## Kuwait University <br> Office of Assistant Vice President for Evaluation and Measurement

## Academic Aptitude Tests

| Student Name |
| :---: |

## Civil ID No.

## Instructions:

1. The aptitude tests consist of three tests.

| Test | Number of Questions | Time |  |
| :--- | :---: | :---: | :--- |
| English | 85 | 1 Hour |  |
| Mathematics | 20 (No Calculator) | 1 Hour |  |
| Chemistry | 25 | 1 Hour |  |

2. Mark all your answers on the Answer Sheet and in the proper section. On your answer sheet as shown below, using a pencil, darkenthe proper circle.

3. Verify all personal and test data on answer sheet and don't make any changes unless approved by the proctor.
4. Write down your name and Civil ID\# on the test booklet.
5. Copy the test's version on your answer sheet.
6. Follow the proctor's instruction during the test.
7. During testing, be quite and avoid any cheating situation.
8. Observe the allocated and the announced time for each test.

## Chemistry Test

## Atomic Molar Mass (g/mol):

Nitrogen $\quad(\mathrm{N})=14.0$
Oxygen $\quad(\mathrm{O})=16.0$

## Atomic Number:

Hydrogen (H) $=1$
Carbon (C) $=6$
Nitrogen (N) $=7$
Oxygen (O) $=8$
Sodium $\quad(\mathrm{Na})=11$
Chlorine $\quad(\mathrm{Cl})=17$

## Physical Constants:

Ion product constant for water $\left(\mathrm{K}_{\mathrm{w}}\right)$ at $25^{\circ} \mathrm{C}=1.00 \times 10^{-14}$

1. Mixing olive oil with an aqueous solution of table salt $(\mathrm{NaCl})$ will form:
a. homogeneous mixture
c. colloidal solution
b. heterogenueous mixture
d. suspension
2. Which of the following statements is true?
a. $\quad$ Sulfur $(\mathrm{S})$ burns in air to form sulfur dioxide $\left(\mathrm{SO}_{2}\right)$ gas
b. Iron metal ( Fe ) forms iron carbonate when exposed to air
c. Sodium hydroxide $(\mathrm{NaOH})$ reacts with nitric acid $\left(\mathrm{HNO}_{3}\right)$ to form salt, water and gas
d. All basic solutions turn blue litmus paper to red
3. In which of the following pairs, do both compounds exist as liquids at room temperature?
a. Nickel chloride $\left(\mathrm{NiCl}_{2}\right)$, and Bromine $\left(\mathrm{Br}_{2}\right)$
b. Sodium acetate $\left(\mathrm{CH}_{3} \mathrm{COONa}\right)$, and Nickel Chloride $\left(\mathrm{NiCl}_{2}\right)$
c. Ethanol $\left(\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}\right)$, and Bromine $\left(\mathrm{Br}_{2}\right)$
d. Sulfur dioxide $\left(\mathrm{SO}_{2}\right)$, and Ethanol $\left(\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}\right)$
4. Which of the following compounds is classified as salt?
a. HCN
b. $\mathrm{CH}_{3} \mathrm{COOH}$
c. $\quad \mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2}$
d. $\quad \mathrm{N}_{2} \mathrm{O}_{5}$
5. Which of the following anions contains sulfur atom?
a. Carbonate
c. Phosphate
b. Dichromate
d. Thiocyanate
6. When an atom gains two electrons it becomes:
a. Doubly negative charged
c. Doubly positive charged
b. Triply positive charged
d. Neutral
7. How many ions would be produced on dissolving one formula unit of potassium hydrogen iodate $\left(\mathrm{KH}\left(\mathrm{IO}_{3}\right)_{2}\right)$ in water?
a. 8
b. 10
c. 4
d. 3
8. Which of the following represents a conjugate acid-base pair?
a. $\quad \mathrm{HBr}(\mathrm{aq})$ and $\mathrm{HCl}(\mathrm{aq})$
b. $\mathrm{HCO}_{3}{ }^{-}(\mathrm{aq})$ and $\mathrm{CO}_{3}{ }^{2-}(\mathrm{aq})$
c. $\quad \mathrm{H}_{3} \mathrm{O}^{+}(\mathrm{aq})$ and $\mathrm{NH}_{4}{ }^{+}(\mathrm{aq})$
d. $\mathrm{H}_{2} \mathrm{O}(\mathrm{l})$ and $\mathrm{H}_{2} \mathrm{O}_{2}(\mathrm{aq})$
9. The number of electrons in the ion $\left({ }_{76}^{192} \mathrm{Os}^{+8}\right)$ is:
a. 84
b. 116
c. $\quad 76$
d. 68
10. Potassium $(\mathrm{K})$ reacts with water $\left(\mathrm{H}_{2} \mathrm{O}\right)$ to produce.
a. $\quad \mathrm{KH}(\mathrm{aq})$ and $\mathrm{OH}^{-}(\mathrm{aq})$
b. $\mathrm{KOH}(\mathrm{aq})$ and $\mathrm{H}_{2}(\mathrm{~g})$
c. $\quad \mathrm{K}_{2} \mathrm{O}(\mathrm{s})$ and $\mathrm{H}_{2}(\mathrm{~g})$
d. $\quad \mathrm{KOH}(\mathrm{aq})$ and $\mathrm{H}^{+}(\mathrm{aq})$
11. Which of the following is an alcohol?
a. KOH
b. $\quad \mathrm{CH}_{3} \mathrm{CHO}$
c. HCOOH
d. $\mathrm{C}_{2} \mathrm{H}_{5} \mathrm{OH}$
12. Which of the following aqueous solution mixtures resists the change in pH value upon the addition of small amount of strong base aqueous solution?
a. $\quad \mathrm{NH}_{3}(\mathrm{aq})$ and $\mathrm{NH}_{4} \mathrm{Cl}(\mathrm{aq})$
b. $\quad \mathrm{NaI}(\mathrm{aq})$ and $\mathrm{Pb}\left(\mathrm{NO}_{3}\right)_{2}(\mathrm{aq})$
c. $\quad \mathrm{AgNO}_{3}(\mathrm{aq})$ and $\mathrm{KCl}(\mathrm{aq})$
d. $\mathrm{HCl}(\mathrm{aq})$ and $\mathrm{NaNO}_{3}(\mathrm{aq})$
13. In which of the following substances the oxidation number of phosphorous atom ( P ) is +6 ?
a. $\mathrm{PCl}_{3}$
b. $\quad \mathrm{P}_{2} \mathrm{O}_{5}$
c. $\quad \mathrm{ZnP}_{2} \mathrm{O}_{7}$
d. $\quad P_{4}$
14. $\mathbf{m C} \mathrm{C}_{7} \mathrm{H}_{8} \mathrm{O}_{2}(\mathrm{l})+\mathbf{n O} 2(\mathrm{~g}) \longrightarrow \mathbf{p C O}_{2}(\mathrm{~g})+\mathbf{q} \mathrm{H}_{2} \mathrm{O}(\mathrm{g})$

After balancing the above chemical equation, the coefficients ( $\mathbf{m}, \mathbf{n}, \mathbf{p}, \mathbf{q}$ ) are:
a. $\quad \mathbf{m}=2, \mathbf{n}=8, \mathbf{p}=7, \mathbf{q}=2$
b. $\quad \mathbf{m}=3, \mathbf{n}=10, \mathbf{p}=8, \mathbf{q}=4$
c. $\quad \mathbf{m}=1, \mathbf{n}=6, \mathbf{p}=3, \mathbf{q}=6$
d. $\quad \mathbf{m}=1, \mathbf{n}=8, \mathbf{p}=7, \mathbf{q}=4$
15. $\mathrm{P}_{4} \mathrm{O}_{10}(\mathrm{~g})+6 \mathrm{PCl}_{3}(\mathrm{~g})+6 \mathrm{Cl}_{2}(\mathrm{~g}) \rightleftharpoons 10 \mathrm{POCl}_{3}(\mathrm{~g})$

What is the equilibrium constant expression for the above equilibrium system?
a. $\quad \mathrm{K}=1 / P^{10}{ }_{\text {POC13 }}$
b. $\mathrm{K}=1 / P_{\mathrm{P} 4010} \cdot P^{6}{ }_{\mathrm{PCl} 3} . P^{6} \mathrm{Cl}_{2}$
c. $\mathrm{K}=P^{10_{\mathrm{POCl}}} / P_{\mathrm{P} 4 \mathrm{O} 10} \cdot P^{6}{ }_{\mathrm{PCl}} \cdot P^{6}{ }_{\mathrm{Cl} 2}$
d. $\quad \mathrm{K}=P_{\mathrm{P} 4 \mathrm{O} 10} \cdot P^{6}{ }_{\mathrm{PCl} 13} \cdot P^{6} \mathrm{C}_{\mathrm{C} 2} / P^{10}{ }_{\mathrm{POCl} 13}$
16. Which of the following contains ionic bond?
a. $\quad \mathrm{SO}_{2}(\mathrm{~g})$
b. $\quad \mathrm{I}_{2}(\mathrm{~s})$
c. $\mathrm{MgO}(\mathrm{s})$
d. $\quad \mathrm{Hg}(\mathrm{l})$
17. Which of the following substances is a polar covalent compound?
a. $\quad \mathrm{CCl}_{4}(\mathrm{l})$
b. $\quad \mathrm{NO}(\mathrm{g})$
c. $\mathrm{Co}(\mathrm{s})$
d. $\mathrm{NaCl}(\mathrm{s})$
18. What is the solubility product constant $\left(\mathrm{K}_{\text {sp }}\right)$ expression for a saturated solution of silver arsenate $\left(\mathrm{Ag}_{3} \mathrm{AsO}_{4}\right)$ ?
a. $\quad \mathrm{K}_{\text {sp }}=\left[\mathrm{Ag}^{+}\right]^{3}\left[\mathrm{AsO}_{4}{ }^{3-}\right]$
b. $\quad \mathrm{K}_{\text {sp }}=\left[3 \mathrm{Ag}^{+}\right]\left[\mathrm{AsO}_{4}{ }^{3-}\right]$
c. $\quad \mathrm{K}_{\text {sp }}=1 /\left[\mathrm{Ag}^{+}\right]^{3}\left[\mathrm{AsO}_{4}{ }^{3-}\right]$
d. $\quad \mathrm{K}_{\text {sp }}=\left[\mathrm{Ag}^{+}\right]\left[\mathrm{AsO}_{4}{ }^{3-}\right]^{3}$
19. Which of the following organic compounds is a saturated compound?
a. $\mathrm{CH}_{3} \mathrm{CCCH}_{3}$
b. $\mathrm{CH}_{2} \mathrm{CHCH}_{2} \mathrm{NH}_{2}$
c. $\mathrm{CH}_{3} \mathrm{CHCHCH}_{3}$
d. $\mathrm{CH}_{3} \mathrm{CH}_{2} \mathrm{CH}_{2} \mathrm{CH}_{3}$
20. A piece of metal having a density equal to $1.74 \mathrm{~g} / \mathrm{cm}^{3}$ was dropped into a graduated cylinder containing $27.50 \mathrm{~cm}^{3}$ of water and the water level is raised to $32.00 \mathrm{~cm}^{3}$. What is the mass of this piece of metal?
a. $\quad 8.69 \mathrm{~g}$
b. $\quad 7.83 \mathrm{~g}$
c. $\quad 11.3 \mathrm{~g}$
d. $\quad 1.74 \mathrm{~g}$
21. If the pOH of a sample of tomato juice is equal to 9.50 , then the hydrogen ion concentration $\left[\mathrm{H}^{+}\right]$of the sample is:
a. $\quad 3.16 \times 10^{-5} \mathrm{~mol} /$ liter
b. $\quad 3.16 \times 10^{-10} \mathrm{~mol} /$ liter
c. $\quad 1.00 \times 10^{-7} \mathrm{~mol} /$ liter
d. $3.16 \times 10^{-7} \mathrm{~mol} /$ liter
22. What is the percent by mass of nitrogen ( N ) in the complex $\left(\left[\mathrm{Co}\left(\mathrm{NH}_{3}\right)_{4}\left(\mathrm{NO}_{2}\right)_{2}\right] \mathrm{Cl}\right)$ ?
[molar mass of the complex $\left.\left(\left[\mathrm{Co}\left(\mathrm{NH}_{3}\right)_{4}\left(\mathrm{NO}_{2}\right)_{2}\right] \mathrm{Cl}\right)=254.4 \mathrm{~g} / \mathrm{mol}\right]$.
a. $\quad 22.0 \%$
b. $\quad 44.0 \%$
c. $33.0 \%$
d. $11.0 \%$
23. How many moles of oxygen ( O ) are there in 8.75 g of the compound $\left(\mathrm{Na}_{2} \mathrm{~S}_{2} \mathrm{O}_{3} .5 \mathrm{H}_{2} \mathrm{O}\right)$ ?
[molar mass of $\left.\left(\mathrm{Na}_{2} \mathrm{~S}_{2} \mathrm{O}_{3} .5 \mathrm{H}_{2} \mathrm{O}\right)=248.2 \mathrm{~g} / \mathrm{mol}\right]$.
a. $\quad 0.176$ mole
b. $\quad 0.282$ mole
c. 0.106 mole
d. $\quad 0.0353$ mole
24. What is the mass of oxygen $(\mathrm{O})$ in 3.25 g of hydrated sodium carbonate $\left(\mathrm{Na}_{2} \mathrm{CO}_{3} .10 \mathrm{H}_{2} \mathrm{O}\right)$ ?
[molar mass of hydrated sodium carbonate $=381.4 \mathrm{~g} / \mathrm{mol}$ ]
a. $\quad 1.11 \mathrm{~g}$
b. $\quad 0.332 \mathrm{~g}$
c. $\quad 1.44 \mathrm{~g}$
d. $\quad 1.77 \mathrm{~g}$
25. A $5.00 \mathrm{~cm}^{3}$ of sulfuric acid $\left(\mathrm{H}_{2} \mathrm{SO}_{4}\right)$ aqueous solution was titrated with 0.050 M of potassium hydroxide $(\mathrm{KOH})$ standard solution. The titration required $7.10 \mathrm{~cm}^{3}$ of the base for complete neutralization. What is the acid's concentration?
a. $\quad 0.0355$ mole / liter
b. $\quad 0.0500$ mole / liter
c. $\quad 0.0178$ mole / liter
d. 0.0710 mole / liter




Answers - Arabic Exam

| Q's\# | Answers | Q's\# | Answers |
| :---: | :---: | :---: | :---: |
| 1 - | ( |  | A (B) (C) (D) |
| 2 | (A) (B) (c) (D) |  | (B) (c) |
| 3 | (A) (B) (C) (D) |  | (A) (B) (C) (1) |
| 4 | (A) (B) (c) (D) | 14 | (A) (B) (C) (1) |
| 5 | (A) (B) (C) (D) | 15 | (A) (B) (C) (1) |
| 6 | (A) (B) (C) (1) | 16 | (A) (B) (c) (1) |
| 7 | (A) (B) (C) (1) | 17 | (A) (B) (C) (1) |
| 8 | (A) (B) (c) (D) |  | A (B) (c) (D) |
| 9 | (A) (B) (C) (D) |  | (A) (B) (c) (D) |
|  | (A) (B) (c) (D) |  | (A) (B) (c) (-) |

Q's\# Answers 21- (A) (B) (C) (D) 22-(A) (B) (C) (ㅁ) 23 - (A) (B) (C) (D) 24-(A) (B) (C) (ㅁ) 25 - (A) (B) (C) (ㅁ) 26-(A) (B) (C) (ㅁ) 27 - (A) (B) (C) (ㅁ) 28 - (A) (B) (C) (ㅁ) $29-$ - $A$ (B) (C) (D)
$30-$ (A) (B) (C) (D)


| Q's\# | Answers | Q's\# | Answers | Q's\# | Answers |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 31 | (A) (B) (C) (D) | 41 | A (B) (c) (D) | 51 |  |
| 32 | (A) (B) (c) (-) | 42 | (A) (B) (c) (-) | 52 | (A) (B) (C) (1) |
| 33 | (A) (B) (C) (D) | 43 - | (A) (B) (c) (D) | $53-$ | (A) (B) (c) (1) |
| 34 | (A) (B) (C) (D) | 44 | (A) (B) (C) (-) | 54 | (A) (B) (c) (1) |
| 35 | (A) (B) (c) (b) | 45 | (A) (B) (c) (1) | 55 | (A) (B) (c) (1) |
| 36 | (A) (d) (c) (1) | 46 | (A) (B) (C) (1) | 56 | (A) (B) (c) (-) |
| 37 | (A) (B) (C) (D) | 47 - | (A) (B) (c) (D) | 57 | (A) (B) (C) (D) |
| 38 | (A) (B) (C) (D) | 48 - | (A) (B) (c) (D) | 58 | (A) (B) (c) (1) |
| 39 | (A) (B) (C) (D) | 49. | (A)(B) (c) (D) | 59 | (A) (B) (C) (1) |
| 40 | (A) (B) (c) (D) | 50 | (A) (B) (c) (D) | 60 | (A) (B) (c) (-) |

