

170501 Chemistry Themed 2nd Semester Final Exam Study Guide - John Williams

Gas

1. What is STP? Do you have the values memorized?
2. Do you know how to convert between Kelvins and °C?
3. Do you know the proper units for $PV = nRT$? Do you have it memorized?
4. Do you know the ideal gas law and the combined gas law? Which has moles? Which has something change?
5. Do you know what 22.4 L means and when to use it? Memorize it.
6. You will not need to memorize R (0.0821 or any pressure values for conversion, except STP)
7. Know gas stoichiometry and sig figs

Petroleum

8. Know burning versus building for petroleum
9. Know what viscosity is and separation by BP (fractional distillation)
10. Know about a fractional distillation tower (bigger C's in bottom, fewer C's in the top, etc.)
11. Know the effect of C's and branching on intermolecular forces
12. Know the effect of IM's on tower position, rate of evap., viscosity, density, BP
13. Know $2n-2$, $2n+2$, $2n$ rules: how to use them and how to name first 10 hydrocarbons
14. Know isomer (and don't confuse with isotope!)
15. Know molecular formula and structural formula; saturated and unsaturated hydrocarbons
16. Know electron dot structures (which has two electrons and the rest have eight)
17. What is the central atom and how do you find it?
18. Know the difference between ionic bonds and covalent bonds including which are used in hydrocarbons
19. Know the heat of combustion and the molar heat of combustion
20. Know what an energy diagram including activation energy, bond breaking step, bond making step, exothermic, endothermic
21. Know how to correctly balance a combustion reaction including the energy term
22. Know that the energy released in exothermic reactions are stored in the bonds and that this energy originated from the sun (photosynthesis)
23. Know calorimetry ($Q = mC\Delta T$). You will **NOT** need to memorize 4.184.

Nuclear

24. What is a nuclear reaction and how does it differ from ordinary chemical reactions?
25. What are the three kinds of radiation discovered by Rutherford (you don't have to know which Scientist did which discovery!)?
26. Know the relative penetrating ability of each radiation type, the damage caused and the necessary shielding
27. Know which kind of radiation is harmful (ionizing) and which is not (non-ionizing)
28. Know what a half-life is and how this relates to how long radioactive waste is dangerous
29. Know how to compute grams or percent still radiation using principles of half-lives
30. Know what a transmutation is and how isotopes are named (Uranium-235, etc.)
31. Memorize $MN = P + N$
32. Know how to balance nuclear reactions
33. Compare/contrast fission and fusions and know where they are used
34. Understand the basics of a nuclear reactor including disposal of nuclear waste

Water

35. Know the difference between direct and indirect water usage
36. Know how to use a periodic table include being able to find number of protons, neutrons, electrons and the difference between atomic number, atomic mass (average mass number) and the isotopes that form from these
37. Know the methods of water purification used in class including decanting/pipet, sand/gravel filtration, charcoal adsorption, paper filtration and know what the percent yield means
38. Know the difference between filtration (separation based on size) and distillation (separation based on BP)
39. Know that distillation produces pure water, but is very expensive; other methods just make water cleaner
40. Know how to classify matter (memorize it)
41. Know what a mixture is and how to model elements, atoms and compounds
42. Know how to name ionic compounds and vice versa including criss-cross and proper use of romans
43. Know saturated, unsaturated and supersaturated (needs a heating and cooling cycle)
44. Know how to read a solubility curve and use it to find the kind of solution (sat/unsat/supersat), how much can dissolve, etc.
45. Know the four solvents/solutes discussed: pretty strong, super strong, polar covalent, non-polar covalent; know their properties, "like dissolves like", how they dissolve or why they don't and general properties (conductivity, solubility in water and oil, relative melting point, which exist as solids only normally)
46. Be able to identify an acid/base and ionic vs. covalent compounds based on formulas
47. Know pH, molarity and titration