

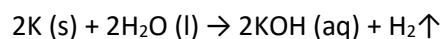
Complete on your own using only a non-programmable calculator and a pencil. You have 20 minutes in which to complete this worksheet. You'll not receive this worksheet back.

1) As discussed in class, ethene contains 1 double bond and two single bonds per carbon atom. Each carbon atom in ethene is in _____ geometry and _____ hybridization.

2) As discussed in class, P^{5+} takes 5 bonds per atom. When that occurs, this ion is in _____ hybridization and _____ geometry.

3) Gamma radiation interacts with atoms in three different ways to lose its energy. In the previous pop quizzes, two were addressed and one wasn't. Which energy loss mechanism hasn't yet been addressed in a pop quiz?

4) The following reaction is a classic reaction involving the reaction of Group I elements with water:



What non-metal reactant participates in the reaction? Use both elemental and/or molecular symbols and spelled out. What's the approximate pH description/property of this chemical?

5) Being able to explain breathing is an application of the _____ Gas Law.

6) The graphic at right best represents/illustrates which chemical technique:

7) Using your knowledge of chromatography and the chromatography column image at right, if you were told this was SEC (or GPC) chromatography, then you'd know that sample _____ has the highest molecular weight.

8) Using your knowledge of chromatography and the chromatography column image above, if you were told this was Reverse Phase chromatography, then you'd know that sample _____ is the most polar sample.

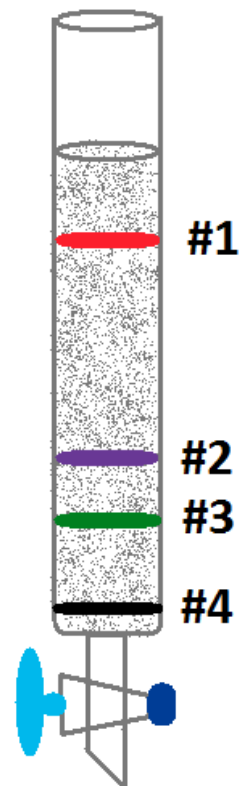
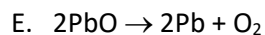
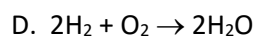
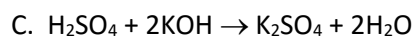
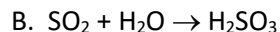
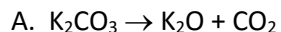
9) What does the phrase "pH₂O" mean?

10) In the phrase "pOH", the "p" stands for:

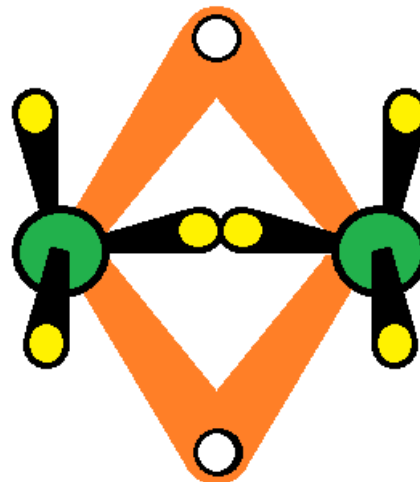
11) That "that the electrons enter each sub-orbital of a given type singly and with identical spins before any pairing of electrons of opposite spin occurs within those orbitals" is:

12) What is a quantum address for an N shell electron in a double-ringed dumb-bell –shaped f subshell that's spinning counter-clockwise?

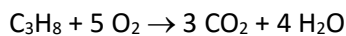
13) Name the kinds of reactions:



14) The image at right illustrates two (2) carbon atoms bonded together in such a way that each C atom will take 2 single and 1 double bond. In what geometry are the carbon atoms? What is their hybridization?



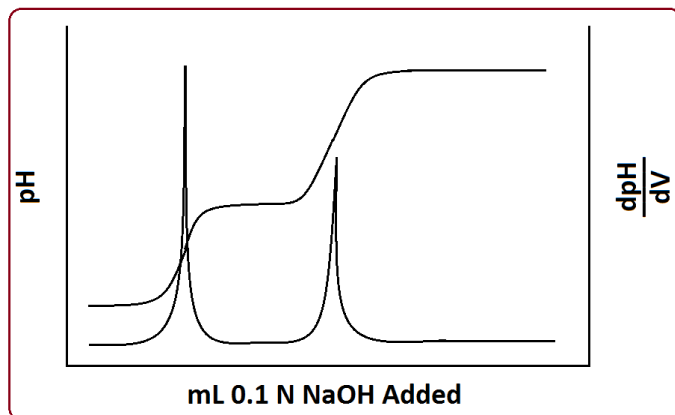
15) For this reaction, 15 g propane (C_3H_8 ; MW=44 g/mol) and 40 g oxygen (MW = 32 g/mol) are used as follows:



What's the limiting reagent based on CO_2 production? If you actually obtained 15 g CO_2 , what is your % yield? Show your work.

16) The EN for Ca is 1.0 and the EN for O is 3.5. What kind of bond really exists between Ca and O?

17) The image at right best represents the titration of which mineral acid?



18) Write out and label the formulas for the following:

A) Gay-Lussac's Law

B) Combined Gas Law

c) Universal Gas Law

D) Boyles' Law

E) Charles' Law

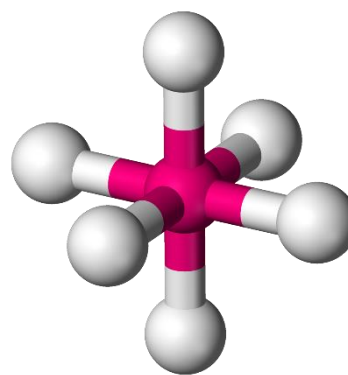
F) Poisuille's Law

19) What are the units on "R", the universal gas constant (use the units most commonly applied in CHEM 121)?

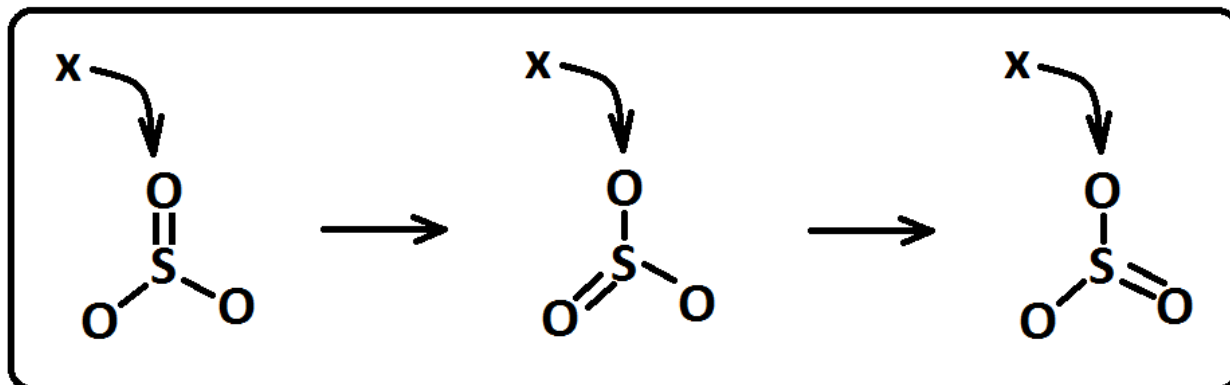
20) A _____ is the substance present in a colloid in the least amount.

21) A _____ is the substance present in a colloid in the largest amount.

22) What's the geometry and the hybridization of the model at right?



23) According to resonance theory, each bond in the sulfite ion (SO_3^{2-}) is consistent with the observation that the two bonds in the sulfite ion have the same bond length. Given that the $\text{S}=\text{O}$ bond energy is 93 kcal/bond and that the $\text{S}-\text{O}$ bond energy is 87 kcal/bond, determine the bond energy for the O labeled "X" in the diagram, below. Perform your calculation in kJ.



24) What's the most important factor in rate determination, relating to elementary reaction rates?

25) According to Fick's law, if a membrane thins to 0.25 times normal, a gas will diffuse across that membrane: