

# Chemistry A: 1<sup>st</sup> Semester Review (ANSWERS)

Find the molar mass for each of the following

1.  $\text{FeCrO}_4$
2.  $\text{BaCl}_2$
3.  $\text{NaC}_2\text{H}_3\text{O}_2$
4. ammonium sulfide  $(\text{NH}_4)_2\text{S}$
5. dinitrogen monoxide  $\text{N}_2\text{O}$
6. How many protons does the isotope I-129 have?
7. How many neutrons does the isotope  $^{129}\text{I}$  have?
8. How many electrons does a  $\text{Ba}^{+2}$  ion have?

1. 171.85
2. 208.23
3. 82.04
4. 68.17
5. 18.02
6. 53
7. 76
8. 54

9. What is the mass of a diamond that has a volume of 1.7 ml and a density of 1.06 g/cm<sup>3</sup>?

$$\text{mass} = \text{density} \times \text{volume} \quad 1.06 \text{ g/cm}^3 \times 1.7 \text{ cm}^3 = 1.8 \text{ g}$$

9. 1.8g

IN THE SPACE AT THE RIGHT, WRITE THE FOLLOWING IN NORMAL NUMBER NOTATION

- 10)  $2.3 \times 10^3$
- 11)  $4.7 \times 10^{-7}$
- 12)  $5.3 \times 10^{-4}$

10. 2300
11. 0.0000047
12. 0.0053

IN THE SPACE AT THE RIGHT, WRITE THE FOLLOWING IN STANDARD SCIENTIFIC NOTATION

- 13) 0.01630
- 14) 2 020 500
- 15) 0.002020

13.  $1.6 \times 10^{-2}$
14.  $2.0205 \times 10^6$
15.  $2.02 \times 10^{-4}$

SOLVE THE FOLLOWING SHOWING ALL WORK, INCLUDE UNITS (Remember sig figs)

16)  $6.7 \text{ m} / \frac{100 \text{ cm}}{1 \text{ m}} = 670 \text{ cm}$

16. 670cm

17)  $17.7 \text{ g} / \frac{1000 \text{ mg}}{1 \text{ g}} = 17,700 \text{ mg}$

17. 17,700 mg

18) 8 MOLES OF O /  $\frac{16.00 \text{ g}}{1 \text{ mol O}} = 128 \text{ g OF O}$  (16 g OF O = 1 MOLE OF O)

18. 128 g

REMEMBER SIG FIGS

- 19) 4.1
- 20) 0.1
- 21) 7.6
- 22)  $7.8 \times 10^4$

+6.29

x 7.01

x 2.94

$1.9 \times 10^2$

19. 10.4
20. 0.7
21. 22
22. 410
23. 5
24. 3
25. 3

- 23) 42.640
- 24) 0.000 120
- 25) 4920

Convert these temperatures

26. 234 °C to \_\_\_\_\_ K
27. 654K to \_\_\_\_\_ °C
28. 25 °C to \_\_\_\_\_ K

26. 507
27. 381
28. 298

Name these compounds

29. SODIUM BROMIDE
30. IRON (III) CHLORIDE
31. CARBON MONOXIDE
32. CALCIUM SULFIDE
33. CARBON TETRAHYDRIDE
34. AMMONIUM SULFITE
35. MAGNESIUM BICARBONATE
36. COPPER (III) OXIDE
37. SULFUR TRIOXIDE
38. SODIUM CHROMATE

29. NaBr
30.  $\text{FeCl}_3$
31. CO
32. CaS
33.  $\text{CH}_4$
34.  $(\text{NH}_4)_2\text{SO}_3$
35.  $\text{Mg}(\text{HCO}_3)_2$
36.  $\text{Cu}_2\text{O}_3$
37.  $\text{SO}_3$
38.  $\text{Na}_2\text{CrO}_4$

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### NAME THE FOLLOWING COMPOUNDS AND MOLECULES

39. MgS
40. FeS
41. Al<sub>2</sub>O<sub>3</sub>
42. (NH<sub>4</sub>)<sub>3</sub> PO<sub>4</sub>
43. N<sub>2</sub>O<sub>4</sub>
44. N<sub>2</sub>O
45. CO<sub>2</sub>
46. CuCl
47. Na<sub>2</sub>SO<sub>3</sub>
48. MgSO<sub>4</sub>
49. H<sub>2</sub>SO<sub>3</sub>
50. H<sub>2</sub>S

39. Magnesium Sulfide
40. Iron(II) Sulfide
41. Aluminum Oxide
42. Ammonium Phosphate
43. Dinitrogen tetroxide
44. Dinitrogen monoxide
45. Carbon dioxide
46. Copper(I) Chloride
47. Sodium Sulfite
48. Magnesium Sulfate
49. Sulfurous acid
50. Hydrogen Sulfide

### PUT THE FOLLOWING IN THEIR EMPIRICAL FORMULA

51. C<sub>2</sub>H<sub>6</sub>O<sub>3</sub>
52. CaCl<sub>2</sub>
53. H<sub>2</sub>O<sub>2</sub>
54. C<sub>12</sub>H<sub>6</sub>
55. What is the percentage by mass of oxygen in CaCO<sub>3</sub>?  
a. 48%      b. 64.0%      c. 60.0%      d. 92.3%
56. The normal melting point of ice on the Kelvin scale is  
a. 0.0 K      b. 32 K      c. 80 K      d. 273 K
57. The empirical formula of a compound is CH. If the molecular mass of the compound is 78 g/mol, then the molecular formula is:  
a. CH      b. C<sub>3</sub>H<sub>6</sub>      c. C<sub>5</sub>H<sub>18</sub>      d. C<sub>6</sub>H<sub>6</sub>
58. Which expression gives the number of atoms in 44 g of CO<sub>2</sub>?  
a.  $6.02 \times 10^{23}$       b.  $1.81 \times 10^{24}$       c. 22.4      d. 2 moles
59. What is the molar mass of ammonium sulfide? (NH<sub>4</sub>)<sub>2</sub>S  
a. 38 g/mol      b. 44 g/mol      c. 50 g/mol      d. 68 g/mol
60. A compound consists of 72.2% magnesium and 27.8% nitrogen by mass. What is the empirical formula?

51. C<sub>2</sub>H<sub>6</sub>O<sub>3</sub>
52. CaCl<sub>2</sub>
53. H<sub>2</sub>O
54. C<sub>6</sub>H
55. a (48%)
56. d (273)
57. d (C<sub>6</sub>H<sub>6</sub>)
58. a ( $6.02 \times 10^{23}$ )
59. d (68.)
60. Mg<sub>3</sub>N<sub>2</sub>

$$72.2\text{g} \left| \frac{1\text{mol}}{24.31\text{g}} \right| = 2.97$$

$$\frac{2.97}{1.98} = 1.52 = 3$$

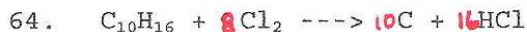
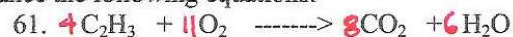
$$27.8\text{g} \left| \frac{1\text{mol}}{14.01\text{g}} \right| = 1.98$$

$$\frac{1.98}{1.98} = 1.2 = 2$$



## Chemistry A: 1<sup>st</sup> Semester Review (ANSWERS)

Balance the following equations:



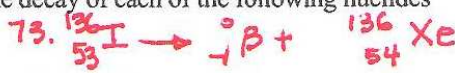
Identify whether the following are metals, nonmetals or metalloids.

- |     |    |   |              |                         |
|-----|----|---|--------------|-------------------------|
| 66. | Zn | a | a. metal     | c. nonmetal             |
| 67. | He | c | b. metalloid | d. heavy metal, dooooo! |
| 68. | H  | c | c. bogus     |                         |
| 69. | Re | a |              |                         |
| 70. | B  | b |              |                         |
| 71. | Ba | a |              |                         |

### Nuclear Chemistry

Write the balanced nuclear equation for the decay of each of the following nuclides

72. beta decay of I-136



73. alpha decay of Pu-234

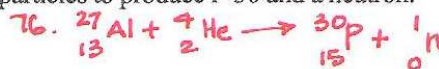


74. positron production by C-11



75. Write a balanced nuclear equation for the bombardment of Al-27 with alpha particles to produce P-30 and a neutron.

76. What is the difference between nuclear fission and nuclear fusion?



77.  $^{210}_{84}\text{Po} \rightarrow ^4_2\text{He} + ?$  What is the second product (also known as the daughter)?



78. What type of decay is demonstrated in the following reaction?



BETA DECAY

List what type the following reactions are:

double displacement

single displacement

oxidation/reduction (redox)

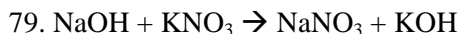
combustion

acid-base

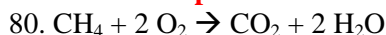
decomposition

precipitation

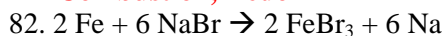
synthesis



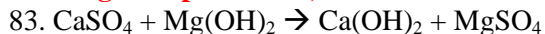
Double Displacement



Combustion, Redox



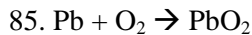
Single Displacement, Redox



Double Displacement, Precipitation



Acid-Base



Synthesis, Redox

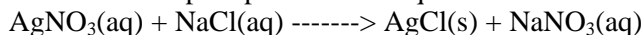


Decomposition, Redox



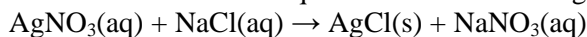
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87. Which is a precipitate in this equation?

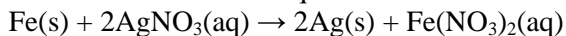


**AgCl is the precipitate**

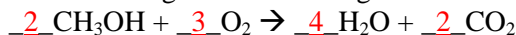
88. Write the net ionic equation for the following equation



89. Write the net ionic equation for the following equation



90. According to the following unbalanced equation:



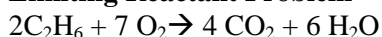
how many grams of oxygen would be required to react completely with 198 g of CH<sub>3</sub>OH?

198g CH <sub>3</sub> OH	1 mole CH <sub>3</sub> OH	3 mole O <sub>2</sub>	32.00g O <sub>2</sub>	= <b>297 g O<sub>2</sub></b>
	32.05g CH <sub>3</sub> OH	2 mole CH <sub>3</sub> OH	1 mole O <sub>2</sub>	

91. What is the % yield of water in a reaction in which the theoretical yield is 45.52 g of H<sub>2</sub>O and actual yield is 36.25 g of H<sub>2</sub>O?

$$\frac{36.25\text{g H}_2\text{O}}{45.52\text{g H}_2\text{O}} \times 100 = \mathbf{79.6\%}$$

### Limiting Reactant Problem



If we begin with 2.36 moles of C<sub>2</sub>H<sub>6</sub> and 7.31 moles of O<sub>2</sub>, and the reaction goes to completion,

92. How many moles of CO<sub>2</sub> will be produced?

93. How many grams of H<sub>2</sub>O will be produced?

94. How many moles of C<sub>2</sub>H<sub>6</sub> will be left un-reacted?

Information we need to know before we can answer the questions, "Which is the limiting reactant?"

2.36 moles C <sub>2</sub> H <sub>6</sub>	7 moles O <sub>2</sub>	= 8.26 moles O <sub>2</sub> needed to complete reaction. We only have 7.31, therefore O <sub>2</sub> is the limiting reactant.
	2 moles C <sub>2</sub> H <sub>6</sub>	

**92.**

7.31 moles O <sub>2</sub>	4 moles CO <sub>2</sub>	= <b>4.18 moles CO<sub>2</sub></b>
	7 moles O <sub>2</sub>	

**93.**

7.31 moles O <sub>2</sub>	6 moles H <sub>2</sub> O	18.02 g H <sub>2</sub> O	= <b>112 g H<sub>2</sub>O</b>
	7 moles O <sub>2</sub>	1 mole H <sub>2</sub> O	

**94.**

7.31 moles O <sub>2</sub>	2 moles C <sub>2</sub> H <sub>6</sub>	= 2.09 moles C <sub>2</sub> H <sub>6</sub> are needed for the reaction. We have 2.36, therefore C <sub>2</sub> H <sub>6</sub> is in XS.
	7 moles O <sub>2</sub>	

$$2.36 \text{ moles C}_2\text{H}_6 - 2.09 \text{ moles C}_2\text{H}_6 = \mathbf{0.27 \text{ moles C}_2\text{H}_6 \text{ unreacted}}$$