!  
[18:33] <Doos> we'll keep that one in Riniel  
[18:33] <Riniel> lol  
[18:33] <Crystal> so we have idiots and harlots :)  
[18:34] <Doos> heh  
[18:34] <Riniel> lol  
[18:34] <Frank> lol  
[18:34] <Doos> so any questions?  
[18:34] <Riniel> nope  
[18:34] <Crystal> not yet  
[18:34] <Doos> maybe next week  
[18:34] <Frank> no...will you post a log and send a copy to Dav?  
[18:34] <Riniel> yeah  
[18:34] <Doos> yah  
[18:34] <Crystal> good  
[18:34] <Doos> so recap:  
[18:35] <Doos> crystal field theory explains idiochromatic - allochromatic and color centers (aswell as fluorescence)  
[18:36] <Doos> all involve unpaired electrons that can interact with incomming energy  
[18:36] <Doos> the interaction causes colour (absorption)  
[18:36] <Doos> as simple as that  
[18:37] <Crystal> cool!  
[18:37] <Riniel> yeah!  
[18:37] <Frank> yes  
[18:37] <Doos> did I deserve a cookie?  
[18:37] <Crystal> absolutely!  
[18:38] <Crystal> I'll put one on your computer now  
[18:38] <Crystal> :)  
[18:38] <Riniel> and an ice-cream!  
[18:38] <Riniel> (icecream)  
[18:38] <Doos> a nice link is  
[http://www.minsocam.org/MSA/collectors\\_corner/arc/color.htm](http://www.minsocam.org/MSA/collectors_corner/arc/color.htm)  
[18:38] <Frank> Thanks Alain you need a big chocolate cookie...but it's no good for upset tum tums so you'll have to wait till tomorrow  
[18:38] <Doos> heh  
[18:38] <Frank> So are we finished for the week?  
[18:38] <Crystal> yeah, hope you're feeling better asap  
[18:39] <Doos> you should now be able to understand the first part of that page  
[18:39] <Frank> Sophie is waithing to go a collect our sprogs  
[18:39] <Riniel> get better soon!!!  
[18:39] <Doos> ok Frank, talk soon again  
[18:39] <Crystal> sprogs?  
[18:39] <Frank> kids  
[18:39] <Crystal> thanks Doos  
[18:39] <Frank> wee buggers  
[18:39] <Crystal> oh  
[18:39] <Frank> that sort of thing  
[18:39] <Crystal> rug rats

[18:39] <Doos> just an little upset tumy .. no big deal  
[18:39] <Crystal> good, sleep it off  
[18:39] <Frank> yeah you got the knowledge riniel  
[18:40] <Frank> Thanks Doos...good chat  
[18:40] <Riniel> hehe  
[18:40] <Riniel> yeah...thanks a lot Doos  
[18:40] <Frank> see you soon...bye all  
[18:40] <Doos> bye Frank  
[18:40] <Riniel> bye Frank  
[18:40] <Crystal> excllent, and thanks so much for being so patient with me  
[18:40] <Crystal> bye Frank  
[18:40] Frank (~Frank@172.186.82.193) left irc: Frank  
[18:40] <Doos> aslong as you understand it .. I dont mind going back a few steps  
[18:41] <Crystal> you cleared it well for me