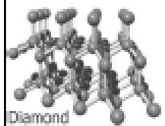
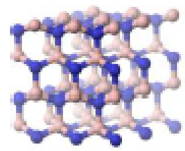
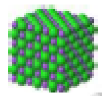
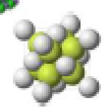
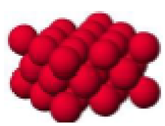
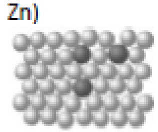
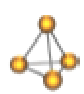
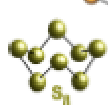
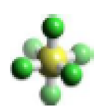
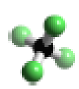
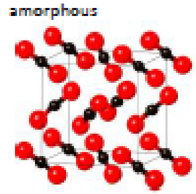
	Main concepts	Elements?	Compounds?	Mixtures?	Crystals? Molecules?	properties	Comparing mps within the group
Covalent-network crystals	Shared valence electrons connecting nonmetal atoms into a on-going array (very rare). To melt one of these requires breaking covalent bonds which is very difficult to do.	SOME Like $C_{diamond}$  	SOME Like BN (boron nitride) or SiO_2 	NONE	Crystals only	VERY HARD, extremely high melting points, nonconductors of electricity, some are 3-D chunks (diamond), some are 2-D sheets (graphite) an some are 1-D fibers (asbestos)	Not usually done... all of these are way high
ionic	Metals lose, become positive, nonmetals gain become negative, and the resulting ions arrange themselves into an on-going + - + - array. To melt ionic substances, you must break ionic bonds.	NONE (if ionic has to involve a metal and a nonmetal it should be obvious that an ionic element could not exist.)	ALL (NaCl, BaF_2, $Mg(NO_3)_2$....)  	NONE	Crystals only	Hard with high melting points , cleavage planes make these brittle, soluble in polar solvents, conduct electricity in molten and aqueous states	First look at charges: higher charges = higher mps (CaO > KF) If charges are equal, look at size: smaller ions = higher mps (KF > KBr)
metallic	Metals losing their electrons to a negatively charged "sea of electrons" that glues them together. Melting these involves breaking metallic bonds.	SOME (K, Mg, Al) 	NONE	SOME these are called alloys like bronze = 66% Cu & 34% Zn) 	Crystals only.	A large range of melting points from very low (Hg = -40*C) to very high (W = 3422*C) Slippage planes make metals and alloys malleable, bendable.	First look at number of val electrons: more = more conc electron sea = higher mp. (Ca > K) If val # are equal, look at size: smaller atoms = higher mps (Ca > Ba)
Covalent molecules	Shared valence electrons connecting nonmetal atoms into small "complete" bundles. When these are melted, only the IMF's between the molecules are broken; the covalent bonds remain intact.	A FEW (Br_2, I_2, N_2, Cl_2, H_2, O_2, F_2, P_4, S_8)    	MOST (CF_4, H_2O, SF_6) This is what we studied with shapes and polarities, etc   	NONE	Molecules YES, and in the solid phase these molecules are often arranged into a crystalline structure held together by IMF's (sugar, ice, iodine) those that are not crystalline are called amorphous 	Generally low melting points, nonconductors If IMFs are strong enough, these may be low melting solids (like sugar which has extensive H-bonding), or liquids or gases at room temperature	Look at IMFs: H-bond > dipole-dipole > dispersion. Within H-bonding, look for more sites (H_2O > HF) Within dispersion, look for total electrons. (Br_2 > F_2)