Honors Chemistry Practice Final 2017 KEY

1. Acetylene gas, C_2H_2, is used in welding because it generates an extremely hot flame when combusted with oxygen. How many moles of oxygen are required to react completely with 4.6 grams of acetylene? Use the balanced equation below:

$$\mathbf{2\ C_2H_2 + 5\ O_2 \rightarrow 4\ CO_2 + 2\ H_2O}$$

a. **0.44 mol** b. 0.071 mol c. 3.0 x10^2 mol d. 0.71 mol

2. If 2.6 moles of $PbCl_2$ react with excess K_2SO_4, how many moles of KCl will be produced? Use the ***unbalanced*** equation below:

$$\mathbf{\_\_\_\_PbCl_2 + \_\_\_\_K_2SO_4 \rightarrow \_\_\_\_PbSO_4 + \_\_\_\_KCl}$$

a. 2.6 mol b. 1.3 mol **c. 5.2 mol** d. 1.0 x10^3 mol

3. How many moles of sulfur dioxide gas will be produced by reacting 7.3 moles of hydrogen sulfide with excess oxygen according to the reaction below:

$$\mathbf{H_2S + O_2 \rightarrow SO_2 + H_2}$$

a. 230 mol b. 29 mol **c. 7.3 mol** d. 3.7 mol

4. Suppose you have 35.0 grams of copper reacting with a silver nitrate solution. How many grams of silver can you make?

$$\mathbf{Cu + 2\ AgNO_3 \rightarrow Cu(NO_3)_2 + 2\ Ag}$$

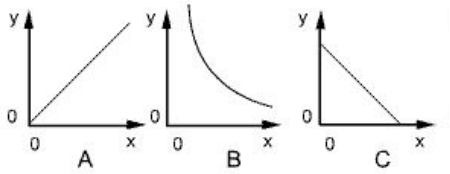
a. 59.4 grams b. 20.6 grams c. 3780 grams **d. 119 grams**

5. A sample of air has a volume of 550.0mL at 106ºC. At what temperature (in degrees Celsius) will its volume be 700.0mL at constant pressure?

a. 134ºC b. 407ºC **c. 209ºC** d. 482ºC e. 755ºC

6. Which of the following conditions represents standard temperature and pressure?
   a. 25°C, 760 atm
   b. 273K, 1.00atm
   c. 25°C, 760 torr
   d. 0°C, 101.3 torr

7. Which of the following graphs below depicts the relationship between pressure and temperature? **A**



8. Find the mass in grams of 4.2 L of NH_3 at standard temperature and pressure

a. 2.63g b. 22.4g c. 0.188g d. 72.0g **e. 3.20g**

9. At what temperature will 41.6 grams N_2 exerts a pressure of 815 torr in a 20.0 L cylinder?

a. 1324K **b. 176K** c. 87.8K d. 6.27K e. 22.4K

10. You have 25.00 mL of a 0.1000 *M* Kool-aid solution. How much water must be ***added*** to make a 0.02458 *M* solution?

a. 126mL b. 101mL **c. 76mL** d. 25.0mL e. 6.15mL

11. When solid sodium is dropped into a flask containing chlorine gas, an explosion occurs and a fine powder of sodium chloride (salt) is produced. If you wanted to make 5.0 grams of salt, how many moles of chlorine gas would you need to add to excess sodium?

a. **0.043mol** b. 0.086mol c. 3.0 mol d. 6.0 mol

12. Calculate the number of grams of water produced when 4.30 moles of propane, C_3H_8, reacts with excess oxygen according to the reaction below:

$$\mathbf{C_3H_8 + 5\,O_2 \rightarrow 3\,CO_2 + 4\,H_2O}$$

a. **310. grams** b. 77.5 grams c. 19.4 grams d. 0.239 grams

13. In an experiment, 5.00 grams of carbon monoxide reacts with 5.00 grams of iron (III) oxide (molar mass =159.7g) (molar mass = 28.01). What mass of iron metal will be produced?

$$\mathbf{Fe_2O_3 + 3CO \rightarrow 3CO_2 + 2Fe}$$

a. 6.64 grams b. 5.38 grams c. 1.75 grams **d. 3.50 grams**

14. True or False, Consider the reaction :

$$\mathbf{KOH + SO_2 \rightarrow KHSO_3}$$

Since the coefficients of the balanced chemical equation are all equal to 1, we know that exactly 1.0 gram of KOH will produce 1.0 gram of $KHSO_3$.

a. True **b. False**

15. Consider the balanced equation: $\mathbf{4Al + 3O_2 \rightarrow 2Al_2O_3}$

What mole ratio would you use to calculate how many moles of oxygen gas were needed to react completely with 2.0 moles of Aluminum metal?

a. $\frac{4\text{mol Al}}{3\text{ mol }O_2}$ b. $\mathbf{\frac{3\text{mol}O_2}{4\text{ mol Al}}}$ c. $\frac{4\text{mol Al}}{2\text{ mol }Al_2O_3}$ d. $\frac{1\text{ mol Al}}{2\text{ mol }O_2}$

16. The height of a barometer, which measures atmospheric pressure, reads 752 torr. What is this pressure in atmospheres?

a. 1.01 atm b. 0.752 atm **c. 0.989 atm** d. 479 atm e. 0.660 atm

17. Use the kinetic molecular theory of gases to predict what would happen to a closed sample of a gas whose temperature increased by a factor of 2 while its volume decreased by a factor of 2.

a. Its pressure would decrease
b. Its pressure would increase
c. Its pressure would hold constant
d. The number of moles of the gas would decrease
e. The average kinetic energy of the molecules of the gas would decrease

18. A weather balloon at Earth's surface has a volume of 4.00 L at 31°C and 755 mm Hg. If the balloon is released and the volume reaches 4.08 L at 728 mm Hg, what is the temperature in Kelvin?

a. 30.5K b. 309K **c. 299K** d. 404K

19. You are holding two balloons of equal volume at 1.00atm and 273K. One balloon contains 22.4g of argon. The other balloon contains neon. What is the mass of neon in the balloon?

a. 22.4g b. 0.561g c. 0.0278g **d. 11.3g** e. 6.02×10^{23} g

20. What volume of 0.550M solution of magnesium hydroxide can be made with 20.6g of magnesium hydroxide?

a. 0.353L b. 1.56L **c. 0.642L** d. 0.907L e. 0.194L

21. How many milliliters of 13.0M sulfuric acid are needed to prepare 600.0mL of 3.50M sulfuric acid solution?

a. 16200mL b. 600.0mL c. 13.0mL d. 0.758mL **e. 162mL**

22. Phenolphthalein is an indicator used when titrating an acid with a standard solution of base. What color is phenolphthalein in acidic solution?

a. **Clear** b. Pink

23. A 2.34g sample of NaCl (molar mass = 58.44 g/mol) is dissolved in enough water to make 50.20 mL of solution. Calculate the molarity of the resulting solution.
    a. 0.00797M b. 7.97M **c. 0.797M** d. 46.6M e. 2720M

24. How many grams of calcium chloride, $CaCl_2$ (molar mass=110.98g/mol), are contained in 375. mL of a 1.277 *M* solution of calcium chloride?
    a. 0.479g b. 478g **c. 53.1g** d. 0.00431g e. 1.277g

25. Calculate the molar mass of phosphoric acid
    a. **98.00g/mol** b. 97.00g/mol c. 96.00g/mol d. 82.00g/mol

26. Calculate the number of particles in 53.40g of aluminum oxide (Al_2O_3).
    a. 101.96 b. 6.02×10^{23} **c. 3.206×10^{23}** d. 3.33×10^{27}

27. Zinc reacts with hydrochloric acid to produce 38.0moles of hydrogen gas. How many grams of hydrogen gas are produced by the reaction?
    a. **76.8g** b. 38.4g c. 18.8g 38.0g

28. If 25.00mL of 0.500M lead (II) nitrate solution is mixed with 25.0mL of 0.500M sodium chloride solution, what mass of lead (II) chloride will be formed?
    a. **1.74g** b. 3.48g c. 0.870g d. 0.0580g

29. Calculate the empirical formula of a compound that is 50.04% carbon, 5.59% hydrogen and 44.37% oxygen.
    a. $C_{15}H_{20}O_{10}$ b. C_5H_2O **c. $C_3H_4O_2$** d. CHO_2

30. If the molecular formula mass of a compound is 360g/mol and the empirical formula is $C_3H_4O_2$, determine the molecular formula of the compound.
    a. **$C_{15}H_{20}O_{10}$** b. C_5H_2O c. $C_3H_4O_2$ d. CHO_2

31. What is average atomic mass of Lithium if 7.42% exists as ^6Li (6.015 g/mol) and 92.58% exists as ^7Li (7.016 g/mol)?
    a. 6.516amu b. 6.015amu c. 7.016amu **d. 6.941amu**

32. A sample of solid potassium chlorate was heated in a test tube and decomposed

    $$\mathbf{2KClO_3\ (s) \rightarrow 2KCl\ (s) + 3O_2\ (g)}$$

    The oxygen produced was collected by water displacement at 23°C. The resulting mixture of oxygen gas and water vapor had a total pressure of 795 torr and a volume of 750mL. Calculate the number of moles of oxygen present. The vapor pressure of water at 23°C is 2.81kPa.
    a. 1.02 moles b. 0.0821 moles **c. 0.0316 moles** 0.277 moles

33. A 2.0L flask contains a mixture of nitrogen and oxygen gas at 25°C. The total pressure of the mixture is 0.91atm and the mixture is known to contain 0.050 moles of nitrogen gas. Calculate the moles of oxygen present.
    a. 0.31 moles b. 0.61 moles c. 289 moles **d. 0.025 moles**

34. Oxygen gas is produced by $\mathbf{2H_2O_2 \rightarrow 2H_2O + O_2}$
    If 50.0mL of a 1.00M solution of H_2O_2 completely decomposes, what volume of dry oxygen gas can be collected at 21.5°C and 742.2 mmHg?
    a. **0.619 L** b. 0.977L c. 0.025L d. 742.2L

35. You begin the lab with 100.g of a hydrate ZnSO4*xH_2O. Upon heating, 43.86g of water are released leaving only the anhydrous salt behind. Calculate the empirical formula of the hydrate.
    a. $ZnSO_4*H_2O$ b. $ZnSO_4*2H_2O$ c. $ZnSO_4*4H_2O$ **d. $ZnSO_4*\ 7H_2O$**

36. What type of reaction is **$4Al + 3O_2 \rightarrow 2Al_2O_3$?**
a. decomposition **b. synthesis** c. combustion d. acid base

37. In an experiment, 5.00 grams of carbon monoxide reacts with 5.00 grams of iron (III) oxide (molar mass =159.7g) (molar mass = 28.01). What mass of iron metal will be produced? **$Fe_2O_3 + 3CO \rightarrow 3CO_2 + 2Fe$**
a. 6.64 grams b. 5.38 grams c. 1.75 grams **d. 3.50 grams**

38. What is the percent yield of the following reaction if 60 grams of $CaCO_3$ is heated and produces 15 grams of CaO? $CaCO_3 \rightarrow CaO + CO_2$
a. **44.6%** b. 15% c. 58% d. 7.0%

39. Consider the reaction $HC_2H_3O_2(aq) + H_2O(l) \rightarrow H_3O^+(aq) + C_2H_3O_2^-(aq)$. Which species is the conjugate acid?
A) $C_2H_3O_2^-(aq)$ B) $HC_2H_3O_2(aq)$ C) $H_2O(l)$
D) two of these **E)** **$H_3O^+(aq)$**

40. A solution with a pH of 2.17 is
A) neutral B) basic **C)** **acidic**

41. A solution has $[H^+] = 4.0 \times 10^{-3}$ *M*. The $[OH^-]$ in this solution is
A) 4.0×10^{-17} *M* **B)** **2.5×10^{-12} *M*** C) 1.0×10^{-14} *M*
D) 4.0×10^{11} *M* E) none of these

42. Calculate the $[OH^-]$ in a solution that has a pH of 3.18.
A) 1.0×10^{-7} *M* B) 3.1×10^{-15} *M* **C)** **1.5×10^{-11} *M***
D) 6.6×10^{-4} *M* E) none of these

43. An aqueous solution of ammonium sulfate is allowed to react with an aqueous solution of lead(II) nitrate. Identify the solid in the balanced equation.
A) $(NH_4)_2SO_4$ B) $Pb(NO_3)_2$
C) **$PbSO_4$** D) NH_4NO_3
E) There is no solid formed when the two solutions are mixed.

44. A reaction that involves a transfer of electrons is called a(n) _____ reaction.
A) precipitation B) acid-base **C)** **oxidation-reduction**
D) double-displacement E) none of these

Use the following to answer questions 45-47: Use the following choices to classify each reaction given below.
a. double replacement b. single replacement c. combustion d.synthesis e. decomposition

45. $ZnBr_2(aq) + 2AgNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + 2AgBr(s)$ ***A***

46. $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$ ***C***

47. $2Cs(s) + F_2(g) \rightarrow 2CsF(s)$ ***D***

48. Write a balanced chemical equation for the reaction of magnesium and hydrochloric acid
$Mg + 2HCl \rightarrow MgCl_2 + H_2$
49. Write a balanced equation for the reaction of magnesium hydroxide and nitric acid
$Mg(OH)_2 + 2HNO_3 \rightarrow 2HOH + Mg(NO_3)_2$
50. Write a balanced chemical equation for the reaction of lead (II) nitrate and potassium iodide
$Pb(NO_3)_2 + KI \rightarrow KNO_3 + PbI_2$