

Fall 2014 Honors Chemistry Final Review Answer Key

Part One

Scientific Method

- observation - the act of noticing, using your 5 senses
- hypothesis - testable explanation for the observations
- experiment - step-by-step procedure for testing (must be repeatable)
- data/analysis - information received from the experiment
 - qualitative data - descriptions
 - quantitative data - measurements, numerical
 - analysis - any calculations done to the data
- theory - explains why phenomena occur
- scientific law - explain what the phenomena are

1) a) initial observation - Honeybee populations are declining rapidly

b) hypothesis - The cause of decline is a pathogen.

c) experiment - One possible experiment.

Set up 2 healthy bee colonies. Introduce suspected pathogen to one colony and observe

d) The data would show that the pathogen killed off the infected colony while the other colony stayed healthy.

e) If the data was not supportive of the hypothesis, then both colonies would still be alive or both colonies would be dead.

2) Lab Safety

a) could catch on fire, knock over chemicals, or get chemicals on it

b) eye protection

c) so broken glass or chemicals don't get on your feet

d) so you don't accidentally ingest chemicals

e) so chemicals and glassware do not get knocked over.

3) Lab Equipment

- | | |
|----------------|--------------------------|
| a) beaker | e) graduated cylinder |
| b) thermometer | f) electronic balance |
| c) funnel | g) beaker - the Muppet ☺ |
| d) funnel | h) Erlenmeyer flask |

4) Scientific Notation

- | | |
|------------------------------------|--|
| a) $6.78 \times 10^{-6} \text{ s}$ | d) $1.211 \times 10^{10} \text{ }^\circ\text{C}$ |
| b) $1.91 \times 10^7 \text{ J}$ | e) 87600 atm |
| c) $5.46 \times 10^{-4} \text{ g}$ | f) 0.000342 mol |

5) Significant Figures

- | | |
|------|------|
| a) 4 | c) 1 |
| b) 7 | d) 8 |

- | | |
|--------------|-----------------|
| w) a) 100. g | c) 0.0000500 s. |
| b) 0.541 m | d) 0.00346 J |

7) Nuclear Chemistry

- | | |
|--------------------|-------------------|
| a) nuclear fusion | c) nuclear fusion |
| b) nuclear fission | d) nuclear fusion |

8) States of Matter

- | | |
|-----------|-----------------|
| 1) liquid | 5) solid |
| 2) gas | 6) gas & plasma |
| 3) solid | 7) liquid |
| 4) plasma | |

9) Physical & Chemical Properties/Changes

- | | |
|-------------|-------------|
| a) physical | e) chemical |
| b) chemical | f) chemical |
| c) physical | g) physical |
| d) physical | h) chemical |

10) Pure Substances vs. mixtures

- | | |
|-----------------------|---------------------|
| a) element | d) element |
| b) heterogeneous mix. | e) homogeneous mix. |
| c) homogeneous mix. | |

- 11)
- | | |
|-------------|-------------|
| a) chemical | d) chemical |
| b) physical | e) physical |
| c) physical | f) physical |

12) Liquid @ normal body temperature

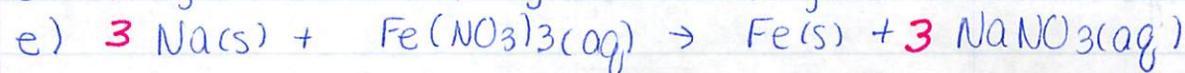
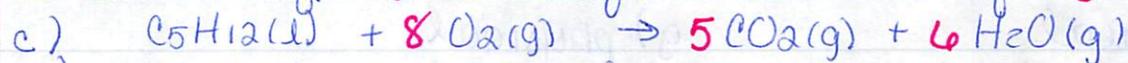
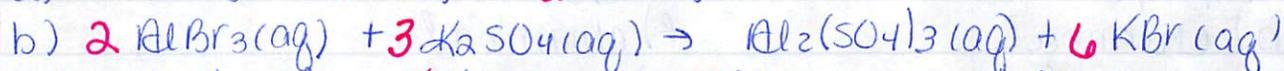
13) Nomenclature

- | | |
|----------------------------|-------------------------------|
| a) Na_2S | f) calcium nitrate |
| b) hydrochloric acid | g) H_2O |
| c) AuF_3 | h) phosphorous acid |
| d) dinitrogen pentoxide | i) $\text{Pb}(\text{SO}_4)_2$ |
| e) H_2CO_3 | j) iron (III) oxalate |

14) Skeleton Equations

- a) $\text{NaCl}(\text{s}) + \text{F}_2(\text{g}) \rightarrow \text{NaF}(\text{s}) + \text{Cl}_2(\text{g})$
- b) $\text{KClO}_3(\text{s}) \rightarrow \text{KCl}(\text{s}) + \text{O}_2(\text{g})$
- c) $\text{S}_8(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$
- d) $\text{HCl}(\text{aq}) + \text{CaCO}_3(\text{s}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
- e) $\text{C}_3\text{H}_8(\text{l}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})$

15) Balancing



16) Types of reaction

from #14

a) single-replacement

b) decomposition

c) synthesis

d) double-replacement

e) combustion

from #15

a) synthesis

b) double-replacement

c) combustion

d) decomposition

e) single-replacement

17) Molar Mass & % Composition

a) CuBr_2

Molar Mass

$$\text{Cu} = 1 \times 63.55 \text{g} = 63.55 \text{g}$$

$$\text{Br} = 2 \times 79.90 \text{g} = 159.80 \text{g}$$

$$\underline{223.35 \text{g}}$$

% Composition

$$\% \text{Cu} = \left(\frac{63.55}{223.35} \right) \times 100 = 28.45\%$$

$$\% \text{Br} = \left(\frac{159.80}{223.35} \right) \times 100 = 71.55\%$$

b) $\text{Co}_2(\text{CO})_3$

Molar Mass

$$\text{Co} = 2 \times 58.93 \text{g} = 117.86 \text{g}$$

$$\text{C} = 3 \times 12.01 \text{g} = 36.03 \text{g}$$

$$\text{O} = 9 \times 16.00 \text{g} = 144.00 \text{g}$$

$$\underline{297.89 \text{g}}$$

% Composition

$$\% \text{Co} = \left(\frac{117.86}{297.89} \right) \times 100 = 39.56\%$$

$$\% \text{C} = \left(\frac{36.03}{297.89} \right) \times 100 = 12.10\%$$

$$\% \text{O} = \left(\frac{144.00}{297.89} \right) \times 100 = 48.34\%$$

moles

$$18) \frac{34.5g \text{ H}_2\text{O}}{18.02g \text{ H}_2\text{O}} \times \frac{1 \text{ mol H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 1.91 \text{ mol}$$

$$19) \frac{0.456 \text{ mol H}_2\text{O}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}} = 2.75 \times 10^{23} \text{ molecules}$$

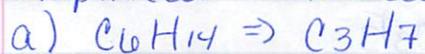
$$20) \frac{21.1g \text{ CaCl}_2}{110.98g} \times \frac{1 \text{ mol}}{1 \text{ mol}} = .190 \text{ mol}$$

$$21) \frac{6.789 \times 10^{22} \text{ f. units CaCl}_2}{6.02 \times 10^{23} \text{ f. units}} \times \frac{1 \text{ mol}}{1 \text{ mol}} = .1128 \text{ mol}$$

$$22) \frac{99.99g \text{ HNO}_3}{63.02g \text{ HNO}_3} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23} \text{ f. units}}{1 \text{ mol}} = 9.552 \times 10^{23} \text{ f. units}$$

$$23) \frac{7.87 \times 10^{25} \text{ molec. SO}_3}{6.02 \times 10^{23} \text{ molec.}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{80.07g}{1 \text{ mol}} = 10,500g \text{ or } 1.05 \times 10^4 g$$

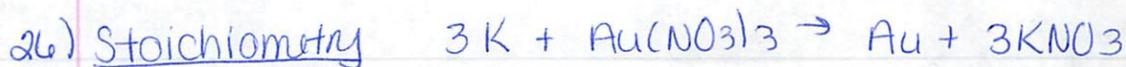
24) Empirical & Molecular Formulas



c) C_3H_8 - already reduced



d) $\text{CO}_2(\text{CO}_3)_3$ - already reduced.



a) $\frac{21.0 \text{ mol K}}{3 \text{ mol K}} \left| \frac{3 \text{ mol } KNO_3}{3 \text{ mol K}} \right. = 21.0 \text{ mol } KNO_3$

b) $\frac{1.50 \text{ mol K}}{3 \text{ mol K}} \left| \frac{1 \text{ mol Au}}{1 \text{ mol Au}} \right| \frac{196.97 \text{ g Au}}{1 \text{ mol Au}} = 98.5 \text{ g Au}$

c) $\frac{50.00 \text{ g } Au(NO_3)_3}{383.00 \text{ g } Au(NO_3)_3} \left| \frac{1 \text{ mol } Au(NO_3)_3}{1 \text{ mol } Au(NO_3)_3} \right| \frac{3 \text{ mol } KNO_3}{1 \text{ mol } Au(NO_3)_3} \left| \frac{101.11 \text{ g } KNO_3}{1 \text{ mol } KNO_3} \right. = 39.60 \text{ g } KNO_3$

d) $\frac{30.00 \text{ mol K}}{3 \text{ mol K}} \left| \frac{1 \text{ mol Au}}{1 \text{ mol Au}} \right. = 10.00 \text{ mol Au}$

$\frac{9.00 \text{ mol } Au(NO_3)_3}{1 \text{ mol } Au(NO_3)_3} \left| \frac{1 \text{ mol Au}}{1 \text{ mol } Au(NO_3)_3} \right. = 9.00 \text{ mol Au}$

$Au(NO_3)_3$ is the limiting reactant!

e) $\frac{1173 \text{ g K}}{39.10 \text{ g K}} \left| \frac{1 \text{ mol K}}{3 \text{ mol K}} \right| \frac{1 \text{ mol Au}}{1 \text{ mol Au}} = 10.00 \text{ mol Au}$

$\frac{3447 \text{ g } Au(NO_3)_3}{383.00 \text{ g } Au(NO_3)_3} \left| \frac{1 \text{ mol } Au(NO_3)_3}{1 \text{ mol } Au(NO_3)_3} \right| \frac{1 \text{ mol Au}}{1 \text{ mol } Au(NO_3)_3} = 9.00 \text{ mol Au}$

$Au(NO_3)_3$ is still the limiting reactant!