



# Kuwait University

Office of the Vice President for Academic Affairs  
Measurement and Teaching Development Center

## Academic Aptitude Tests

<b>Student Name</b>
---------------------

<b>Version</b> <b>A</b>
----------------------------

<b>Civil ID No.</b>
---------------------

### Instructions:

1. The aptitude tests consist of three tests.

<u>Test</u>	<u>Number of Questions</u>	<u>Time</u>
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

### Gram Atomic Mass (g/mol):

Hydrogen (H) = 1.0

Carbon (C) = 12.0

Oxygen (O) = 16.0

Sodium (Na) = 23.0

### Atomic Number:

Hydrogen (H) = 1

Carbon (C) = 6

Oxygen (O) = 8

### Physical Constant:

Ion product constant for water ( $K_w$ ) at 25 °C =  $1.00 \times 10^{-14}$

Avogadro's number ( $N_A$ ) =  $6.02 \times 10^{23}$  / mole

- Chemically pure water is classified as:
  - Element
  - Compound
  - Homogeneous mixture
  - Heterogeneous mixture
- The name of the compound having the chemical formula ( $\text{NH}_4\text{NO}_2$ ) is:
  - Ammonium nitrite
  - Ammonium nitrate
  - Ammonia nitrate
  - Ammonia hydrogen nitrite
- From the following statements, select the one that specifies a chemical property.
  - Naphthalene sublimates at room temperature
  - Water freezes at  $0^\circ\text{C}$
  - Ether evaporates at room temperature
  - Sulfur burns in air
- Which of the following is a pair of covalent compounds?
  - $\text{Cl}_2(\text{g})$  and  $\text{Na}_2\text{CO}_3(\text{s})$
  - $\text{I}_2(\text{s})$  and  $\text{NaCl}(\text{s})$
  - $\text{H}_2\text{O}(\text{l})$  and  $\text{CO}_2(\text{g})$
  - $\text{KCl}(\text{s})$  and  $\text{N}_2(\text{g})$
- The molar solubility of silver ion [ $\text{Ag}^+$ ] in a saturated solution of silver chromate ( $\text{Ag}_2\text{CrO}_4$ ) can be expressed as:
  - $(2s)^2 \text{ mol/L}$
  - $(2s) \text{ mol/L}$
  - $(s^2) \text{ mol/L}$
  - $(s) \text{ mol/L}$
- Aqueous ammonia solution ( $\text{NH}_3(\text{aq})$ ) is:
  - Weakly acidic
  - Strongly acidic
  - Weakly basic
  - Strongly basic
- Which of the following is a non-electrolyte?
  - $\text{NaCl}(\text{molten})$
  - $\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{sugar})$
  - $\text{H}_2\text{SO}_4(\text{aq})$
  - $\text{Ca}(\text{OH})_2(\text{aq})$
- Brønsted-Lowry acid is defined as:
  - Proton donor
  - Proton acceptor
  - Electron pair donor
  - Electron pair acceptor
- Benzyl acetate ( $\text{CH}_3\text{COOCH}_2\text{C}_6\text{H}_5$ ) has jasmine smell. Benzyl acetate is:
  - Aldehyde
  - Ketone
  - Alcohol
  - Ester

10. Atoms in chemical compounds are held together by.....

- (a) Moles (c) Bonds  
(b) Protons (d) Neutrons

11.  $\text{Cu(s)} + \text{S(s)} \longrightarrow \text{CuS(s)}$

The above reaction is an example of a.....

- (a) decomposition reaction  
(b) combustion reaction  
(c) neutralization reaction  
(d) combination reaction

12. Oxidation- reduction reactions occur as a result of transfer of .....

- (a) One electron or more (c) One proton or more  
(b) One ion or more (d) One neutron or more

13. Which of the following organic compounds contains single covalent bonds, in addition to one covalent triple bond between two carbon atoms?

- (a)  $\text{C}_4\text{H}_8$  (c)  $\text{C}_2\text{H}_6$   
(b)  $\text{C}_5\text{H}_8$  (d)  $\text{C}_2\text{H}_6\text{O}$

14. Which of the following electronic configurations is correct?

- (a)  $1s^2 2s^2 2p^7 3s^1$  (c)  $1s^2 2s^2 2p^6 3s^2$   
(b)  $1s^2 2s^2 2p^6 2d^2$  (d)  $1s^2 2s^2 2p^8$

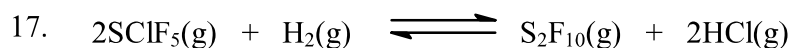
15. A solution that is obtained by mixing equal volumes having the same concentration, of aqueous solutions of a weak acid and the salt of the acid, is known as:

- (a) Heterogeneous solution (c) Colloidal solution  
(b) Amphoteric solution (d) Buffer solution

16.  $m\text{Mg}_3\text{N}_2(\text{s}) + p\text{HCl}(\text{aq}) \longrightarrow q\text{MgCl}_2(\text{aq}) + r\text{NH}_4\text{Cl}(\text{aq})$

When the equation of the above chemical reaction is balanced, the values of the coefficients (**m, p, q, r**) are:

- |     | <b>m</b> | <b>p</b> | <b>q</b> | <b>r</b> |
|-----|----------|----------|----------|----------|
| (a) | 2        | 6        | 6        | 3        |
| (b) | 1        | 4        | 3        | 2        |
| (c) | 1        | 8        | 3        | 2        |
| (d) | 1        | 6        | 3        | 2        |



What is the equilibrium constant expression for the above equilibrium system?

- (a)  $K_p = P_{\text{S}_2\text{F}_{10}} \cdot P_{\text{HCl}}^2 / P_{\text{SClF}_5}^2 \cdot P_{\text{H}_2}$       (c)  $K_c = P_{\text{S}_2\text{F}_{10}} \cdot P_{\text{HCl}} / P_{\text{SClF}_5} \cdot P_{\text{H}_2}$   
 (b)  $K_p = P_{\text{SClF}_5}^2 \cdot P_{\text{H}_2} / P_{\text{S}_2\text{F}_{10}} \cdot P_{\text{HCl}}^2$       (d)  $K_c = P_{\text{S}_2\text{F}_{10}} \cdot P_{\text{HCl}}^2 / P_{\text{SClF}_5}^2 \cdot P_{\text{H}_2}$

18. In which of the following pairs do the underlined atoms have the same oxidation numbers?

- (a)  $\text{K}_2\underline{\text{Cr}}_2\text{O}_7$  and  $\underline{\text{Cr}}_2\text{O}_3$       (c)  $\text{Mg}_2\underline{\text{P}}_2\text{O}_3$  and  $\text{H}_3\underline{\text{P}}\text{O}_4$   
 (b)  $\underline{\text{K}}\text{MnO}_4$  and  $\text{NaH}\underline{\text{S}}\text{O}_4$       (d)  $\underline{\text{P}}_2\text{O}_5$  and  $\text{K}_3\underline{\text{P}}\text{O}_4$

19. What is the percentage by mass of water ( $\text{H}_2\text{O}$ ) in one mole of potassium aluminum sulfate (alum) ( $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ )?

[molar mass of potassium aluminum sulfate (alum) ( $\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ ) = 474.3 g / mole]

- (a) 3.80 %      (c) 25.0 %  
 (b) 45.5 %      (d) 75.0 %

20. Diethyl ether is a liquid which has a density of 0.714 g /  $\text{cm}^3$ ; what is the volume (in  $\text{cm}^3$ ) of the liquid needed to provide 0.750 mole of the ether?

[molar mass of diethyl ether = 74.0 g / mol]

- (a) 77.7  $\text{cm}^3$       (c) 81.6  $\text{cm}^3$   
 (b) 39.7  $\text{cm}^3$       (d) 62.4  $\text{cm}^3$

21. What is the hydrogen ion concentration [ $\text{H}^+$ ] of a  $1.25 \times 10^{-2}$  M of potassium hydroxide solution (KOH)?

- (a)  $8.00 \times 10^{-13}$  M      (c)  $1.00 \times 10^{-14}$  M  
 (b)  $1.00 \times 10^{-7}$  M      (d)  $1.25 \times 10^{-12}$  M

22. A sample of the compound ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) contains 0.3478 g of sodium (Na). What is the mass of this sample?

[molar mass of the compound ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) = 381.4 g/mol]

- (a) 0.3478 g      (c) 2.884 g  
 (b) 0.3814 g      (d) 1.442 g

23. A solution is prepared by dissolving 20.75 g of zinc sulfate ( $\text{ZnSO}_4$ ) in a sufficient quantity of water to produce  $500 \text{ cm}^3$  of solution. Calculate the molarity of this solution?  
[molar mass of zinc sulfate ( $\text{ZnSO}_4$ ) = 161.5 g/mol]
- (a) 0.257 M (c) 0.208 M  
(b) 0.0642 M (d) 0.162 M
24. What is the number of moles of carbon (C) present in 7.25 g of the compound ( $\text{Ni}(\text{C}_4\text{H}_7\text{O}_2\text{N}_2)_2$ )?  
[molar mass of ( $\text{Ni}(\text{C}_4\text{H}_7\text{O}_2\text{N}_2)_2$ ) = 288.92 g/mol].
- (a) 0.0251 mol (c) 0.100 mol  
(b) 0.201 mol (d) 0.351 mol
25. What is the total number of nitrogen atoms (N) present in 2.05 g of dinitrogen oxide ( $\text{N}_2\text{O}$ )?  
[molar mass of dinitrogen oxide ( $\text{N}_2\text{O}$ ) = 44.0 g/mol]
- (a)  $6.02 \times 10^{23}$  atoms (c)  $2.80 \times 10^{22}$  atoms  
(b)  $2.05 \times 10^{22}$  atoms (d)  $5.61 \times 10^{22}$  atoms