Review Lab #2 Answers

1. Sodium hydrogen carbonate + hydrochloric acid form water, sodium chloride and carbon dioxide gas.
2. $NaHCO_{3(S)} + HCl_{(AQ)} \rightarrow H_2O_{(L)} + NaCl_{(AQ)} + CO_{2(G)}$

3. Grams of carbon dioxide comes from line "G"
4. We assume the alka-seltzer is 95% sodium hydrogen carbonate, mass from line "D" X 0.95 =

5. Molar mass of $NaHCO_{3(S)}$ = 84 grams/mole. Na = 23 g/ 84 g X 100% = 27% sodium
6. The mass of your $NaHCO_3$ (Q #4) x .27 = grams of $NaHCO_3$ that are just sodium.

7. Three-step mole problem. First 137.9 g $NaHCO_{3(S)}$ X 84 g/mole = 1.642 moles $NaHCO_{3(S)}$
   Here, the $NaHCO_{3(S)}$ and carbon dioxide are in a 1:1 ratio, so, 1.642 moles $CO_{2(G)}$ forms.
   Lastly, 1.642 moles CO_2 X 44 grams/mole = 72.25 grams CO_2 form.

8. 1.642 moles CO_2 X 6.02 x 10^{23} molecules/mole = 9.885 x 10^{23} molecules CO_2.
9. Matter cannot be created or destroyed in a chemical reaction, or physical change.

10. Chlorophyll is $C_{55}H_{72}MgN_4O_5$ Molar mass….

C	12 x 55 g =	660
H	1 x 72 g =	72
Mg	1 x 24 g =	24
N	4 x 14 g =	56
O	5 x 16 g =	80
molar mass =		892 g/mole

11. 660 g/ 892 g X 100% = 74.0% carbon

12. $Ca_{(S)} + Na_2CrO_{4(AQ)} \rightarrow CaCrO_{4(AQ)} + 2Na_{(S)}$
13. Skip this one.
14. That is a single replacement reaction.
15. The Ca replaces Na in solution, the chromate anion is the spectator ion.

16. Kr 2-8-18-8 is ground state. A possible excited state might be: 2-8-18-7-1

17. Energy can be transferred (from heat into an atom) and excite its electrons. If electrons in the ground state of an atom get exactly the right amount of energy to become excited—to move to a higher shell temporarily, the electrons can hold this energy gain temporarily. The excited state is not stable. When the electron (or electrons) return to the ground state, they emit this EXACT amount of energy as visible light, which we can see and measure. Each atom or compound requires a specific and unique amount of energy to become excited in the first place, so when they emit this unique amount of energy as light, we can see it and measure it and determine what atom or compound is present.

18. On table H there are four liquids. The compound with the lowest vapor pressure at 90°C is also the liquid that evaporates the worst. Lower vapor pressure = stronger intermolecular attraction. Ethanoic acid evaporates worst so it has the strongest IMF of attraction.

19. The highest VP at 60C is propanone, which is the highest curve at that temp. It's ~115 kPa. This means that the propanone evaporates the easiest at this temp, because it cannot seem to hold itself together as well as the other more polar molecules.

20. At 20 kPa and 65C, the "dot" on the graph is between the water and the ethanoic acid curve, only the ethanoic acid is still liquid, the other three have passed their boiling points.

21. Isotope math…
    (122.95 u)(.5585) + (123.89 u)(.3281) + (124.96 u)(0.1134) =
    (68.67 amu) + (40.65 amu) + (14.17 amu) = 123.49 → 123.5 amu (4 SF)

22. The most common isotope of indium (#49) has the rounded mass 115 amu.
    It has 49 p^+ and 49 e^-. 115 - 49 protons = 66 neutrons.

23. ammonium chromate, aluminum cyanide, sodium hypochlorite, palladium (IV) phosphate

24. carbon disulfide, sulfur hexafluoride, nitrogen triiodide, and carbon tetrabromide

25. 799.0 mm Hg X 101.3 kPa/760 mm Hg = 106.5 kPa (4 SF)

26. Go to table S, look at the MP and BP columns. At 875 Kelvin, Mg is not yet able to melt. (MP = 923 K) Magnesium is solid.
    Na melts at 371 K, but doesn't boil until 1156 K, sodium is a liquid.
    Make a temperature line. (ask me if you forgot how to do this).

27. Density = mass divided by volume. D = 546 grams/81.74 cm^3 = 6.68 g/cm^3.
    Table S says this is probably antimony, element #51, Sb