***** ANSWER KEY *****

Student Name: **Grade:** 09

Test Name: November Chemistry for All: Unit 5 - Nomenclature and Formula Stoichiometry **Version:** 1

1. Based on the molecular formula for sucrose, $C_{12}H_{22}O_{11}$, calculate the percent by weight of carbon.

(a) 12.0%
(b) 26.6%
✔ (c) 42.1%
(d) 51.4%

Standard:

MI_CHEM_HS-0912-C4-1x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1a Calculate the percent by weight of each element in a compound based on the compound formula.

2. Based on the molecular formula for sucrose, $C_{12}H_{22}O_{11}$, calculate the percent by weight of oxygen.

(a) 11.0%
(b) 24.4%
(c) 42.1%
✔ (d) 51.4%

Standard:

MI_CHEM_HS-0912-C4-1x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1a Calculate the percent by weight of each element in a compound based on the compound formula.

3. Based on the molecular formula for sucrose, $C_{12}H_{22}O_{11}$, calculate the percent by weight of hydrogen.

(a) 1.0%
✔ (b) 6.5%
(c) 22.0%
(d) 48.9%

Standard:

MI_CHEM_HS-0912-C4-1x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1a Calculate the percent by weight of each element in a compound based on the compound formula.

4. Based on the chemical formula for aluminum sulfate, $Al_2(SO_4)_3$, what is the percentage by weight of aluminum?

(a) 11.8%
✔ (b) 15.8%
(c) 36.0%
(d) 54.0%

Standard:

MI_CHEM_HS-0912-C4-1x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1a Calculate the percent by weight of each element in a compound based on the compound formula.

5. Based on the chemical formula for aluminum sulfate, $Al_2(SO_4)_3$, what is the percentage by weight of sulfur?

(a) 17.6%
✔ (b) 28.1%
(c) 32.0%
(d) 42.7%

Standard:

MI_CHEM_HS-0912-C4-1x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1a Calculate the percent by weight of each element in a compound based on the compound formula.

6. Based on the chemical formula for aluminum sulfate, Al2(SO4)3, what is the percentage by weight of oxygen?

(a) 12.0%
(b) 21.3%
✔ (c) 56.1%
(d) 70.6%

Standard:

MI_CHEM_HS-0912-C4-1x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1a Calculate the percent by weight of each element in a compound based on the compound formula.

7. Calculate the correct empirical formula of a compound that contains 75% carbon and 25% hydrogen.

✔ (a) CH_4

(b) C_3H

(c) C_7H_3

(d) C_2H_8

Standard:

MI_CHEM_HS-0912-C4-1x-b

MI HSCEs Science - Chemistry

09-12

STANDARD C4: PROPERTIES OF MATTER

Topic C4.1x Molecular and Empirical Formulae

C4.1b Calculate the empirical formula of a compound based on the percent by weight of each element in the compound.

8. Pure formaldehyde consists of 40.0% carbon, 6.7% hydrogen, and 53.3% oxygen. What is its empirical formula?

(a) C_4HO_5

(b) $C_5H_7O_9$

(c) C_2HO_2

✔ (d) CH_2O

Standard:

MI_CHEM_HS-0912-C4-1x-b

MI HSCEs Science - Chemistry

09-12

STANDARD C4: PROPERTIES OF MATTER

Topic C4.1x Molecular and Empirical Formulae

C4.1b Calculate the empirical formula of a compound based on the percent by weight of each element in the compound.

9. Which of the following is the correct empirical formula for a compound that is composed of 34.2% sodium, 17.7% carbon, and 47.6% oxygen.

- ✔ (a) $NaCO_2$
- (b) $Na_3C_2O_5$
- (c) Na_4CO_4
- (d) $Na_2C_2O_4$

Standard:

MI_CHEM_HS-0912-C4-1x-b
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1b Calculate the empirical formula of a compound based on the percent by weight of each element in the compound.

10. Which of the following represents the correct empirical formula for a compound that contains 72% magnesium and 28% nitrogen?

- (a) Mg_2N_3
- (b) Mg_7N_3
- (c) Mg_3N_7
- ✔ (d) Mg_3N_2

Standard:

MI_CHEM_HS-0912-C4-1x-b
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1b Calculate the empirical formula of a compound based on the percent by weight of each element in the compound.

11. Which of the following choices represents the correct empirical formula for a compound that is 29.0% sodium, 40.5% sulfur, and 30.4% oxygen?

(a) $Na_3S_4O_3$

(b) $NaSO_2$

✔ (c) $Na_2S_2O_3$

(d) $Na_3S_3O_4$

Standard:

MI_CHEM_HS-0912-C4-1x-b
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1b Calculate the empirical formula of a compound based on the percent by weight of each element in the compound.

12. The simplest formula for butane is C_2H_5 and its molecular mass is 58 g/mol. What is the molecular formula of butane?

(a) C_3H_6

(b) C_4H_9

✔ (c) C_4H_{10}

(d) C_6H_{15}

Standard:

MI_CHEM_HS-0912-C4-1x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1c Use the empirical formula and molecular weight of a compound to determine the molecular formula.

13. A compound with an empirical formula of CH has a molecular weight of 78 g/mol. What is the molecular formula for this compound?

(a) C_4H_4

(b) C_5H_5

✔ (c) C_6H_6

(d) C_7H_7

Standard:

MI_CHEM_HS-0912-C4-1x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1c Use the empirical formula and molecular weight of a compound to determine the molecular formula.

14. Fructose has an empirical formula of CH_2O. Find its molecular formula if its molecular mass is 180.0 g/mol.

(a) $C_4H_8O_4$

(b) $C_3H_6O_3$

✔ (c) $C_6H_{12}O_6$

(d) $C_{12}H_{22}O_{12}$

Standard:

MI_CHEM_HS-0912-C4-1x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.1x Molecular and Empirical Formulae
C4.1c Use the empirical formula and molecular weight of a compound to determine the molecular formula.

15. A compound has the empirical formula $NaCO_2$. If its molecular mass is 134 g/mol, determine its molecular formula.

✔ (a) $Na_2C_2O_4$

(b) $Na_3C_3O_6$

(c) $Na_4C_4O_8$

(d) $Na_5C_5O_{10}$

Standard:

MI_CHEM_HS-0912-C4-1x-c

MI HSCEs Science - Chemistry

09-12

STANDARD C4: PROPERTIES OF MATTER

Topic C4.1x Molecular and Empirical Formulae

C4.1c Use the empirical formula and molecular weight of a compound to determine the molecular formula.

16. The simplest formula for vitamin C is $C_3H_4O_3$. Experimental data indicates that the molecular mass of vitamin C is about 180. What is the molecular formula of vitamin C?

(a) $C_3H_4O_3$

✔ (b) $C_6H_8O_6$

(c) $C_9H_{12}O_9$

(d) $C_{12}H_{16}O_{12}$

Standard:

MI_CHEM_HS-0912-C4-1x-c

MI HSCEs Science - Chemistry

09-12

STANDARD C4: PROPERTIES OF MATTER

Topic C4.1x Molecular and Empirical Formulae

C4.1c Use the empirical formula and molecular weight of a compound to determine the molecular formula.

17. What is the name for the simple binary compound, MgO?

(a) Magnesium Oxygen
(b) Manganese Oxygen
(c) Manganese Oxide
✔ (d) Magnesium Oxide

Standard:

MI_CHEM_HS-0912-C4-2-A
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2A Name simple binary compounds using their formulae.

18. What is the name for the simple binary compound, K_2S?

✔ (a) Potassium sulfide
(b) Potassium (II) sulfide
(c) Potassium sulfate
(d) Potassium (II) sulfate

Standard:

MI_CHEM_HS-0912-C4-2-A
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2A Name simple binary compounds using their formulae.

19. What is the name of the simple binary compound with the formula, $BeCl_2$?

- ✔ (a) Beryllium chloride
- (b) Beryllium chlorate
- (c) Beryllium dichloride
- (d) Beryllium dichlorate

Standard:

MI_CHEM_HS-0912-C4-2-A
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2A Name simple binary compounds using their formulae.

20. What is the name for the simple binary compound, Ca_3P_2?

- (a) Tricarbon diphosphide
- (b) Tricalcium diphosphide
- ✔ (c) Calcium phosphide
- (d) Carbon phosphide

Standard:

MI_CHEM_HS-0912-C4-2-A
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2A Name simple binary compounds using their formulae.

21. What is the name of the simple binary compound with the formula, BN?

(a) Boron nitrate
(b) Boride nitride
(c) Boride nitrate
✔ (d) Boron nitride

Standard:

MI_CHEM_HS-0912-C4-2-A
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2A Name simple binary compounds using their formulae.

22. What is the formula for the simple binary compound, calcium bromide?

(a) $CaBr_3$
(b) Ca_2Br
(c) CaBr
✔ (d) $CaBr_2$

Standard:

MI_CHEM_HS-0912-C4-2-B
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2B Given the name, write the formula of simple binary compounds.

23. What is the formula for the simple binary compound, gallium chloride?

(a) $GaCl$
(b) $GaCl_2$
✔ (c) $GaCl_3$
(d) Ga_2Cl

Standard:

MI_CHEM_HS-0912-C4-2-B
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2B Given the name, write the formula of simple binary compounds.

24. What is the formula for the simple binary compound, lithium nitride?

(a) LiN
(b) LiN_3
✔ (c) Li_3N
(d) Li_3N_3

Standard:

MI_CHEM_HS-0912-C4-2-B
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2B Given the name, write the formula of simple binary compounds.

25. What is the formula for the simple binary compound, barium iodide?

(a) BaI

✔ (b) BaI_2

(c) BaI_3

(d) Ba_2I

Standard:

MI_CHEM_HS-0912-C4-2-B
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2B Given the name, write the formula of simple binary compounds.

26. What is the formula for the simple binary compound, magnesium sulfide?

(a) $MgSO_4$

(b) MgS_2

✔ (c) MgS

(d) $Mg(SO_4)_2$

Standard:

MI_CHEM_HS-0912-C4-2-B
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2 Nomenclature
C4.2B Given the name, write the formula of simple binary compounds.

27. What is the name of the compound, $Pb_2(CO_3)_3$?

(a) Lead (II) carbonate
✔ (b) Lead (III) carbonate
(c) Lead carbonate (II)
(d) Lead carbonate (III)

Standard:

MI_CHEM_HS-0912-C4-2x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2c Given a formula, name the compound.

28. What is the name of the compound, $CuCl_2$?

(a) copper chloride (I)
(b) copper (I) chloride
✔ (c) copper (II) chloride
(d) copper chloride (II)

Standard:

MI_CHEM_HS-0912-C4-2x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2c Given a formula, name the compound.

29. What is the name of the compound, $BeSO_3$?

(a) Beryllium sulfate
✔ (b) Beryllium sulfite
(c) Beryllium sulfide
(d) Beryllium sulfoxide

Standard:

MI_CHEM_HS-0912-C4-2x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2c Given a formula, name the compound.

30. What is the name of the compound, Fe_2O_3?

(a) Iron oxide
(b) Iron (II) oxide
✔ (c) Iron (III) oxide
(d) Iron oxalate

Standard:

MI_CHEM_HS-0912-C4-2x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2c Given a formula, name the compound.

31. What is the name of the compound, $Fe(NO_3)_2$?

(a) Iron (II) nitrite
✔ (b) Iron (III) nitrite
(c) Iron (II) nitrate
(d) Iron (III) nitrate

Standard:

MI_CHEM_HS-0912-C4-2x-c
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2c Given a formula, name the compound.

32. Choose the formula for the compound, sulfur hexafluoride.

✔ (a) SF_6
(b) S_6F
(c) S_7F
(d) SF_7

Standard:

MI_CHEM_HS-0912-C4-2x-d
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2d Given the name, write the formula of ionic and molecular compounds.

33. Choose the formula for the compound, calcium hydroxide.

(a) $CaOH_2$

(b) Ca_2OH

(c) $Ca(OH_2)$

✔ (d) $Ca(OH)_2$

Standard:

MI_CHEM_HS-0912-C4-2x-d
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2d Given the name, write the formula of ionic and molecular compounds.

34. Choose the formula for the compound, ammonium sulfate.

(a) NH_4SO_4

(b) $NH_4(SO_4)_2$

(c) $2NH_4SO_4$

✔ (d) $(NH_4)_2SO_4$

Standard:

MI_CHEM_HS-0912-C4-2x-d
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2d Given the name, write the formula of ionic and molecular compounds.

35. Choose the formula for the compound, diphosphorus pentoxide.

(a) $2PO_5$

✔ (b) P_2O_5

(c) 2P5O

(d) $P_2$5O

Standard:

MI_CHEM_HS-0912-C4-2x-d
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2d Given the name, write the formula of ionic and molecular compounds.

36. Draw and name the five structural isomers for C_6H_{14}. (1 point for each correct structure, 1 point for each correct name)

Rubric:

1 point for each correct compound name 1 point for each correct structural drawing

Standard:

MI_CHEM_HS-0912-C4-2x-e
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2e Given the formula for a simple hydrocarbon, draw and name the isomers.

37. Draw and name the three structural isomers for $C_5H_{12.}$ (1 point for each correct structure, 1 point for each correct name)

Rubric:

1 point for each correct structure
1 point for each correct name

Standard:

MI_CHEM_HS-0912-C4-2x-e
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.2x Nomenclature
C4.2e Given the formula for a simple hydrocarbon, draw and name the isomers.

38. How many moles are there in 53.8 g of magnesium chloride, $MgCl_2$?

(a) 5,111 mol
(b) 3,201 mol
(c) 0.904 mol
✔ (d) 0.565 mol

Standard:

MI_CHEM_HS-0912-C4-6x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6a Calculate the number of moles of any compound or element given the mass of the substance.

39. How many moles of CO2 are there in 454 grams?

- ✔ (a) 10.3 mol
- (b) 16.2 mol
- (c) 12,712 mol
- (d) 19,976 mol

Standard:

MI_CHEM_HS-0912-C4-6x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6a Calculate the number of moles of any compound or element given the mass of the substance.

40. How many moles are there in 120 grams of potassium, K?

- (a) .325 mol
- ✔ (b) 3.08 mol
- (c) 2,280 mol
- (d) 4,680 mol

Standard:

MI_CHEM_HS-0912-C4-6x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6a Calculate the number of moles of any compound or element given the mass of the substance.

41. How many moles are there in 72 grams of copper, Cu?

(a) 0.40 mol
(b) 0.88 mol
✔ (c) 1.13 mol
(d) 2.48 mol

Standard:

MI_CHEM_HS-0912-C4-6x-a
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6a Calculate the number of moles of any compound or element given the mass of the substance.

42. How many particles are there in 4.6 grams of sucrose ($C_{12}H_{22}O_{11}$)? (1 mol = 6.02×10^{23} particles)

(a) 2.8×10^{24} particles
(b) 4.5×10^{25} particles
✔ (c) 8.1×10^{21} particles
(d) 9.5×10^{26} particles

Standard:

MI_CHEM_HS-0912-C4-6x-b
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6b Calculate the number of particles of any compound or element given the mass of the substance.

43. How many particles are there in 200 grams of $NaNO_3$? (1 mol = 6.02 x 10^{23} particles)

✔ (a) 1.4 x 10^{24} particles

(b) 2.6 x 10^{23} particles

(c) 3.9 x 10^{24} particles

(d) 7.1 x 10^{25}particles

Standard:

MI_CHEM_HS-0912-C4-6x-b
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6b Calculate the number of particles of any compound or element given the mass of the substance.

44. How many particles are there in 50.0 g of calcium, Ca? (1 mol = 6.02 x 10^{23})

(a) 1.3 x 10^{24} particles

(b) 2.1 x 10^{24} particles

(c) 4.8 x 10^{23} particles

✔ (d) 7.5 x 10^{23} particles

Standard:

MI_CHEM_HS-0912-C4-6x-b
MI HSCEs Science - Chemistry
09-12
STANDARD C4: PROPERTIES OF MATTER
Topic C4.6x Moles
C4.6b Calculate the number of particles of any compound or element given the mass of the substance.

45. How many particles are there in 25.0 g of gold? (1 mol = 6.02 x 10^{23} particles)

(a) 1.3 x 10^{23} particles

(b) 2.1 x 10^{25} particles

(c) 4.7 x 10^{24} particles

✔ (d) 7.6 x 10^{22} particles

Standard:

MI_CHEM_HS-0912-C4-6x-b

MI HSCEs Science - Chemistry

09-12

STANDARD C4: PROPERTIES OF MATTER

Topic C4.6x Moles

C4.6b Calculate the number of particles of any compound or element given the mass of the substance.