Name: _____ Chemistry 11 (Final Exam Review) Block: _____

Chemistry 11 **Final Exam Review**	Unit
Purpose: **Review Units 1 - 8** ***Lesson Objectives:*** By the end of this lesson I will be able to: • Review the vocabulary, methods, and concepts discussed in Units 1 - 8	1-8 Exam Review

Unit 1— Naming and Reaction Types

Pages in Student Workbook	Extra Questions (Hebden)
65 - 76	p.75-76

1. Write the correct formula for the following compounds:

a) ammonium chlorate ..... NH_4ClO_3

b) copper (II) sulphite..... $CuSO_3$

c) zinc carbonate tetrahydrate ..... $ZnCO_3 \cdot 4H_2O$

d) nitric acid ..... HNO_3 (aq)

e) phosphorus pentaiodide ..... PI_5

f) iron (III) thiocyanate..... $Fe(SCN)_3$

g) sulphuric acid..... H_2SO_4

h) dinitrogen tetrafluoride ..... N_2F_2

2. Write the correct names for the following compounds:

a) $Mn(SO_4)_2$..... Manganese (IV) Sulphate

b) $PbCrO_4 \cdot 6H_2O$ ..... Lead (II) Chromate Hexahydrate

c) As_2O_3..... Diarsenic Trioxide

d) CH_3COOH ..... Acetic acid

e) $Ni_2(C_2O_4)_3$..... Nickel (III) Oxalate

f) NF_3 ..... Nitrogen Trifluoride

g) $(NH_4)_2HPO_4$ ..... Ammonium Phosphate

h) $Ba(OH)_2 \cdot 10H_2O$..... Barium Hydroxide Decahydrate

Name: _____ Chemistry 11 (Final Exam Review) Block: _____

Unit 1.6 - 1.7: Balancing Equations and Reaction Types Review

Using the different types of reactions (**Synthesis, Decomposition, Single Replacement, Double Replacement, Neutralization,** and **Combustion**) predict the products and balance the equation.

1) ___ H_3PO_4 + _3_ KOH → ___ K_3PO_4 + ___ H_2O

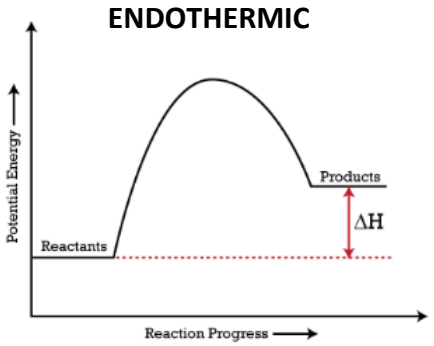
Type of Reaction: _____Neutralization_____

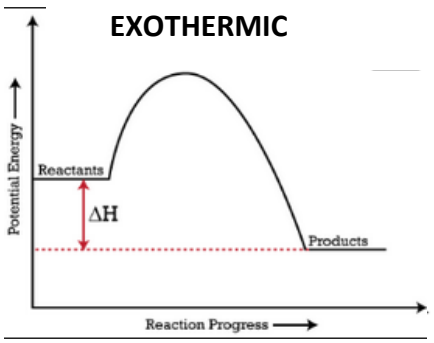
2) _2_ C_2H_2 + _5_ O_2 → _2_ H_2O + _4_ CO_2

Type of Reaction: _____Combustion_____

Unit 1.8: Exothermic and Endothermic Reactions

1. Draw a diagram of an **Exothermic** and **Endothermic** Re
Products, Enthalpy Change (ΔH), and Activation Energy





2. List the following Reactions as Exothermic or Endothermic:

a. $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g) + 200kJ$ Answer: ____Exothermic___

b. $Mn(s) + 2\ HCl(aq) \rightarrow MnCl_2(aq) + H_2(g) + 221\ kJ$ Answer: ____Exothermic___

c. $2\ N_2O_5\ (g) + 110\ kJ \rightarrow 4NO_2(g) + O_2(g)$ Answer: ___Endothermic__

d. $P_4O_{10}(g) + 6H_2O(l) \rightarrow 4\ H_3PO_4(aq) + 424\ kJ$ Answer: ____Exothermic__

Name: _____ Chemistry 11 (Final Exam Review) Block: _____

Unit 2 + 3 — Atoms, Periodic Table and Bonding and Forces

Pages in Student Workbook	Extra Questions (Hebden)
p. 139 - 192	p.146-147, p.149, p.150, p.155, p.157-158, p.164, p.170-171, p.181, p.183, p.191-192

1. The Greek who developed the idea of atoms was _____**Democritus**_____

2. Consider the following ideas:
   - Compounds are made up of molecules which are combinations of atoms
   - All atoms of an element are the same
   - Atoms of different elements are different
   - Atoms are indivisible particles

   Who came up with these ideas? _____**Dalton**_____ He called the ideas, the

   _____**Atomic**_____ Theory.

3. Give the number of protons, neutrons and electrons in the following:

Isotope	*Protons*	*Neutrons*	*Electrons*
$^{194}Ir^{3+}$	77	194 – 77 = 117	74
$^{202}Hg^{2+}$	80	202 – 80 = 122	78
$^{125}Te^{2-}$	52	125 – 52 = 73	54
^{263}Sg	106	263 – 106 = 157	106
$^{2}H^{+}$	1	2 – 1 = 1	0

4. Give the nuclear notation of the following:

Isotope	*Protons*	*Neutrons*	*Electrons*
$^{262}Db^{2+}$	105	157	103
$^{123}Sb^{3+}$	51	72	48
$^{75}As^{3-}$	33	42	36
^{133}Xe	54	79	54
$^{244}Pu^{3+}$	94	150	91

5. Element "X" is composed of the following naturally occurring isotopes:

Isotope	% Abundance
^{79}X	50.69
^{81}X	49.31

Calculate the average atomic mass of element "X" to 3 decimal places.

$$[79 \times (0.5069)] + [81 \times (0.4931)] = 79.99 g/mol$$

Element "X" is actually the real element _____**Bromine**_____.

6. Regions in space occupied by electrons are called _____**Orbitals**_____

7. Write the ground state electron configurations (eg. $1s^2\ 2s^2\ 2p^6$) for the following atoms or ions. You may use the **core** notation.

a) P **$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$** **OR** **[Ne] $3s^2\ 3p^3$**
b) M **$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^4$** **OR** **[Kr] $5s^2\ 4d^4$**
c) Cl^- **$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$** **OR** **[Ne] $3s^2\ 3p^6$**
d) Al^{3+} **$1s^2\ 2s^2\ 2p^6$** **OR** **[He] $2s^2\ 2p^6$**
e) S^{2-} **$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$** **OR** **[Ne] $3s^2\ 3p^6$**

8. Circle the metalloid: Be Rb Os (Ge) Pb Al
9. Circle the most reactive element in the following: (Na) Mg Si Al Ar
10. Circle the most reactive element in the following: (Cl) Br I At N
11. Circle the element with the largest atomic radius of these: (Na) Mg Si Al Ar
12. Circle the element with the largest ionization energy of these: K Ca Ga As (Kr)
13. What is meant by ionization energy?

Energy required to remove the outermost electron

14. Circle the element with the largest density of these: C Si Ge Sn (Pb)
15. Circle the element with the highest electronegativity of these: (Mg) Sr Ba Ra
16. Circle the element with the highest electronegativity of these: (F) Cl Br I
17. What is meant by electronegativity?

The attraction an atom has for the electrons of a neighboring atom

18. Circle the most metallic element of these: Be Mg Ca Sr (Ba)
19. Circle the most metallic element of these: (Ga) Ge Se Br Kr
20. Write a balanced equation for the reaction of potassium with water.

$$2K + 2H_2O \rightarrow H_2 + 2KOH$$

21. Write a balanced equation for the reaction of aluminum with bromine.

$$2Al + 3Br_2 \rightarrow 2AlBr_3$$

22. In an ionic bond, electrons are
    a. shared equally by two atoms
    b. shared unequally by two atoms
    c. transferred from a metal to a non-metal
    d. transferred from a non-metal to a metal
    e. closer to one end of a molecule, forming a temporary dipole Answer _____

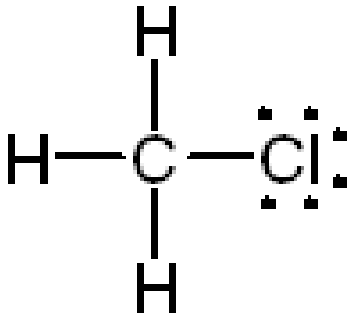
23. In a covalent bond, electrons are
    a. shared equally by two atoms
    b. shared unequally by two atoms
    c. transferred from a metal to a non-metal
    d. transferred from a non-metal to a metal
    e. closer to one end of a molecule, forming a temporary dipole Answer _____

24. In a polar covalent bond, electrons are
    a. shared equally by two atoms
    b. shared unequally by two atoms
    c. transferred from a metal to a non-metal
    d. transferred from a non-metal to a metal
    e. closer to one end of a molecule, forming a temporary dipole Answer _____

25. In London forces, electrons are
    a. shared equally by two atoms
    b. shared unequally by two atoms
    c. transferred from a metal to a non-metal
    d. transferred from a non-metal to a metal
    e. closer to one end of a molecule, forming a temporary dipole Answer _____

26. Draw the Lewis Structures for: (a) CH_3Cl (b) H_2 (c) PO_4^{-3} (d) SF_6 .
    Indicate if polar or non-polar.

a.

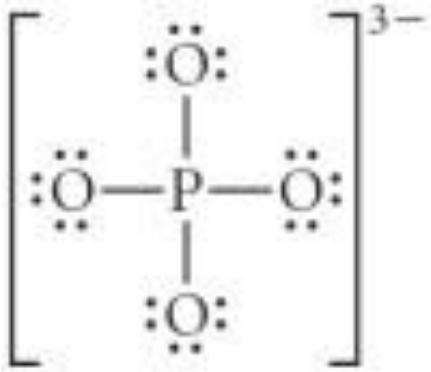


Polar

b.

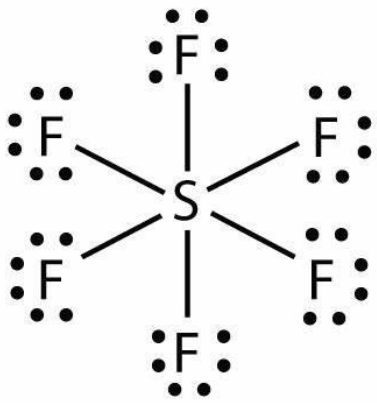
Non-Polar

c



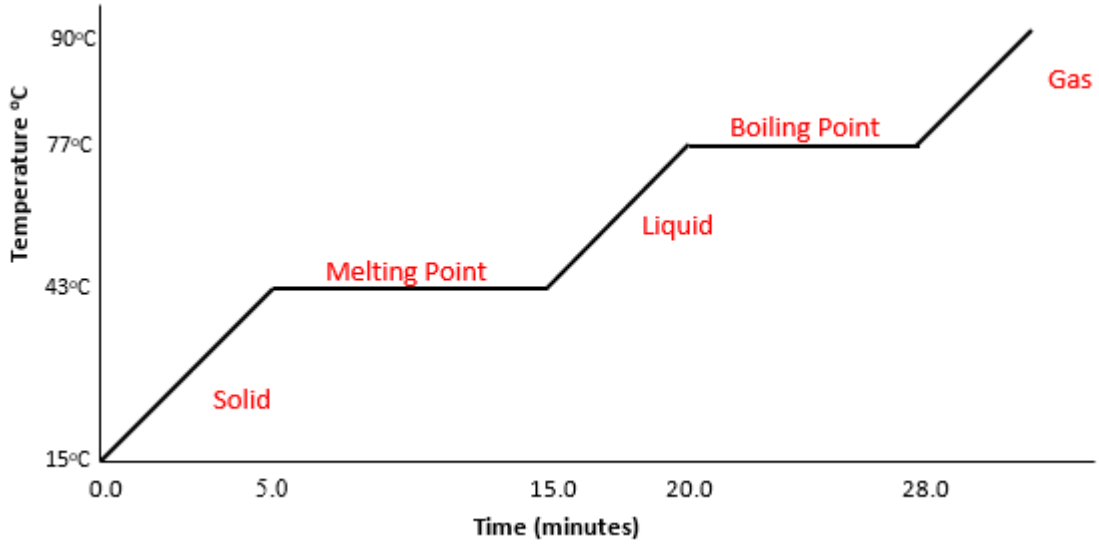
Non-Polar

d.



Non-Polar

27. Given the following graph of Temperature vs. Time for warming substance "X" which starts out as a solid, answer the questions below:



a) During time 0.0 – 5.0 minutes, the added heat energy is being used to _____**Increase the temperature of the solid substance**_____

b) During time 5.0 – 15.0 minutes, the added heat energy is being used to _____**Melt the solid substance**_____

c) During time 15.0 – 20.0 minutes, the added heat energy is being used to _____**Increase the temperature of the liquid substance**_____

d) During time 20.0 – 28.0 minutes, the added heat energy is being used to _____**Boil the liquid**_____

e) The melting point of substance "X" is _____**43 °C**_____

f) The boiling point of substance "X" is _____**77 °C**_____

g) If a greater amount of substance "X" was used, the melting point would be
1. a lower temperature
2. a higher temperature
3. the same temperature Answer _____

h) What phase is substance "X" at 90°C? _____**Gas**_____

i) Explain WHY the curve levels off between 5.0 min. and 15.0 min.

All of the added heat energy is being used for the process of melting the solid (phase change) so none is available to warm the substance until after the melting is complete

Name: _____ Chemistry 11 (Final Exam Review) Block: _____

Unit 4-Solution Chemistry

Pages in Student Workbook	Extra Questions (Hebden)
p.	Pg. 193-212

1. Which would be miscible with water: ethanol or butane? Why?

Both ethanol and water are polar substances. Recall: "Like dissolves like"

2. Why are some solvents polar and some non-polar? Which would you use to dissolve salt?

Polar molecules are molecules which are not symmetrical and have permanent dipoles because of an uneven sharing of electrons. NaCl is polar so you would use a polar solvent ("like dissolves like")

4. Which of the following would you except to form conducting ("ionic") solutions when added to water, and which would form non-conducting ("non-ionic") solutions?

(a) KI (b)HBr (c)CH_4 (d)CsF = Conducting

(e) H_2CO_3 (f)ICI (g)$CaBr_2$ (h)CH_3COOH

5. Which of the following conduct electricity?

(a)$HCl_{(aq)}$ (b)$Ag_{(s)}$ (c)$BaBr_{2(aq)}$ (d)$LiCl_{(s)}$

(e)$CO_{2(s)}$ (f)$LiOH_{(l)}$ (g)$C_{14}H_{10(l)}$ (h) $CH_3COOH_{(l)}$

6. Which should melt at a higher temperature? Why?

(a)He or Xe (b)F_2 or Br_2 (c)CH_4 or CH_3F (d)HBr or Kr

(e)HI or HCI (f)H_2O or H_2Te (g)CH_3-CH_3 or HO-CH_2CH_2-OH

7. What will be the $[Cl^{-1}]$ if 60.0 g of $BaCl_{2(s)}$ is dissolved in water to a final volume of 600.0mL?

8. If 35.0g of $V(NO_3)_5$ is dissolved in water to a final volume of 1.0L , what will the $[NO_3^{-1}]$ be?

9. What mass of NaBr must be dissolved in 4.9L of water to make a 5.2 M NaBr solution?

Name: _____ Chemistry 11 (Final Exam Review) Block: _____

Unit 5—SI Units and Conversions

Pages in Student Workbook	Extra Questions (Hebden)
P. 9 - 40	p.21, p.26, p.33-34, p.39, p.40

1. 0.0006 mm = ? µm Answer _____0.6 µm _____

2. 0.054 mL = ? nL Answer ___$5.4 \times 10^4\ nL$ ____

3. 3.5 µg/L = ? mg/mL Answer __$3.5 \times 10^{-6} mg/mL$__

4. The density of iron is 7860 g/L. Calculate the mass of a 3.2 mL sample of iron.

$mass = 0.032L \times 7860 \frac{g}{L} = 25.152\ g = 25\ g$ Answer _____**25 g**_____

5. Manganese has a density of 7.20 g/mL. Calculate the volume occupied by a 4.0 kg piece of manganese.

$volume = \frac{4000g}{7.20\ g/mL} = 555.56\ mL = 5.6 \times 10^2\ mL$ Answer ____$5.6 \times 10^2\ mL$ ____

6. A 0.0460 L piece of copper has a mass of 410.32 g. Calculate the density of copper in g/mL.

$density = \frac{mass}{volume} = \frac{410.32g}{46.0\ mL} = 8.92\ g/mL$ Answer ____$8.92\ g/mL$ ____

7. Give the number of significant digits in each of the following. Assume they are all measurements.

a) 0.0023 ..... ____**2**____ d) 3.2×10^{-4} ..... ____**2**___

b) 3953 000 ..... ____**4**___ e) 50020.000 ..... ____**8**___

c) 1.0200×10^5 ..... ____**5**___ f) 3450 ..... ____**3**___

8. Perform the following calculations and round the answers off to the correct number of significant digits as justified by the data. Assume all numbers are measurements.

a) 2.1500 x 0.31 ..... ____**0.67**____ f) $8.90 \times 10^3 \div 4.400 \times 10^{-6}$.__$\mathbf{2.02 \times 10^9}$__

b) 0.05 + 394.7322 ..... __**394.78**____ g) $83.00 \div 1.2300 \times 10^2$ ..... ____**0.6748**__

c) $4.905 \times 10^6 \div 4 \times 10^{-2}$ ____**1x10⁸**____ h) 98.0076 - 2.195 ..... __**95.813**____

d) (3.33 x 9.52) + 13.983. ___**45.7**_____ i) 0.00000200 x 245.912 ..... _$\mathbf{4.92 \times 10^{-4}}$__

e) 3.813 + 98.98 + 2.669 ..... _**105.46**__ j) 5.802 ÷ 6.21 + 2.41 ÷ 9.2565... ___**1.195**__

9. Round the following numbers to 2 significant digits. (4 marks)

a) 2 000 000 000 ____2.0×10^9____ c) 3.88945 x 10^{28} ..... ____3.9×10^{28}____

b) 106 000 ..... ____1.1×10^{10}____ d) 0.000 000 7895 ..... ____7.9×10^{-7}____

Unit 6— The Mole Concept

Pages in Student Workbook	Extra Questions (Hebden)
p. 77 - 104	p.82, p.84, p.87, p.88-90, p.93, p.95, p.98, p.102, p.103-104

1. Make the following conversions, clearly showing your steps. Include proper units in all of your work and in your answer.

a) 133.44 grams of PCl_5 = ? moles Answer ____**0.64000 mol**____

b) 0.00256 moles of $Li_2Cr_2O_7$ = ? grams Answer ____**0.588 g**____

c) 170.24 L of NO_2 at STP = ? moles Answer ____**7.6000 mol**____

d) 570.625 g of PCl_3 gas = ? L (STP) Answer ____**92.9600 mL**____

e) 1030.4 mL of C_2H_6 gas at STP = ? g Answer ____**1.3853 g**____

f) 5.00 kg of nitrogen gas = ? L (STP) Answer ____$4.00 \times 10^3\ L$____

g) 0.5696 kg of $CH_{4(g)}$ = ? mL Answer ____$7.974 \times 10^5\ mL$____

2. The density of liquid ethanol (C_2H_5OH) is 0.790 g/mL. Calculate the number of molecules in a 35.0 mL sample of liquid ethanol.
(**Note**: You **cannot** use 22.4 L/mol since this is **NOT** a gas at STP!)

Answer ____$3.62 \times 10^{23}\ molecules$____

3. A 100.0 mL sample of liquid mercury contains 6.78 moles. Calculate the density of liquid mercury from this data.

Answer ____**13.6 g/mL**____

4. a) The density of a gas at STP is 4.955 g/L. Calculate the molar mass of this gas.

$MM = 4.955\ g/L \times \frac{22.4\ L}{1\ mol} = 110.9\ g/mol$

b) The gas is an oxide of selenium. Determine the molecular formula.

$SeO = 95\ g/mol$

$SeO_2 = 110.0\ g/mol$ $\quad 110.0\ g/mol - 95\ g/mol = 16.0\ g = O$

Answer SeO_2

5. Find the percent composition (% by mass of each element) in the following compound: $Sr_3(PO_4)_2$. Show your work.

$Sr_3(PO_4)_2 = 452.8\ g/mol$

$\%Sr = \left(\frac{3 \times 87.6}{452.8}\right) \times 100\% = 58.04\%$

$\%P = \left(\frac{2 \times 31.0}{452.8}\right) \times 100\% = 13.69\%$

$\%O = \left(\frac{8 \times 16.0}{452.8}\right) \times 100\% = 28.27\%$

Answer 58.04 %Sr, 13.69 %P, 28.27 % O

6. A compound was analyzed and the following results were obtained:

Molar mass: 270.4 g/mol

Mass of sample: 162.24 g

Mass of potassium: 46.92 g ÷ 39.1 g/mol = 1.20 mol ÷ 1.20 mol = 1

Mass of sulphur: 38.52 g ÷ 32.1 g/mol = 1.20 mol ÷ 1.20 mol = 1

Mass of oxygen: the remainder of the sample is oxygen $76.8\ g \div 16.0 = 4.80\ mol \div 1.20 = 4$

a) Determine the mass of oxygen in the sample.

$162.24 - (46.92 + 38.52) = 76.8\ g$

Answer 76.8 g

b) Determine the empirical formula for this compound.

Answer: Empirical Formula: KSO_4

c) Determine the molecular formula for this compound.

$KSO_4 \rightarrow 135.2\ g/mol$

$270.4\ g/mol \div 135.2\ g/mol = 2$

Answer: Molecular Formula: $K_2S_2O_8$

7. 123.11 g of zinc nitrate, $Zn(NO_3)_2$ are dissolved in enough water to form 650.0 mL of solution. Calculate the $[Zn(NO_3)_2]$ Include proper units in your work and in your answers.

$123.11\ g\ Zn(NO_3)_2 \times \frac{1\ mol}{189.4\ g} = 0.65\ mol$

$M = \frac{mol}{L} = \frac{0.65\ mol}{0.650\ L} = 1.000\ M$

Answer 1.000 M

8. Calculate the mass of potassium sulphite (K_2SO_3) needed to make 800.0 mL of a 0.200 M solution of K_2SO_3. Include proper units in your work and in your answers

$0.800\ L \times \frac{0.200\ mol\ K_2SO_3}{1\ L} \times \frac{158.3\ g}{1\ mol\ K_2SO_3} = 25.328\ g$

Answer 25.3 g

9. 150.0 mL of water are added to 400.0 mL of 0.45 M HNO_3 . Calculate the final $[HNO_3]$.
Include proper units in your work and in your answers.

$M_1V_1 = M_2V_2$

$(400\,mL)(0.45\,M\,HNO_3) = M_2(550\,mL)$ Answer $M_2 = 0.33\,M$

$M_2 = 0.33\,M$

10. What volume of water needs to be added to 150.0 mL of 4.00 M H_2SO_4 in order to bring the concentration down to 2.50 M? Include proper units in your work and in your answers.

$M_1V_1 = M_2V_2$

$(4.00\,M)(150.0\,mL) = (2.50\,M)(V_2)$ Answer 90.0 mL

$240.0\,mL = V_2$

$240.0\,mL - 150.0\,mL$

90.0 mL

Unit 7— Stoichiometry

Student Workbook	Extra Questions (Hebden)
123 - 138	p.124, p.127, p.131, p.133, p.137

1. Given the following balanced equation, answer the questions following it:

$$2NF_{3(g)} + 3H_{2(g)} \rightarrow N_{2(g)} + 6HF_{(g)}$$

a) If 5.5 moles of H_2 are reacted, how many moles of NF_3 will be consumed?

$5.5\,mol\,H_2 \times \frac{2\,mol\,NF_3}{3\,mol\,H_2} = 3.67\,mol\,NF_3$ Answer 3.7 mol NF_3

b) In order to produce 0.47 moles of HF, how many moles of NF_3 would be consumed?

$0.47\,mol\,HF \times \frac{2\,mol\,NF_3}{6\,mol\,HF} = 0.157\,mol$ Answer 0.16 mol

c) If you needed to produce 180.6 g of N_2, how many moles of H_2 would you need to start with?

$180.6\,g\,N_2 \times \frac{1\,mol\,N_2}{28.0\,g\,N_2} \times \frac{3\,mol\,H_2}{1\,mol\,N_2} = 19.35\,mol\,H_2$ Answer 19.35 mol H_2

d) If you completely react 17.04 g of NF_3 , what mass of HF will be produced?

$17.04\,g\,NF_3 \times \frac{1\,mol\,NF_3}{71.0\,g\,NF_3} \times \frac{6\,mol\,HF}{2\,mol\,NF_3} \times \frac{20.0\,g\,HF}{1\,mol\,HF} = 14.4\,g\,HF$ Answer 14.4 g HF

Name: _____ Chemistry 11 (Final Exam) Block: ____

2. Given the following balanced equation, answer the questions following it:

$$HBrO_3 + 5\,HBr \rightarrow 3\,H_2O_{(l)} + 3\,Br_{2(g)}$$

a) If 3.56 moles of HBr are reacted, how many litres of Br_2 will be formed at STP?

$3.56\ mol\ HBr \times \frac{3\ mol\ Br_2}{5\ mol\ HBr} \times \frac{22.4\ L\ Br_2}{1\ mol\ Br_2} = 47.85\ L\ Br_2$ Answer 47.9 L Br_2

b) In order to produce 3.311×10^{24} molecules of Br_2, what mass of HBr is needed?

$3.311 \times 10^{24}\ molecules\ Br_2 \times \frac{1\ mol\ Br_2}{6.02 \times 10^{23}\ molecules} \times \frac{5\ mol\ HBr}{3\ mol\ Br_2} \times \frac{80.9\ g\ HBr}{1\ mol\ HBr}$ Answer ↳ 741.6 g HBr

3. Given the following balanced chemical equation, answer the question below it.

$$MgCO_{3\,(s)} + 2HCl_{(aq)} \rightarrow CO_{2\,(g)} + H_2O_{(l)} + MgCl_{2(aq)}$$

a) What mass of $MgCO_3$ will react completely with 15.0 mL of 1.5 M HCl?

$0.0150\ L\ HCl \times \frac{1.5\ mol\ HCl}{1\ L} \times \frac{1\ mol\ MgCO_3}{2\ mol\ HCl} \times \frac{84.3\ g\ MgCO_3}{1\ mol\ MgCO_3}$

$= 0.948\ g$ Answer 0.948 g ≠ 0.95 g

b) Calculate the volume of 2.0 M HCl which would be needed to react completely with 37.935 grams of magnesium carbonate.

$37.935\ g\ MgCO_3 \times \frac{1\ mol\ MgCO_3}{84.3\ g} \times \frac{2\ mol\ HCl}{1\ mol\ MgCO_3} \times \frac{1\ L}{2.0\ mol\ HCl} = 0.45\ L$ Answer 0.45 L

5. Given the following balanced equation, answer the questions below it.

$$3\,Cu_{(s)} + 8HNO_{3(l)} \rightarrow 3\,Cu(NO_3)_{2(aq)} + 2NO_{(g)} + 4\,H_2O_{(l)}$$

a) If 317.5 grams of Cu are placed into 756.0 grams of HNO_3, determine which reactant is in excess.

Answer Cu in excess

b) If the reaction in (a) is carried out, what mass of NO will be formed?

Answer 90.0 g NO

11

$317.5\ g\ Cu \times \frac{1\ mol\ Cu}{63.5\ g} \times \frac{2\ mol\ NO}{3\ mol\ Cu} \times \frac{30.0\ g}{1\ mol\ NO} = 100 \times 10^2\ g\ NO$

$756.0\ g\ HNO_3 \times \frac{1\ mol\ HNO_3}{63.0\ g} \times \frac{2\ mol\ NO}{8\ mol\ HNO_3} \times \frac{30.0\ g\ NO}{1\ mol\ NO} = 90.0\ g\ NO$

Name: _____ Chemistry 11 (Final Exam) Block: ____

6. Given the balanced equation: $2BN + 3F_2 \rightarrow 2BF_3 + N_2$,

When 161.2 grams of BN are added to an excess of F_2, a reaction occurs in which 326.118 grams of BF_3 are formed.

a) Calculate the *theoretical* yield of BF_3 in grams.

$$161.2\text{ g BN} \times \frac{1\text{ mol BN}}{24.8\text{ g BN}} \times \frac{2\text{ mol BF}_3}{2\text{ mol BN}} \times \frac{67.8\text{ g BF}_3}{1\text{ mol BF}_3}$$

$$= 440.7\text{ g BF}_3$$

Answer 440.7g BF_3

b) Calculate the *percentage* yield of BF_3.

$$\%\text{ yield} = \frac{326.118\text{ g}}{440.7\text{ g}} \times 100\% = \boxed{74.0\%}$$

Answer _____

7. When reacting NH_3 with O_2 according to the reaction:

$$4\,NH_3 + 5\,O_2 \rightarrow 4\,NO + 6\,H_2O$$

Using 163.2 grams of NH_3 with an excess of O_2 produces a 67% yield of NO.

a) Calculate the *theoretical yield* of NO in grams.

$$163.2\text{ g NH}_3 \times \frac{1\text{ mol NH}_3}{17.0\text{ g NH}_3} \times \frac{4\text{ mol NO}}{4\text{ mol NH}_3} \times \frac{30.0\text{ g NO}}{1\text{ mol NO}} = 288.0\text{ g NO}$$

Answer 288.0g NO

b) Calculate the *actual yield* of NO in grams.

$$288.0\text{ g} \times 0.67 = 192.9\text{ g}$$

Answer _____

$$= 193.0\text{ g}$$

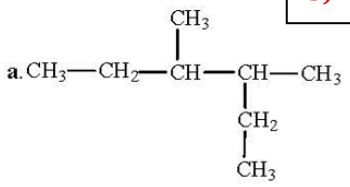
Name: _____ Chemistry 11 (Final Exam Review) Block: _____

Unit 8 - Organic Chemistry

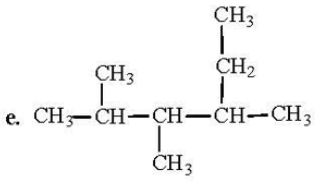
Pages in Student Workbook	Extra Questions (Hebden)
p.	Pg. 220 - 221

1. Name the following hydrocarbons.

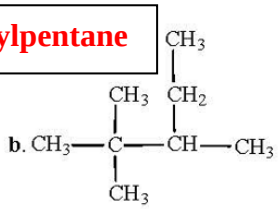
3,4-dimethylhexane



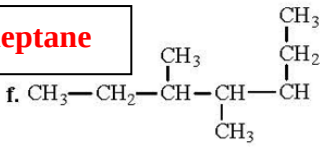
2,3,4-trimethylhexane

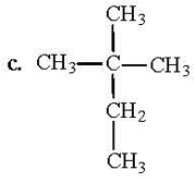


2,2,3-trimethylpentane

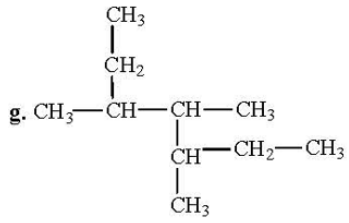


3,4-dimethylheptane



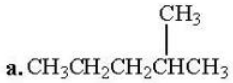


2,2-dimethylbutane

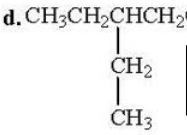


3,4,5-trimethylheptane

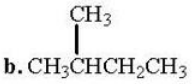
2. Name the following hydrocarbons.



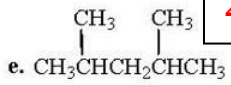
2-methylpetane



3-methylpetane



2-methylbutane



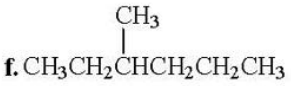
2,4-dimethylpetane

3. Listed below are the condensed structural formulas or names of the nine isomers of heptane, C_7H_{16}. Write the formula and name for each.

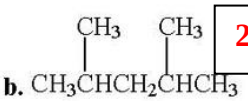
Heptane

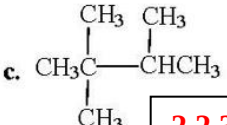
a. $CH_3CH_2CH_2CH_2CH_2CH_2CH_3$

3-methylhexane

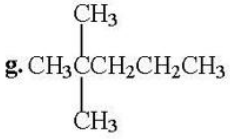


2,4-dimethylpetane



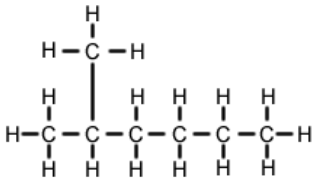


2,2,3-trimethylpropane

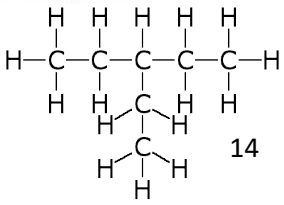


2,2-dimethylpetane

h. 2-methylhexane



i. 3-ethylpentane



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Cation = Positive (+) Ion

Anion = Negative (-) Ion

PREFIX

Mono = 1

Di = 2

Tri = 3

Tetra = 4

Penta = 5

Hexa = 6

Hepta = 7

Octa = 8

Nona = 9

IONIC COMPOUND NAMES

Ionic Compounds = Metal + Non-metal

Metal Name + Non-Metal Name (change ending to "-ide")

E.g: Calcium Chlor**ide** **($CaCl_2$)**

Copper (II) Iod**ide** **(CuI_2)**

COVALENT COMPOUND NAMES

Covalent Compounds = **Non-Metal** + **Non-Metal**

Prefix+Non-Metal Prefix+Non-Metal("-ide")

E.g: **Tri**nitrogen **Deca**brom**ide** **(N_3Br_{10})**

HYDRATES

Ionic Compound + **Prefix**hydrate

E.g: Copper (II) Sulfate **Penta**hydrate

(Ionic Name) (Prefix Hydrate)

ACID NAMES

No Oxygen: **"Hydro_____ic Acid"** (Ex. Hydrobromic Acid – HBr)

With Oxygen: Identify the polyatomic oxyanion, and

- Change the endings: **"ite" → "ous"**
  "ate" → "ic"

Name the oxoanion and add the word "acid".
(Example: Chlorous Acid – $HClO_2$)

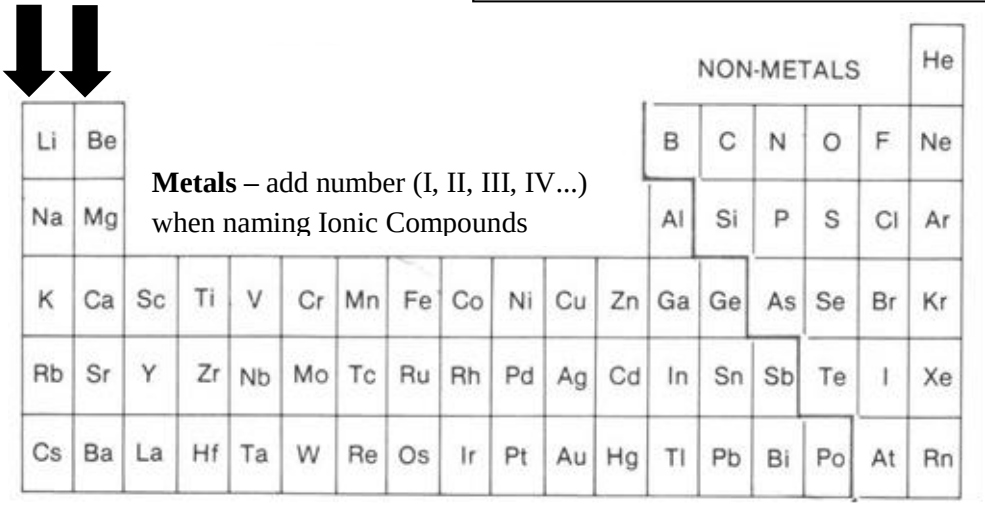
BASE NAMES

1. Name the metal first
2. The polyatomic ion "hydroxide" (-OH) after

Example: NaOH - **Sodium Hydroxide**

Metals (Rows 1 & 2)
(Do not need to add number when naming Ionic Compounds)

Metals – add number (I, II, III, IV...) when naming Ionic Compounds



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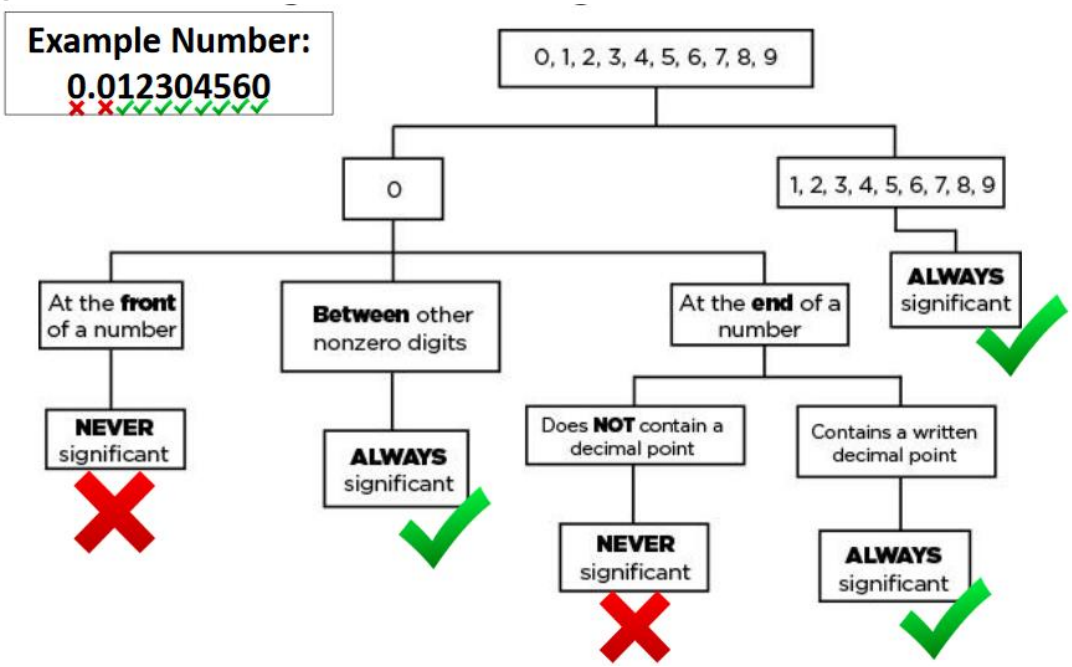
Organic Naming Rules

Number of Carbon Atoms	1	2	3	4	5	6	7	8	9	10
Root	Meth-	Eth-	Prop-	But-	Pent-	Hex-	Hept-	Oct-	Non-	Dec-
Alkane (Parent)	Methane	Ethane	Propane	Butane	Pentane	Hexane	Hept	Octane	Nonane	Decane
Branch	Methyl	Ethyl	Propyl	Butyl	Pentyl	Hexyl	Heptyl	Octyl	Nonyl	Decyl

Reaction Types

Type of Reaction	General Equation
Combination (Synthesis)	$A + B \rightarrow AB$
Decomposition	$AB \rightarrow A + B$
Single Displacement	$A + BC \rightarrow AC + B$
Double Displacement	$AB + CD \rightarrow AD + BC$
Combustion	$C_xH_y + O_2 \rightarrow CO_2 + H_2O$

Sig Fig Rules



Stoichiometric Conversions