Honors Chemistry Q2 Review

1. In a balanced equation __ is/are conserved.
   I. moles II. atoms III. mass IV. Volumes of gases at same T&P V. molecules

   a.) I, III, IV
   b.) II, III
   c.) II, IV, V
   d.) I, IV, V
   e.) I, II, III

2. $6.02x10^{23}$ atoms of an element weigh 63.5 grams. Which statement(s) is/are true about this element?
   I.) The element is more dense than water.
   II.) The element is a metal
   III.) The metal is a poor conductor of electricity and heat.
   IV.) The element forms a +1 and a +2 ionic charge.
   V.) The element reacts explosively when added to water

   a.) I, II, IV b.) II, III, IV c.) I, II, IV, V d.) I, II, IV e.) I, II, IV

3. What is the percentage of nickel in nickel(III) chloride?

4. A chemist determined that 0.168 moles of a compound with the empirical formula $C_5H_8O_2$ has a mass of 50.4 grams. What is the compounds molar mass and molecular formula?

5. Calculate the mass of $1.94x10^{-2}$ moles of the amino acid tyrosine, $C_9H_{11}NO_3$.

6. 5.00 grams of norepinephrine contains 2.84 grams of C, 0.33 grams of H, 0.414 grams of N and 1.42 grams of O . What is the empirical formula of the compound?

7. Which statements below are correct about formulas and stoichiometry?
   I.) The subscripts in a chemical formula represent the relative numbers of moles in a compound.
   II.) The percent composition of a molecular formula is the same as the percent composition of its empirical formula.
   III.) Coefficients in a balanced equation represent the relative ratio of mass.
   IV.) Spectator ions are not included in the net ionic equation.
   V.) Mass and atoms are conserved in a chemical reaction.

   a.) I, II, IV, V b.) I, II, III, IV, V c.) III, IV, V d.) III, V e.) II, V

8. In the combustion reaction of butane, C_4H_{10}, 12.4 liters of CO_2 gas was formed at STP. What mass in grams of H_2O was also produced? The equation is: $2\ C_4H_{10(g)} + 13\ O_{2(g)} \longrightarrow 8\ CO_{2(g)} + 10\ H_2O_{(g)}$

9. Given: $5\ N_2O_{4(l)} + 4N_2H_3CH_{3(l)} \rightarrow 12H_2O_{(g)} + 9N_{2(g)} + 4CO_{2(g)}$ $\Delta H = -4594$ kJ
   What amount of energy is released when $3.0x10^5$ grams of N_2O_4 reacts with $2.5x10^5$ grams of $N_2H_3CH_3$?

10. A difficult reaction has only a 4.22% yield. If a student actually produced 38.27 mg of product how many mg of product theoretically should have been produced?

11. Term for the region in space with 90% probability of finding an electron.

12. The electron configuration of an element is give as: $[Ar]4s^2 3d^{10} 4p^3$. How many valence electrons does it have?

13. Which is/are correct about electron configuration?

    I.) The $3s^2$ orbital has more energy than the $3p^6$ orbital
    II.) The 3rd energy level of an atom contains nine orbitals.
    III.) $2p^5$ is not allowed.
    IV.) Oxygen contains 4 unpaired electrons.
    V.) The 2nd energy level can hold a maximum of six electrons.

    a.) I, II, V
    b.) I, II, IV
    c.) II, III, IV, V
    d.) IV, V
    e.) II

14. How many paired and unpaired electrons does an atom of tin have? (*In the order of paired, unpaired*)

15. How many paired and unpaired electrons does an atom of magnesium have? (*In the order of paired, unpaired*)

16. The Na^+ ion is (larger / smaller) than the sodium atom and has an electron configuration similar to __ .

17. The S^{2-} ion is (larger / smaller) than the sodium atom and has an electron configuration similar to __ .

18. Given the following elements, which list gives the correct predicted order of ionization energy from lowest to highest?

    Ni Rb F Ca Al N

19. The electron configuration of an element is: $[Xe]6s^2 4f^{14} 5d^{10} 6p^2$. Which statements are true about this atom?

    I. This element is use to shield radiation during routine dental X-ray exams.
    II. The atom has 2 unpaired electrons.
    III. There are a total of 18 electrons in the atom's 3rd energy level.
    IV. The atom has 4 valence electrons
    V. This element is a metal.

    a.) I, III, IV, V
    b.) III, IV
    c.) I, II, V
    d.) II, IV, V
    e.) I, II, III, IV, V

20. What are the 4 driving forces for a chemical reaction to occur?