



Highlander Help

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Good Luck!

KEY

FIRST EXAM

NAME _____

1 inch = 2.54 cm; 1 mile = 1.609 km; 1L = 1.056 qt. $4qt = 1 gal$

Multiple choice = 4 points each
Circle the best answer

1. Below is a list of common prefixes used in the SI and metric systems. Fill in the appropriate blanks.

mega	10^{+6}
a) centi	10^{-2}
b) <u>micro</u>	10^{-9}
c) kilo	10^3
d) milli	10^{-3}

- 10^{-1} deci ✓
- 10^{-2} centi ✓
- 10^{-3} milli ✓
- 10^{-6} micro ✓
- 10^{-9} nano ✓
- 10^{-12} pico ✓
- 10^2 deka ✓
- 10^3 kilo ✓
- 10^6 mega ✓
- 10^9 giga ✓
- 10^{12} tera ✓

2. Perform the indicated mathematical operations and round off the answer to the proper number of significant figures:

$(2.346 - 2.323)(8.34)/(0.325 - 0.215) =$

$(.02300)(8.34) = .192$
 $.110$

- a) 1.7658 c) 1.7 e) 01.7744
b) 1.7438 d) 1.77 f) 1.74

3. Express 18.56 cubic feet in cubic centimeters.

$18.56 ft^3 \left(\frac{1228 in^3}{ft^3} \right)$
 $11.387 cm^3$
 in^3

- a) 27237 cm³ c) 1.725×10^4 cm³ e) 5.986×10^4 cm³ g) 5.256×10^5 cm³
b) 5.66×10^2 cm³ d) 5.735×10^4 cm³ f) 8.597×10^3 cm³ h) 3.655×10^4 cm³

4. The mileage rating of an automobile that is 15.0 kilometers per liter could also be expressed as _____ miles per gallon.

$\left(\frac{15 km}{L} \right) \left(\frac{1 mile}{1.609 km} \right) \left(\frac{L}{1.056 qt} \right) \left(\frac{4 qt}{1 gal} \right)$

- a) 28.2 c) 31.6 e) 23.5 g) 33.8 i) 73.1
b) 29.8 d) 71.6 f) 32.6 h) 25.3 j) 35.3

5. Which of the following numbers has 4 significant figures?

- a) 0.063010⁵ c) 1.63980⁶ e) 0.15837⁵ g) 5.90³ i) 0.06798⁴
b) 0.0563³ d) 0.670909⁶ f) 0.0065² h) 0.048² j) 8.6090⁵

6. (8 pts) Fill the blanks in the following table.

Cation	Anion	Formula	Name
Ca ²⁺	NO ₂ ⁻	Ca(NO ₂) ₂	Calcium nitrite
Al ³⁺	O ²⁻	Al ₂ O ₃	Aluminum Oxide
Ba ²⁺	N ³⁻	Barium Nitride Ba ₃ N ₂	Barium nitride

375

$$\left(\frac{119.6925}{159.59}\right)(55.845) = \frac{X}{375}$$

$$\frac{119.6925}{159.59} = \frac{X}{375}$$

7. An iron ore contains 25% iron oxide, Fe_2O_3 , plus other material that does not contain iron. How many kg of iron can be extracted from 1500 kg of this ore?

- a) 699 kg c) 1000 kg e) 154 kg g) 580 kg i) 780 kg
 b) 220 kg d) 262 kg f) 56 kg h) 1 kg j) 776 kg

8. How many atoms of carbon are there in 250 g of CH_2O ?

- $\frac{250}{30} (6.022 \times 10^{23})$
 a) 6.3×10^{22} c) 1.4×10^{24} e) 2.5×10^{23} g) 1.0×10^{25} i) 2.3×10^{23}
 b) 2.6×10^{23} d) 5.0×10^{24} f) 8.7×10^{24} h) 1.5×10^{24} j) 4.1×10^{24}

9. The mass of 1.24 moles of K_2CO_3 is:

- $(138.196)(1.24)$
 a) 1.24 g c) 239 g e) 171 g g) 35.5 g i) 247 g
 b) 35.2 g d) 236 g f) 379 g h) 216 g j) 226 g

10. Calculate the mass in grams of one thousand nitrogen atoms.

- $(14)(1000)$
 6.022×10^{23}
 a) 6.022×10^{-23} c) 2.00×10^{-23} e) 132 g) 4.810×10^{-23} i) 4.810×10^{-22}
 b) 12.01 d) 1.201×10^6 f) 2.00×10^{-17} h) 7.985×10^{23} j) 2.33×10^{-20}

11. Which element has a mass that is one-third that of iron - 57 ?

- a) Na c) Ar e) Ca g) Cr i) Rb
 b) Sr d) Cs f) F h) Kr j) O

$$57/3 = 19 \approx F$$

12. A compound is known to contain only carbon, hydrogen, and oxygen. If the complete combustion of a 0.200-g sample of this compound produces 0.352 g of CO_2 and 0.072 g of H_2O , what is the empirical formula of this compound?

- a) $\text{C}_3\text{H}_3\text{O}_4$ c) $\text{C}_6\text{H}_6\text{O}_2$ e) C_3HO_3 g) $\text{C}_3\text{H}_6\text{O}_5$
 b) $\text{C}_2\text{H}_4\text{O}_2$ d) $\text{C}_5\text{H}_7\text{O}_5$ f) CH_2O h) $\text{C}_4\text{H}_4\text{O}_3$

13. A compound contains hydrogen, sulfur, and oxygen. Analysis shows that it contains by mass 2.44% hydrogen and 39.02% sulfur. What is the simplest formula for this compound?

- a) H_2SO_2 c) HS_6O_2 e) H_2SO_4 g) H_2SO
 b) $\text{HS}_{16}\text{O}_{24}$ d) H_2SO_3 f) HSO h) HSO_4

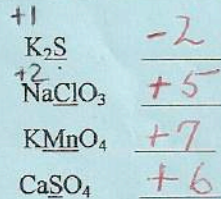
14. Sulfur dioxide reacts with oxygen to form sulfur trioxide, $\text{SO}_2 + \text{O}_2 = \text{SO}_3$. Write the balanced equation and determine how many grams of SO_3 can be produced if 50.0 g of SO_2 is allowed to react with 10.0 g of O_2 .

- a) 81.4 g c) 63.8 g e) 67.5 g g) 111 g i) 88.5 g
 b) 94.5 g d) 50.0 g f) 9.05 g h) 78.0 g j) 18.0 g

15. If 35.0 g of SO_3 is produced under experimental conditions in problem 14 above, what is the percent yield?

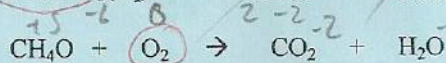
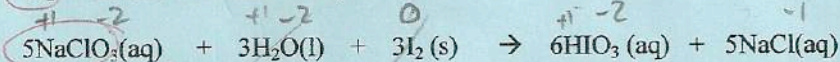
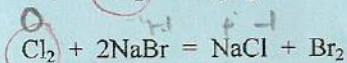
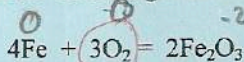
- a) 10% c) 11% e) 90% g) 70% i) 52%
 b) 40% d) 68% f) 100% h) 80% j) 12%

23. Determine the oxidation number of the underlined element in:



3
 Pu
 -12

24. In the following redox reactions circle the reactant which is the oxidizing agent:

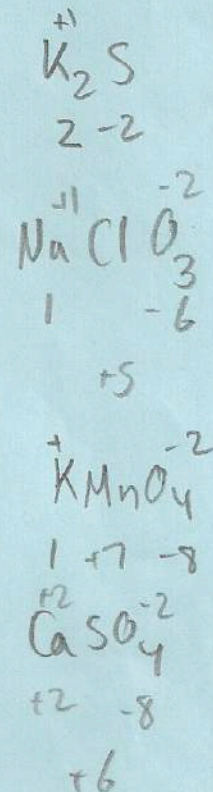


25. What volume of 2.00 molar hydrochloric acid, HCl, is required to react with 15.0 grams of calcium carbonate, CaCO₃?



- a) 208 mL c) 150 mL e) 167 mL g) 33.0 mL
 b) 104 mL d) 75.0 mL f) 67.0 mL h) 83.3 mL

$15g \left(\frac{1 \text{ mol } CaCO_3}{100.078} \right) \left(\frac{2 \text{ mol } HCl}{1 \text{ mol } CaCO_3} \right) \left(\frac{36.45 \text{ g } HCl}{1 \text{ mol } HCl} \right)$



$\frac{10.926}{36.45}$

0.2997 ml

$x \cdot 2 = \frac{0.2997}{x} \cdot x$

$\frac{7057}{2} = x$
 $\frac{202}{2} = x$
 $x \cdot 2 = \frac{202}{x} \cdot x$