

UMMUL QURA HIGH SCHOOL
AROWONA BUS-STOP, AMULOKO-AKANRAN ROAD, IBADAN.
2020/2021 SECOND TERM EXAMINATION

SUBJECT: Chemistry

DURATION : 2hrs : 30mins

CLASS: SS 2

INSTRUCTION: Answer *all* questions from part **A** and any *four* from part **B**

PART A

1. A basic postulate of kinetic theory of gases is that the molecules of gases move in a straight line before collision. this *implies* that
 - A. Collisions are perfectly elastic
 - B. Forces of repulsion exist
 - C. Forces repulsion and attraction are in equilibrium
 - D. Collisions are inelastic
2. Which of the following gases diffuse *fastest* under similar conditions?
 - A. C₂H₆
 - B. CH₄
 - C. CO₂
 - D. NO₂
3. According to kinetic theory, an *increase* in temperature causes the *kinetic energy* of particles to
 - A. Decrease
 - B. Increase
 - C. Be zero
 - D. Remain constant
4. A *separating funnel* is used in separating a mixture of
 - A. liquids with different boiling points
 - B. sediments in a liquid
 - C. liquids with different colours
 - D. liquids that are immiscible
5. If the pressure of 100cm³ of a sample of air is halved at constant temperature, what will be its *new* volume?
 - A. 1000cm³
 - B. 200cm³
 - C. 100cm³
 - D. 50cm³
6. The initial volume of a gas at 27⁰C was 220cm³. Determine its temperature in *Kelvin*, when the volume became **250cm³**
 - A. 183k
 - B. 264k
 - C. 300k
 - D. 341k
7. $P_{TOTAL} = P_1 + P_2 + P_3 + \dots + P_n$ where *P_{TOTAL}* is the pressure of a *mixture* of gases. The equation above is an expression of
 - A. Graham's LAW
 - B. Dalton's law
 - C. Avogadro's law
 - D. Gay- Lussac's law
8. Equal volume of CO and CO₂ at **s.t.p** have the same
 - A. Mass
 - B. Density
 - C. Rate of diffusion
 - D. Number of molecules
9. Consider the *reaction* represented by the equation below:
$$x\text{NH}_{3(g)} + y\text{Cl}_{2(g)} \longrightarrow z\text{HCl}_{(g)} + \text{N}_{2(g)}$$

- the values of x, y, and z are respectively
- 2, 4 and 6
 - 3, 2 and 4
 - 2, 3 and 6
 - 3, 2 and 6
- A given volume of *methane* (CH_4) diffuse in 20seconds. How long will it take the same volume of sulphur(IV)oxide (SO_2) under the same conditions?
 - 5 seconds
 - 60 seconds
 - 40 seconds
 - 20 seconds
 - Alums* are classified as
 - simple salts
 - basic salts
 - double salts
 - complex salts
 - Citric *acid* is said to be a *weak acid* because
 - It is derived from fruits
 - It is not corrosive
 - It ionizes slightly in water
 - Forms acid salts with bases
 - The **pH** of a solution of 0.1 mol dm^{-3} of H_2SO_4 solution is
 - 2.5
 - 0.5
 - 2.7
 - 0.7
 - Sodiumhydroxide *pellets* are
 - Deliquescent
 - Hygroscopic
 - Efflorescent
 - Hydrated
 - The **pH** of four solutions W, X, Y and Z are 4, 6, 7 and 10 respectively, therefore
 - None of these solutions is acidic
 - The pH of Y is made more acidic by addition of distilled water
 - Z is the most acidic solution
 - W is the most acidic solution
 - One *source* of ascorbic acid is
 - Beans
 - Vinegar
 - Orange
 - Banana
 - The product formed when acid anhydride *reacts* with water is
 - Acid
 - Base
 - Salt
 - Acid salt
 - A reaction between ammonium salts and alkali *produce* a salt, water and
 - CO_2
 - HCl
 - NH_3
 - SO_2
 - The method chosen for preparing a particular salt *depends* largely on
 - Vaporization and evaporation
 - Solubility and heat stability
 - Solubility and evaporation
 - Vaporization and heat stability
 - Ammonia *cannot* be dried using concentrated H_2SO_4 because ammonia
 - has a pungent smell
 - has a high rate of diffusion
 - reacts with the acid
 - is a colourless gas
 - The *basicity* of CH_3COOH is
 - 3
 - 4
 - 2
 - 1

22. Which of the following substances is **NOT** a salt?
- Sodiuntrioxocarbonate(iv)
 - Zinc chloride
 - Aluminium oxide
 - Sodium hydrogen tetraoxosulphate
23. All common **gases** are dried using P_2O_5 **Except**
- NO_2
 - NH_3
 - SO_2
 - H_2S
24. A solid substance with high melting and boiling points is **likely** to be a/an
- Covalent compound
 - Dative – covalent compound
 - Electrovalent compound
 - Non-metal
25. Two **examples** of strong bases are
- CaO and $CaCO_3$
 - K_2CO_3 and $(NH_4)_2CO_3$
 - $Ca(OH)_2$ and CaO
 - KOH and $NaOH$
26. $2Pb(NO_3)_2 \longrightarrow 2PbO + zNO_2 + 0_2$
What is the value of **Z** in the equation above?
- 1
 - 2
 - 3
 - 4
27. A hydrocarbon contained 14.3% hydrogen, and the remaining percentage for carbon. The empirical formula for the **hydrocarbon** would be ($C = 12$, $H = 1$)
- CH
 - CH_2
 - CH_3
 - CH_4
28. A balanced chemical equation is based on the **law** of
- Periodicity
 - Constant composition
 - Multiple proportion
 - Conservation of mass
29. Which of the following hydroxides is **not** readily soluble in water?
- NH_4OH
 - $Ca(OH)_2$
 - KOH
 - $NaOH$
30. Which of the following **separation techniques** is applied in the **petroleum industry**?
- Fractional crystallization
 - Chromatography
 - Filtration
 - Fractional distillation
31. A student who was stung by an insect felt better on putting some **vinegar** on the sting. The conclusion that could be **drawn** about the insect sting is that it is
- acidic
 - alkaline
 - amphoteric
 - neutral
32. $30cm^3$ of hydrogen at **s.t.p** combine with $20cm^3$ of oxygen to form steam according to the following equation
- $$2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(g)}$$
- Calculate** the actual volume of the gaseous mixture at the **end** of the reaction
- $50cm^3$
 - $35cm^3$
 - $30cm^3$
 - $25cm^3$

33. A solution of **pH 7** is
- Acidic
 - Neutral
 - Basic
 - Saturated
34. What volume of oxygen will be required to **burn** 30cm^3 of methane **completely** according to the equation?
- $$\text{CH}_4 + 2\text{O}_2 \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O}$$
- 60cm^3
 - 30cm^3
 - 100cm^3
 - 90dm^3
35. Tetraoxosulphate(VI) acid is described as a strong acid **because** it is highly
- corrosive
 - concentrated
 - soluble in water
 - ionized in water
36. Water in crystalline salts **provides**
- hydrated bonds and colour
 - colour and solubility base
 - colour and shape
 - shape and crystal lattice
37. All the following acids are monobasic **Except**
- Hydrochloric acid
 - Trioxonitrate(V) acid
 - Tetraoxophosphate(V) acid
 - Ethanoic acid
38. A **mixture** of NaCl and NH_4Cl is **best** separated by
- dissolution followed by filtration
 - sublimation
 - dissolution followed by evaporation
 - dissolution followed by sublimation
39. Sodium chloride crystals can be obtained from sea water **by**
- Decantation
 - Condensation
 - Evaporation
 - Neutralization
40. Two atoms of an element **X** are represented as indicated below:
- $${}^{39}_{19}\text{X} \text{ and } {}^{40}_{19}\text{X}$$
- This shows that **X** exhibits
- Isomerism
 - Isotopy
 - Allotropy
 - Radioactivity
41. Which of the following methods is **suitable** for the preparation of an insoluble salt?
- Action of an acid on a metal
 - Double decomposition
 - Neutralization
 - Action of an acid on a trioxocarbonate(iv)
42. Which of the following is **not** a covalent compound?
- Water
 - Oxygen molecule
 - Magnesium chloride
 - Carbon(iv) oxide
43. A substance which changes **directly** from the solid state to the gaseous state without forming a liquid substance is **said** to
- condense
 - sublime
 - evaporate
 - precipitate
44. Calculate the percentage composition of **carbon** in $\text{Ca}(\text{HCO}_3)_2$
- [Ca = 40, H = 1, C = 12, O = 16]

- A. 7.4
- B. 14.8
- C. 22.2
- D. 3.7

45. Which of these **chemical reactions** is/are balanced?

- I. $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \longrightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$
- II. $\text{CH}_4 + 2\text{O}_2 \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- III. $\text{NH}_3 + 2\text{O}_2 \longrightarrow \text{HNO}_3 + \text{H}_2\text{O}$

- A. I only
- B. III only
- C. I and II only
- D. II and III only

46. Which of the following **compounds** would form a solution on exposure to the atmosphere?

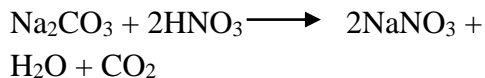
- A. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- B. FeCl_2
- C. NaNO_3
- D. $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

47. Which of the following separation techniques would show that **ink** is a mixture of chemical compounds?

- A. Chromatography
- B. Crystallization
- C. Filtration

D. Sublimation

48. Consider the **neutralization** reaction represented by the following equation:



The stoichiometric ratio of acid to base is

- A. 2 : 2
- B. 2 : 1
- C. 1 : 1
- D. 1 : 2

49. If 60cm^3 of a gas is heated from 27°C to 50°C . What is the **new volume** of gas at constant pressure?

- A. 32.4cm^3
- B. 55.7cm^3
- C. 64.6cm^3
- D. 111.1cm^3

50. Dative bond is also **known** as

- A. Vander waal forces
- B. Ionic bond
- C. Coordinate covalent bond
- D. Hydrogen bond

PART B

Instruction: Answer **FOUR** questions from this part

Question 1

(a) Define **each** of the following

- (i) An acid
- (ii) An acid anhydride
- (iii) Basicity of an acid

(b) List **three** physical properties and two chemical properties of acids

(c) Name the **acid** that is found in each of the following :

(i) Grape fruit

(ii) Vinegar

(iii) Lime

(iv) Ant or bee

(v) Milk

(d) State **two** uses of acids

Question 2

a(i) Define **pH** of a solution

(ii) What is the relationship between **pH** and **pOH** of an aqueous solution?

(iii) Determine **pH** of a solution containing 0.05mol dm^{-3} H_2SO_4

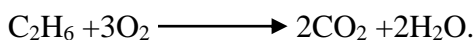
(v) State **two** importance of **pH**

(b) State the following gas laws

(i) Avogadro's law

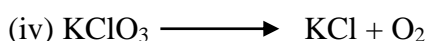
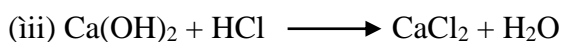
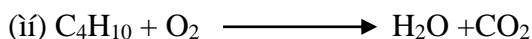
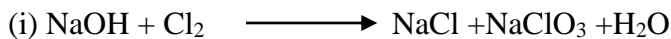
(ii) Gay Lussac's law

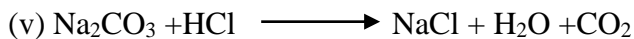
(c) 25cm^3 of **ethane** is mixed with 60cm^3 of oxygen. The mixture is ignited forming **carbon(iv) oxide and water** according to the equation below :



Calculate the **volume** of the gas left at the end of the reaction.

(d) **Balance** the following chemical equations





Question 3

a(i) What is an *alkali*?

(ii) Is calcium oxide an acid, a base or salt? Give *three* reasons for your answer.

(b).What do you understand by the following terms? Give *two* examples of compounds in each case.

(i) Hygroscopy

(ii) Deliquescence

(iii) Efflorescence

c(i) What drying *agent* is particularly suitable for *ammonia gas*?

(ii) 7.60g of blue copper (ii) tetraoxosulphate(vi) crystals, $\text{CuSO}_4 \cdot \text{H}_2\text{O}$, were heated to a constant mass, first at a temperature of **100°C** and then at **120°C**. The residue that was obtained at 100°C weighed **5.40g** and that obtained at 120°C weighed **4.85g**. *Calculate* the stages of dehydration reached at 100°C and 120°C respectively.

Question 4

a(i) Distinguish *between* a strong acid and a concentrated acid

(ii) Give *two* methods of preparation for acids in the laboratory

(b) State these gas laws

(i) Boyle's law

(ii) Graham's law of diffusion

(c) If the volume of a given mass of gas at 25°C and a pressure $205.2 \times 10^3 \text{Nm}^{-2}$ is 2.12dm^3 , what is the volume at **s.t.p**?

(Standard pressure = $101.3 \times 10^3 \text{Nm}^{-2}$ and standard temperature = 273K)

(d)(i) State any *three* of the postulates of the kinetic theory of gases.

(ii) Mention *two* natural phenomena that support the kinetic theory of matter.

Question 5

a(i) What is a *salt*?

(ii) List *three* methods of preparing soluble salts

(iii) Give *two* methods for measuring pH of solutions

b(i) State the type of *salt* represented by each of the following compounds

(i) NaHSO_4

(ii) $\text{K}_3\text{Fe}(\text{CN})_6$

(iii) K_2SO_4

(iv) $(\text{NH}_4)_2\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$

(v) $\text{Mg}(\text{OH})\text{NO}_3$

(d) 80cm^3 of chlorine gas diffuses through a porous pot in *60 seconds*, while it takes *90 seconds* for the *same volume* of an unknown gas to diffuse through the same pot. *Calculate* the relative molecular mass of the unknown gas. (Cl = 35.5)