1. What could be said about the following reaction?

\[ \text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 43\text{kcal} \rightarrow 2\text{NO}(\text{g}) \]

a. The rxn is endothermic and delta H will be negative
b. The rxn is endothermic and delta H will be positive
c. The rxn is exothermic and delta H will be negative
d. The rxn is exothermic and delta H will be positive
e. The rxn is endothermic and delta H will be zero.
2. Which of the following orbitals has the lowest energy?
   a. 3d
   b. 4s
   c. 4d
   d. 4p
   e. 5s
3. How many electrons are in a 5p sublevel? How many electrons are in a 5p orbital?
   a. 6; 2
   b. 2; 6
   c. 2; 1
   d. 1; 2
4. What is the limiting reagent if we start with 2.80g of aluminum and 4.25g of chlorine gas? (Hint: combination reaction)
   a. Chlorine gas
   b. Aluminum
5. How many grams of ZnCl₂ will be produced from 7.00g of Zn and 8.00g of CuCl₂?
   a. 8.01
   b. 0.107
   c. 0.060
   d. 7.01
6. Ammonia and oxygen gas react to form the products nitric oxide and water. There are 3.25g of ammonia and 3.50g of oxygen gas. How many moles of NO are formed?
   a. 0.206
   b. 0.109
   c. 0.412
   d. 0.218
7. If 4.95g of ethane (C2H4) are combusted with 3.25g of oxygen. How many grams of CO₂ are formed?
   a. 3.14
   b. 1.49
   c. 5.96
   d. 2.98
8. If 5g of nitrogen gas and 5g of hydrogen gas react to form ammonia, what mass of the reagent in excess remains?
   a. 1.08g  
   b. 3.17g  
   c. 2.56g  
   d. 3.94g  
   e. 6.11g
9. Which element does the following electron configuration refer to?

\[ \text{[Ne]} \ 3s^23p^2 \]

a. Ne  
b. S  
c. P  
d. Si
10. When 10g of lithium nitrate reacts with 10g of barium sulfate, what is the limiting reactant?
   a. LiNO₃
   b. BaSO₄
   c. Li₂SO₄
   d. Ba(NO₃)₂
   e. H₂O
11. You run a combustion of hexane in excess oxygen. Given that you have 6 grams of organic material, what is the percent yield given that 5.9 grams of water are produced?
   a. 69%
   b. 30%
   c. 14%
   d. 91%
   e. 42%
12. If the combustion of methane releases 890 kJ/mol, how much heat is released when 36 g of water are produced (in kJ)?
   a. 610
   b. 750
   c. 890
   d. 1000
   e. 1108
13. An electron that falls in the n=2 energy level can be expected to be found where on the periodic table?
   a. Group 2
   b. Period 2
   c. Atomic number 2
   d. That sort of information cannot be determined using the Bohr’s Model
14. Butane is combusted in a reaction with oxygen gas to form water, carbon dioxide, and heat. Which of the following is a true statement?
   a. This is an exothermic reaction because heat is being invested
   b. This is an exothermic reaction because heat is being released
   c. This is an endothermic reaction because heat is being invested
   d. This is an endothermic reaction because heat is being released
15. 2.50g of coal burn to heat 600g of water from 30 degrees Celsius to 50 degrees Celsius. How much heat does the coal produce (kJ/g)?
   a. 12.0
   b. 12.5
   c. 32.3
   d. 16.1
16. A 100g piece of metal is heated to 150\textdegree C and dropped into 90g of water at 45\textdegree C. If the final temperature of the water is 60\textdegree C, what is the specific heat of the metal in J/g\textdegree C?

a. 0.5273  
b. 1.2321  
c. 0.7263  
d. 0.8231  
e. 0.6276
17. It requires 4.33kJ to raise the temperature of a 150g bar of copper \((C=0.385 \text{ J/gC})\) from 100K to what?
   a. 175°C
   b. 165°C
   c. 150°C
   d. 145°C
   e. 95°C
18. What is the energy of a photon of light with a wavelength of 75.0nm?
   a. $2.65 \times 10^{-18}$
   b. $3.95 \times 10^{-18}$
   c. $2.65 \times 10^{-16}$
   d. $3.95 \times 10^{-16}$
19. True or false. Frequency and wavelength are directly proportional.
   a. True
   b. False
20. Which of the following has the highest energy on the electromagnetic spectrum?
   a. Microwave
   b. Gamma
   c. Ultraviolet
   d. Radio