

FALL FINAL REVIEW

1. What is a binary compound?

A compound that contains two elements.....water, NaCl, CaO, MgO, etc.....

2. What is a pure substance?

Something with a single identity. Elements and compounds both qualify

3. What are the basic types of particles that come from radioactive decay? What are their charges? How would they be affected when passing through an electric field?

Alpha particles -- these are Helium nuclei. The two protons and two neutrons give the particle a charge of +2

Beta Particles -- These are electrons. Their charge is -1

Gamma particles -- These are high energy light. Light does not have a charge.

sometimes neutrons and protons -- neutrons are neutral and protons are positive.

When passing through an electric field, the particles that have charges will bend, the those that have no charge will pass straight through.

4. What creates positive and negative ions?

Losing electrons creates positive ions. Gaining electrons creates negative ions.

5. What types of elements form ionic bonds?

In general----- when a metal bonds with a non metal, the bond is ionic

6. What happens to ions when an ionic compound dissolves?

When an ionic compound dissolves, the ions separate from each other and bond to the water molecules. SO.....In solutions of ionic compounds like salt water, in the solution are sodium ions and chloride ions that have separated from each other. We call this dissociation.

Check out this link:

http://www.wou.edu/las/physci/ch412/dis_nac1.mov

7. How do you determine the geometry of a molecule?

You must draw the dot diagram and follow the chart. You can use your geometry spreadsheet.

8. What types of forces cause chemical bonds to be created?

Bonds form because of the attraction between the nucleus of one atom and the electrons of another.

9. What are the characteristics of a metalloid?

Metalloids have properties of both metals and of nonmetals.

10. What are the names and valences shell electron configurations of groups 1,2,16,17,18?

1- alkali metals

2- alkaline earth metals

16 - chalcogens

17 - halogens

18 - noble gases

Also, know that the d block elements are called transition metals

11. For isoelectronic particles, which would be smallest? Which would be largest?

Isoelectronic particles all have the same number of electrons. The smallest particle would have the most protons, while the largest would have the fewest protons. For example, Na^+ would be smaller than F^- because there are 11 protons in Na.

12. What are transition metals? (what sublevel block)

d sublevel block

13. What are the periodic trends in regard to metallic properties, ionization energy and electronegativity?

metals lose electrons in reactions, so the bigger atoms will be more metallic.....so.....metallic properties increase as you move down and to the left.

ionization energy and electronegativity increase as you move up and to the right. Also, review the definitions of these trends and be sure that you understand why they exist.

14. How do you determine the products of a double replacement reaction?

the cations change partners as in our precipitation lab.

15. What would cause charge to change in a chemical reaction?

If electrons are lost or gained, charge changes.

16. How do you determine the oxidation state of an element in an ion? for example, what would be the oxidation state of sulfur in SO_4^{2-} ?

The charges of elements in a polyatomic ion must add up to equal the charge on the ion. So in

SO_4^{2-} the charge on the sulfur would have to be + 6

17. What is "reduction" in chemistry?

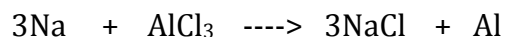
Reduction is the gain of electrons. Gain of electrons is called reduction because charge is reduced when negative charge is added.

18. What is "oxidation" in chemistry?

Oxidation is the loss of electrons. Charge will go up

19. If sodium reacts with Aluminum chloride to make elemental sodium chloride and aluminum, what is oxidized? What is reduced? What is the oxidizing agent? What is the reducing agent?

The equation looks like this.



Since sodium is by itself on the left, its charge is 0. On the right, it has given away an electron, so its charge is + 1. The aluminum on the left is +3, but on the right it is alone, so its charge is 0. The chlorine is -1 on both sides.

So, Na was oxidized and Aluminum ions were reduced.

Since aluminum ions made the oxidation possible by gaining electrons, the aluminum ions are called the oxidizing agent. The sodium made reduction possible by giving away electrons, so it is called the reducing agent.

20. Are bonds between two molecules generally strong, or weak? What effect would this have on their melting and boiling points?

Bonds between one molecule and another molecule are weak. This means they don't stick together well, so their melting and boiling points tend to be low.

21. Do big molecules or small molecules have stronger LDF's?

LDF's are temporary dipoles caused by "sloshing" electrons. Since more electrons cause the dipoles to last longer, big molecules have stronger LDF's

22. What are the periodic trends in regard to size?

Atoms get smaller left to right within a series due to increasing protons while shielding is relatively constant. Atoms get larger from top to bottom in a family due to the addition of energy levels. The increased shielding negates the effect of increasing protons.

23. What do electrons do when an atom is excited? How does the energy of an excited electron compare to that of an electron in the ground state?

Excited electrons have gained energy and moved away from the nucleus. They have more energy than they have in their normal or "ground" state. When they return to the ground state they release the gained energy.

24. What phases changes are endothermic? Which are exothermic?

solid to liquid and liquid to gas changes remove molecules to move faster, requiring energy. This is endothermic.

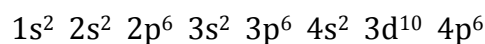
the opposite changes are exothermic as molecules slow down and release energy as heat.

25. Does the formation of bonds result in loss, or gain of energy?

Formation of bonds happens as atoms move to a lower energy state, so energy is lost to the environment.

26. Be able to write an electron configuration of any element or ion, and identify how many electrons are in each sublevel.

Example, Se^{2-}



There are two extra electrons in the above configuration due to the -2 charge.

There are a total of 18 p electrons, 8 s electrons, etc...

27. What is/causes nuclear charge?

Protons are positive and in the nucleus...so they cause nuclear charges. Neutrons are also in the nucleus, but they do not affect charge.

28. Be able to identify an element based on its electron configuration.

In a neutral atom, the number of electrons = the number of protons. The number of protons is the atomic number and determines identity.

29. Describe a polar covalent bond.

A covalent bond in which the electrons are shared UNEvenly.

30. What is the chemical formula for nitrogen (III) oxide?



31. What type of bonding results in the strongest type of solid? ---- and why?

Network covalent. There are no separate molecules. In each sample of this type of matter there is essentially one macromolecule. See this picture of diamond:

<http://howechem.net/H%20CHEM/Bonding/diamond.png>

32. What is hydrogen bonding and what is necessary to set it up?

Hydrogen bonds are the strongest of the weak intermolecular forces, and occur BETWEEN one molecule and another when hydrogen is bonded WITHIN a molecule to N, O, or F

33. What is the most active metal? nonmetal?

Fr F

34. What types of elements are malleable, ductile and good conductors?

Metals.

Also, graphite (network covalent) will conduct due to sp^2 hybridization and resonance.

35. What are electrolytes?

Electrolytes are particles that cause electricity to be able to transfer through water. This happens when ionic compounds dissolve in water, like the salt you saw in the video that was linked earlier.

36. What is electron affinity, and what elements have the most electron affinity?

Electron affinity is the energy change when an electron is added to an atom. The elements with the greatest electron affinity are those with open spots in their valence shell and high attraction for electrons. The halogen family has the greatest affinity for electrons.

37. What type of bond forms between two non metals? between a metal and a nonmetal?

Two nonmetals-----covalent
Metal and nonmetal ---- ionic

38. What are the rules for zeros when identifying significant figures?

Zero in front----never significant
Zero in middle ---- always significant
Zero at the end----significant if there is a decimal anywhere in the number.

For example..... in .00300030 m there are 6 sig figs.

39. What types of substances dissolve in polar solvents?

Substances with charge or partial charge will likely dissolve in polar solvents. So---polar covalent substances and some ionic substances. The basic rule is "like dissolves like."

40. How many sigma and pi bonds would you expect to find in carbon monoxide?

1 sigma and 2 pi

41. What is the relationship between valence electrons and oxidation state?

Atoms with 4 or less valence electrons will tend to lose them and move to zero.

Atoms with 5 or more valence electrons will tend to gain more electrons to get to 8.

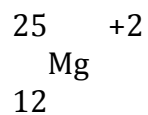
42. When forming compounds between two elements, what must be the sum of the positive and negative oxidation numbers?

ZERO

43. What are isotopes? What atomic property varies in isotopes---- atomic mass or atomic number?

Isotopes are atoms of the same element with different numbers of neutrons but the same number of protons.. This causes a variance in mass.

44. Given the following symbol, determine the number of protons, neutrons and electrons.....



12 protons, 13 neutrons, 10 electrons

45. What is Hund's rule?

electrons are placed individually in orbitals of the same sublevel until all of the orbitals contain one electron. It is not until all orbitals in the sublevel contain one electron that pairing begins.

46. How many unpaired electrons would be found in an atom of iron?

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