General Chemistry: Final Exam Review Name: _____

Chapter 1

1) Which of the following below is quantitative → numerical data
Red smoke banana smell 7.4 grams solid to liquid change

2) Put the following numbers into scientific notation
890000 8.9×10^5 .00325 3.25×10^{-3} 22000 2.2×10^4

3) How many significant figures are in: 0.0078 2 400 1 500.0 4 0.030 2

4) What is the percent error if you calculate the density of aluminum to be 2.94 g/mL and the theoretical density of aluminum is 2.70 g/mL? 8.89%

5) Is the data accurate, precise, or both?
Experimental data: 5.57, 5.56, 5.58 *Theoretical value*: 5.59
both precise and accurate

Chapter 2

6) What is the density of an object if it has a mass of 28 grams and moves the water level from 4.5 mL to 11.5 mL?
4 g/mL

Chapter 3

7) ***Briefly describe the main idea of each scientist listed below:***

Thomson – cathode ray tube exp → discovered electron
Rutherford – gold foil exp., discovered nucleus
Mendeleev – arranged periodic table by atomic mass
Bohr – planetary model of the atom

8) How many protons, electrons and neutrons are in each of the following

$^{27}_{13}Al^{+3}$	Carbon-13	Fe^{+2}	S^{-2}
p= 13	p= 6	p= 26	p= 16
n= 14	n= 7	n= 30	n= 16
e= 10	e= 6	e= 24	e= 18

9) What is the average atomic mass of element "X" if it is 74% X-45, 18% X-46 and 8% X-47?

45,34 amu

Chapter 4

10) If carbon has a half-life of 5730 years, how much of a 800 gram sample will be left after 17190 years?

100g

11) What element has the electron configuration: $1s^2 2s^2 2p^5$ Fluorine

12) Which element has electron configuration ns^2np^3 Li (N) Si F

Chapter 5

13) Which elements would have similar properties to Na?? Mg (K) Al (Li)

14) What family of elements has 8 valence electrons? noble gases

Chapter 7

15) ***Name the following. Indicate "I" for Ionic and "C" for Covalent in the blank.***

C SiO_2 silicon dioxide

I Mg_3N_2 magnesium nitride

I AlF_3 aluminum fluoride

I Cu_2O copper (I) oxide

C Cl_2O_7 dichlorine heptoxide

C N_2O_4 dinitrogen tetroxide

16) ***Write the formula of the following:***

I Lithium nitride Li_3N

C diphosphorus pentoxide P_2O_5

I Iron (III) sulfide Fe_2S_3

C nitrogen tetroxide NO_4

I Magnesium hydroxide $Mg(OH)_2$

I Aluminum phosphide AlP

17) What happens to electrons in an ionic bond? transferred covalent bond? shared

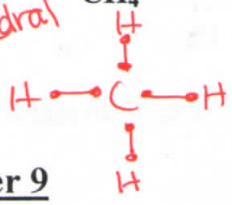
Chapter 8

18) Draw the Lewis Dot structure of the following elements:

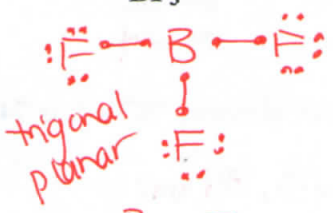
Al · N · O : Ar :

19) Draw the Lewis Dot structure of the following molecules and name the shape:

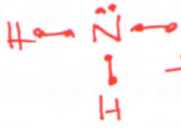
CH_4 tetrahedral



BF_3 trigonal planar



NH_3 trigonal planar



Chapter 9

20) What are the seven diatomic elements? Br I N Cl H O F

Balance each of the following reactions. Then identify the "type" of reaction in the blank.

21) Type: SR 2 $FeBr_3$ + 3 Cl_2 → 2 $FeCl_3$ + 3 Br_2

22) Type: DR ___ Ca_3N_2 + 3 K_2S → 3 CaS + 2 K_3N

23) Type: D ___ Li_3P → 3 Li + ___ P

24) Type: S 2 Al + 3 I_2 → 2 AlI_3

Chapter 10

Find the percent composition of each element in the following compounds:

25) H_3PO_3 %H = 3.66 %P = 37.78 %O= 58.56

26) $C_6H_{12}O_6$ %C = 40.0 %H = 6.67 %O= 53.3

27) Convert 68 g of water to moles.

3.77 mol

28) Convert 52 liters of oxygen (O_2) at STP to grams.

74.29g

29) How many molecules are equivalent to 4.5 mol of glucose ($C_6H_{12}O_6$)?

2.71×10^{24} molecules

Chapter 11

Use the reaction in the box below to answer questions #29-30

$$C_3H_8 + 5O_2 \text{ ----------} \rightarrow 3CO_2 + 4H_2O$$

30) If 128g of oxygen (O_2) react with propane, how many grams of carbon dioxide will be produced?

105.6g

31) If 3 moles of water were produced, how many moles of C_3H_8 were consumed?

0.75 mol

Chapter 12

32) Convert: 22°C = 295 Kelvin

33) What are the three characteristics of a catalyst? speeds up a reaction, lowers activation energy, is not used up

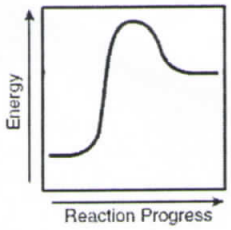
34) Define: "absolute zero" all molecular motion stops, 0 Kelvin

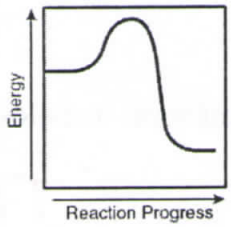
35) Define: ***sublimation***= solid to gas ***condensation***= gas to liquid

36) The specific heat of aluminum is 0.900 $\frac{J}{g\,°C}$. How much heat is required to raise the temperature of a 55.0 g block of aluminum from 35.0°C to 95.0°C?

2970 J

37) Identify the energy curves as endothermic or exothermic. Describe what happens to energy.





Type: endothermic
Energy: absorbs

exothermic
releases

Chapter 13

38) A balloon has a volume of 8 liters with a pressure of 770 mmHg. If the pressure is decreased to 630 mmHg, what is the new volume of the balloon?

9.78 L

39) In a closed system, 4 mol of CO_2 is in a container with a volume of 4.5 L and a temperature of 35°C. What is the pressure of this system in kPa?

$R = 8.31 \frac{kPa \cdot dm^3}{moles \cdot K}$

2275.09 kPa

40) A tire starts off with a volume of 3.5 L at a temperature of 35°C. What will be the new volume if the temperature of the tire increases to 65°C?

3.84 L

Chapter 15

41) What is the molarity of a solution containing 117.68 grams of H_2SO_4 diluted in 3 L of water?

0.40 M

42) What is the final concentration if 300.0 mL of a 2.0 M HCl solution are diluted to 800.0 mL?

0.75 M

43) Briefly explain why water and oil do not mix.

"like dissolves like" – water is polar and oil is nonpolar

Chapter 18

44) Define pH: hydrogen ion (H^{+1}) concentration

45) If pH = 8, then pOH = 6

If pOH = 2, then pH = 12

46) If $[H^{+1}] = 1 \times 10^{-5}$ then pH = 5

If $[OH^{-1}] = 1 \times 10^{-3}$ then **pH** = 11

pOH = 3