Taibah University

Deanery of Academic Services

Unified Scientific Track

Answer Key

Mock Test For

Quiz No. 2

Introduction to Chemistry (CHEM 101)

(Chapters: 2 (Topic 07 only), 3 & 4)

Topics 07 – 15

For

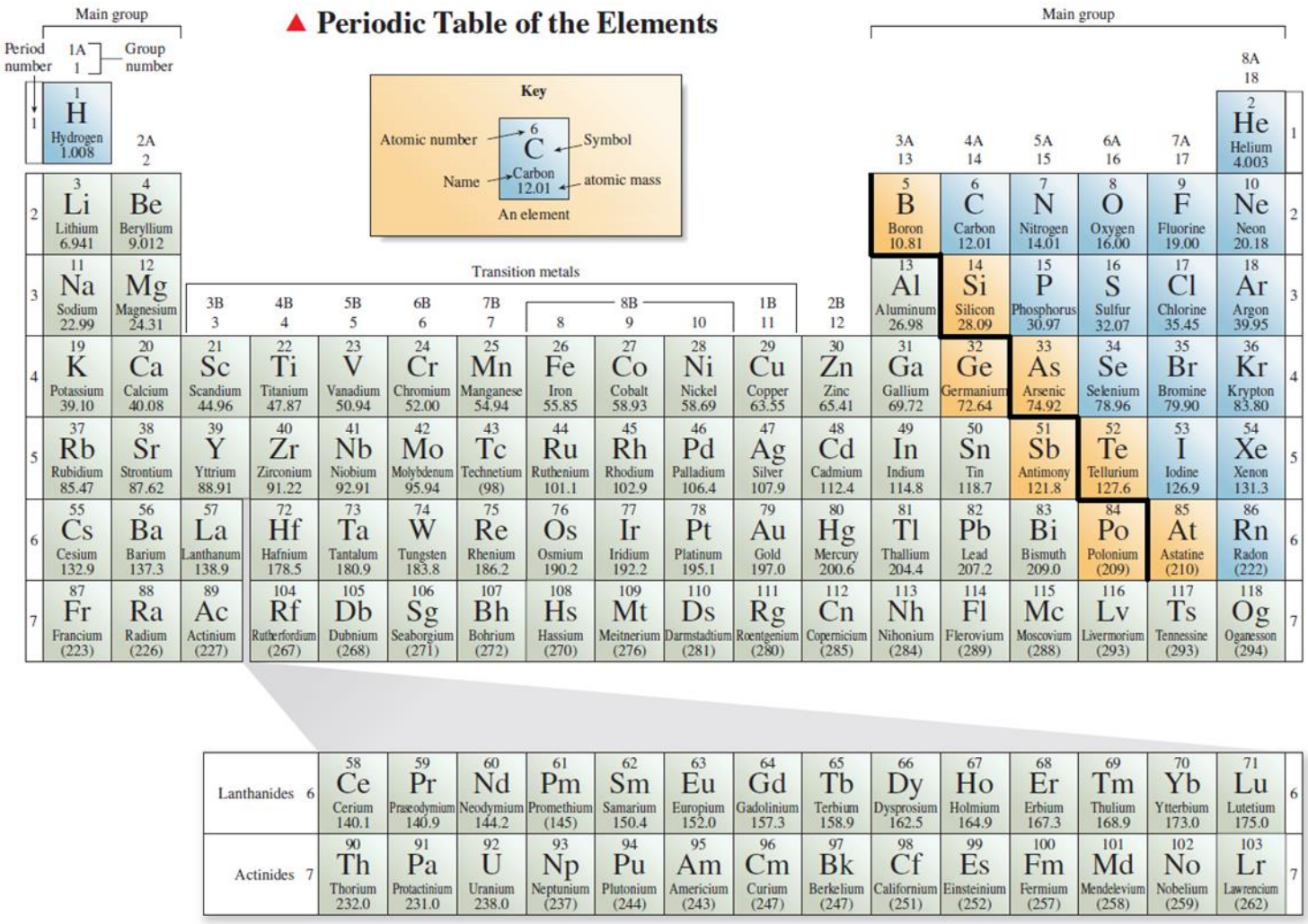
Unified Scientific Track Students

(All Campuses)

2nd Semester

1441 | 2019 – 2020

▲ Periodic Table of the Elements



▶ CHEM 101 SUPPLEMENTAL INFO.

$d = \frac{m}{V}$	$°C = \frac{(°F - 32)}{1.8}$	$°F = [1.8 \times (°C)] + 32$	$°C = K - 273.15$	$K = °C + 273.15$
$M = \frac{n}{V}$	$M_1 V_1 = M_2 V_2$	$K_W = [H_3O^+] \times [OH^-] = 1 \times 10^{-14}$		$pH = -\log [H_3O^+]$
Molecular formula = empirical formula $\times n$ $n = \frac{\text{molar mass of molecular formula}}{\text{molar mass of empirical formula}}$		$\%\text{ mass of element X} = \frac{\text{mass of element X in 1 mol of compound}}{\text{mass of 1 mol of the compound}} \times 100\%$		$\%\ yield = \frac{\text{actual yield}}{\text{theoretical yield}}\ X\ 100$
$q = C \times \Delta T$	$w = -P\Delta V$	$q = m \times C_s \times \Delta T$	1 L.atm = 101.3 J	Avogadro's No. = 6.022×10^{23}

$$\text{Atomic mass} = \sum_n (\text{fraction of isotope } n) \times (\text{mass of isotope } n)$$
$$= (\text{fraction of isotope 1} \times \text{mass of isotope 1}) + (\text{fraction of isotope 2} \times \text{mass of isotope 2}) + \cdots$$

Mole Conversions: Grams of Substance ⇄ (÷ Molar Mass / × Molar Mass) Moles of Substance ⇄ (× Avo. Number / ÷ Avo. Number) Number of Atoms or Molecules

Answer the following questions:

1. Which of these elements has the smallest atomic radius?

☑ a. Ne ❑ b. O ❑ c. Be ❑ d. B

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2. Amongst the following elements; …… is the most metallic one.

❑ a. Ca ❑ b. Sr ❑ c. Be ☑ d. Ba

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3. The ionization energy of "Ca" is lower than the ionization energy of ……..

❑ a. K ❑ b. Ba ☑ c. Be ❑ d. Ra

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4. The elements with the lowest electron affinity are the ……..

❑ a. alkaline earth metals. ☑ b. alkali metals.

❑ c. halogens ❑ d. nonmetals

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5. As we move from bottom to top, and from left to right on the periodic table; ……..

❑ a. atomic radius increases & ionization energy increases.

☑ b. atomic radius decreases & ionization energy increases.

❑ c. atomic radius increases & ionization energy decreases.

❑ d. atomic radius decreases & ionization energy decreases.

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6. Which of the following elements has the largest atomic radius?

☑ a. Ra ❑ b. Ca ❑ c. Be ❑ d. Ba

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7. Among the following elements; the most electronegative one is ……..

❑ a. Si ❑ b. Al ❑ c. Mg ☑ d. S

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8. What is the empirical formula of the compound $C_2H_4O_2$?

❑ a. CHO ☑ b. CH_2O ❑ c. $C_2H_2O_2$ ❑ d. $C_2H_4O_2$

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9. Identify the type of the substance CO.

❑ a. atomic element ❑ b. ionic compound

☑ c. molecular compound ❑ d. molecular element

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10. What is systematic name of $Cu_3(PO_4)_2$?

❑ a. tricopper diphosphate ☑ b. copper(II) phosphate

❑ c. copper(I) phosphorus oxide ❑ d. copper(II) phosphide

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11. Choose the correct systematic name of the compound CCl_4.

❑ a. monocarbon tetrachloride ☑ b. carbon tetrachloride

❑ c. tetrachloride monocarbon ❑ d. carbon trichloride

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12. Give the correct formula of ammonium sulfate.

❑ a. $SO_4(NH_4)_2$ ☑ b. $(NH_4)_2SO_4$ ❑ c. NH_4SO_4 ❑ d. $(NH_4)_2SO_3$

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13. Indicate the formula of sulfite ion.

❑ a. S^{2-} ❑ b. SO_4^{2-} ☑ c. SO_3^{2-} ❑ d. SO_3^{1-}

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14. Name the compound $HBr_{(aq)}$.

❑ a. hydrogen monobromide ❑ b. hydrobromide

❑ c. hydrogen monobromic acid ☑ d. hydrobromic acid

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15. Calculate the molar mass of the compound $(NH_4)_3PO_4$.

☑ a. 149.09 g/mol ❑ b. 94.97 g/mol ❑ c. 113.01 g/mol ❑ d. 203.13 g/mol

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16. How many moles of $(NH_4)_2S$ are there in 34.07 g of $(NH_4)_2S$?

❑ a. 0.3 mol ☑ b. 0.5 mol ❑ c. 1.2 mol ❑ d. 2.3 mol

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17. How many <u>moles</u> and how many <u>atoms</u> of Rb are there in a sample weighing 30 g?

❑ a. 0.53 mol and 1.14×10^{24} atoms ❑ b. 1.12 mol and 1.12×10^{23} atoms

❑ c. 3.51 mol and 3.20×10^{23} atoms ☑ d. 0.35 mol and 2.11×10^{23} atoms

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18. How many molecules are there in 110 g of chlorine gas?

❑ a. 1.87×10^{24} molecules ☑ b. 9.34×10^{23} molecules

❑ c. 7.12×10^{23} molecules ❑ d. 4.42×10^{23} molecules

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19. Calculate the mass percent of oxygen in the compound $Fe(OH)_3$.

❑ a. 76.66 % ☑ b. 44.91 % ❑ c. 52.26 % ❑ d. 21.96 %

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20. Find the empirical formula of a compound consisting of 21.96 % S and 78.04 % F.

❑ a. SF ❑ b. SF_2 ❑ c. SF_4 ☑ d. SF_6

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21. What is the empirical formula of a compound that contains 50.05 % sulfur and 49.95 % oxygen (mass percent)?

❑ a. SO_3 ☑ b. SO_2 ❑ c. SO ❑ d. S_6O_2

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22. A compound has a molar mass of 515.46 g/mol. What is the molecular formula of this compound if its empirical formula is CBr_2?

❑ a. CBr_4 ❑ b. C_4Br_8 ☑ c. C_3Br_6 ❑ d. C_2Br_4

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23. When the following equation is balanced, the coefficient of H_2O is ……

$$SnO_2 + H_2 \rightarrow Sn + H_2O$$

❑ a. 1 ☑ b. 2 ❑ c. 3 ❑ d. 4

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24. Which of these substances is formed by electron transferring between atoms?

☑ a. $FeF_{2\,(s)}$ ❑ b. $CCl_{4\,(g)}$ ❑ c. $SO_{3\,(g)}$ ❑ d. $CH_{4\,(g)}$

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25. Which set of coefficients will correctly balance the following equation?

$$\text{....}\ Fe + \text{....}\ O_2 \rightarrow \text{....}\ Fe_2O_3$$

☑ a. 4, 3, 2 ❑ b. 2, 3, 4 ❑ c. 3, 2, 1 ❑ d. 4, 2, 3

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26. The Lewis dot symbol for the Cl^- ion is ……

❑ a. ❑ b.  ❑ c.  ☑ d. 

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27. How many nonbonding and bonding pairs of electrons are there in a nitrogen molecule, N_2?

❑ a. 4 nonbonding pairs, 6 bonding pairs ❑ b. 3 nonbonding pairs, 2 bonding pairs

☑ c. 2 nonbonding pairs, 3 bonding pairs ❑ d. 0 nonbonding pairs, 3 bonding pairs

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28. Which bond is formed as a result of unequal sharing of electrons between two atoms of different elements?

❑ a. ionic ❑ b. pure covalent ☑ c. polar covalent ❑ d. metallic

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29. Which of the following bonds is the shortest yet strongest?

❑ a. C=C ☑ b. C≡C ❑ c. C–C ❑ d. C–H

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30. How many moles of NO_2 will be formed when 15 moles of N_2O_5 completely dissociate?

$$2\ N_2O_{5\,(g)} \rightarrow 4\ NO_{2\,(g)} + O_{2\,(g)}$$

☑ a. 30 ❑ b. 15 ❑ c. 60 ❑ d. 8

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31. Calculate the theoretical yield (in mol) for NO, when 5 moles of NH_3 react with 4 moles of O_2, according to the following equation:

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

☑ a. 3.2 mol ❑ b. 5.0 mol ❑ c. 4.8 mol ❑ d. 4.0 mol

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32. What is the mass (in g) of NaCl required to make 430 mL of a 1.5 M NaCl solution?.

❑ a. 0.645 g ☑ b. 37.7 g ❑ c. 3.77 g ❑ d. 645 g

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33. What is the percent yield for a reaction if its theoretical yield is 123 g and its actual yield is 95 g?

❑ a. 95.00 % ❑ b. 56.94 % ❑ c. 47.96 % ☑ d. 77.23 %

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34. What is the molarity of a solution if 3.4 moles of NaBr are dissolved in water to make 1.8 L solution?

❑ a. 2.5 M ☑ b. 1.89 M ❑ c. 4.4 M ❑ d. 3.1 M

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35. What is the molarity of KCl solution prepared by diluting 300.0 mL of 3.00 M KCl to a total volume of 1.2 L?

❑ a. 0.43 M ❑ b. 3.12 M ☑ c. 0.75 M ❑ d. 1.21 M

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36. What is the oxidation number of Cr in $Cr_2O_7^{2-}$?

❑ a. +2 ❑ b. +4 ❑ c. +5 ☑ d. +6

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37. In the following reaction; which element is oxidized?

$$Pb(NO_3)_{2\,(aq)} + Na_2SO_{4\,(aq)} \rightarrow PbSO_{4\,(s)} + 2\ NaNO_{3\,(aq)}$$

❑ a. Pb ❑ b. N ❑ c. S ☑ d. None

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38. Identify the oxidizing agent in the following redox reaction:

$$Sn_{(s)} + 2H^+_{(aq)} \rightarrow Sn^{2+}_{(aq)} + H_{2(g)}$$

❑ a. Sn ❑ b. Sn^{2+} ☑ c. H^+ ❑ d. H_2

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39. Which of the following substances gives the strongest electrolyte when dissolved in water?

❑ a. HF ☑ b. Na_2CO_3 ❑ c. NH_3 ❑ d. $C_6H_{12}O_6$

Best Wishes

Al-Madinah, 24th of March, 2020