## AGA KHAN UNIVERSITY EXAMINATION BOARD

## SECONDARY SCHOOL CERTIFICATE

## CLASS IX

## MODEL EXAMINATION PAPER 2023 AND ONWARDS

### Chemistry Paper I

**Time: 1 hour 10 minutes    Marks: 40**

**INSTRUCTIONS**

1. Read each question carefully.

2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.

3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 40 only.

4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.
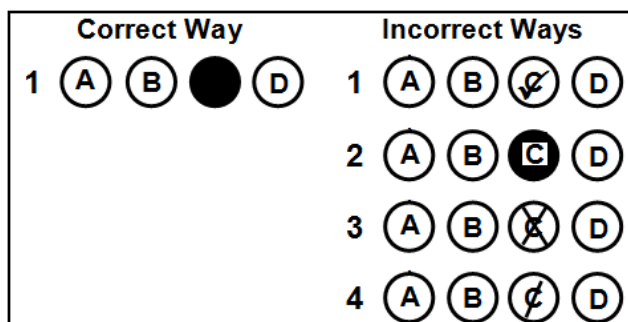


**Candidate's Signature**

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.

6. DO NOT write anything in the answer grid. The computer only records what is in the circles.

7. You may use a simple calculator if you wish.

1. The valency of iron (Fe) in $Fe(NO_3)_3$ is

   A.    0
   B.    + 1
   C.    + 2
   D.    + 3

2. $$\underline{w}\,NH_{3(g)} + \underline{x}\,O_{2(g)} \rightarrow \underline{y}\,NO_{(g)} + 6H_2O_{(g)}$$

   To balance the given chemical equation, the values of **w**, **x** and **y** would be

   |   | w | x | y |
   |---|---|---|---|
   | A | 2 | 5 | 2 |
   | B | 2 | 3 | 2 |
   | C | 4 | 5 | 4 |
   | D | 4 | 3 | 4 |

3. A compound **X** has an empirical formula $C_4H_9$ and its molecular mass is 114 g/mol.

   Based on the given information, the molecular formula of compound **X** will be

   (**Note**: $^{12}_{6}C$ and $^{1}_{1}H$)

   A.    $C_6H_{11}$
   B.    $C_7H_{12}$
   C.    $C_8H_{18}$
   D.    $C_{12}H_{27}$

4. A physiologist took a blood sample from a diabetic patient and examined the composition and amount of each component present in the sample using different techniques and instruments.

   His study is related to the field of

   A.    nuclear chemistry.
   B.    physical chemistry.
   C.    inorganic chemistry.
   D.    analytical chemistry.

5. $H_3C^{\bullet}$ is a free radical because it

   A.    is a stable unit.
   B.    carries a net charge.
   C.    possesses odd number of electrons.
   D.    forms in the absence of light energy.

6. What is the molarity of a solution containing 32 g of potassium sulphate ($K_2SO_4$) in 350 cm$^3$ of solution?

   (**Note**: Molar mass of $K_2SO_4$ = 174 g mol$^{-1}$)

   A. 0.06 M
   B. 0.09 M
   C. 0.52 M
   D. 64.37 M

7. The given diagram shows an area covered in fog.

   

   Fog is a solution of

   A. gas in liquid.
   B. liquid in gas.
   C. solid in liquid.
   D. liquid in liquid.

8. Which of the following differences between solution and suspension is INCORRECT?

   |   | Solution | Suspension |
   |---|---|---|
   | A | It passes through the filter paper. | It leaves residue on filtration. |
   | B | It forms homogeneous mixture. | It forms heterogeneous mixture. |
   | C | It does not show Tyndall effect. | It may show Tyndall effect. |
   | D | It appears translucent. | It appears transparent. |

9. Brass is an alloy which is made up of

   A. 90-95% tin and 5-10% copper.
   B. 90-95% copper and 5-10% tin.
   C. 60-80% zinc and 20-40% copper.
   D. 60-80% copper and 20-40% zinc.

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10. A teacher asks a student to dissolve 2.5 g of sodium carbonate in 50 g of water. What will be the concentration of the prepared solution?

    A. 0.048%
    B. 0.050%
    C. 4.762%
    D. 5.000%

11. Which of the following options shows the sub-atomic particles of a species having a +1 charge on it?

| | Number of Electrons | Number of Protons | Number of Neutrons |
|---|---|---|---|
| A | 18 | 20 | 20 |
| B | 18 | 19 | 20 |
| C | 10 | 9 | 10 |
| D | 10 | 8 | 8 |

12. Rutherford's atomic model explains all of the following statements EXCEPT that the

    A. volume occupied by the nucleus is very small.
    B. positively charged particles exist inside the nucleus.
    C. entire mass of the atom is concentrated in the nucleus.
    D. energy emitted by the electrons forms a line spectrum.

13. Goiter, a disease affecting thyroid glands, can be diagnosed by the use of

    A. cobalt-60.
    B. iodine-131.
    C. strontium-90.
    D. uranium-235.

14. The electronic configuration of potassium $\left(^{39}_{19}\text{K}\right)$ is

    A. $1s^2, 2s^2, 2p^6, 3s^2, 3p^5$
    B. $1s^2, 2s^2, 2p^6, 3s^2, 3p^6$
    C. $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1$
    D. $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2$

15. How many sub-shells are present in an L-shell?

    A. 1
    B. 2
    C. 3
    D. 4

16. Which of the following statements is FALSE regarding ionisation energy of elements?

    A. The first ionisation energy of lithium is less than that of beryllium.
    B. The second ionisation energy of magnesium is less than that of sodium.
    C. It is the amount of energy required to remove an electron from a gaseous atom or ion.
    D. It is the tendency of an atom or molecule to attract electrons of other atom or molecule to itself.

17. The CORRECT statement about groups in the periodic table is that

    A. both metals and non-metals are present in all groups.
    B. reactivity in non-metals increases when moving up a group.
    C. ionisation energy of elements increases when moving down a group.
    D. the total number of electrons for each element in a group is the same.

18. In the periodic table, an element with atomic number 14 is placed in period

    A. 1
    B. 2
    C. 3
    D. 4

19. The periodic trend that is observed in moving down group VIIA of the periodic table is

    A. decreasing reactivity.
    B. decreasing boiling point.
    C. increasing electronegativity.
    D. increasing ionisation energy.

20. "The properties of elements are periodic function of their atomic number."

    This law was stated by

    A. Moseley.
    B. Newland.
    C. Mendeleev.
    D. Dobereiner.

21. At constant temperature and pressure, which of the following gas molecules will diffuse the fastest through air?

    (**Note**: Atomic mass of O = 16 amu, Cl = 35.5 amu, N = 14 amu, C = 12 amu and H = 1 amu)

    A. $O_{2(g)}$
    B. $Cl_{2(g)}$
    C. $NO_{2(g)}$
    D. $CH_{4(g)}$

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22. At constant temperature, if the volume of a gas in a container is reduced to half, then the pressure on the gas will

   A. be doubled.
   B. reduce to half.
   C. remain the same.
   D. reduce to a quarter.

23. The substance that does NOT have a fixed volume and can be compressed is

   A. sugar.
   B. honey.
   C. kerosene oil.
   D. water vapour.

24. In the given diagrams, the rate of evaporation of water at room temperature, i.e., 25°C would be the greatest in



| A | B |
|---|---|
| C | D |
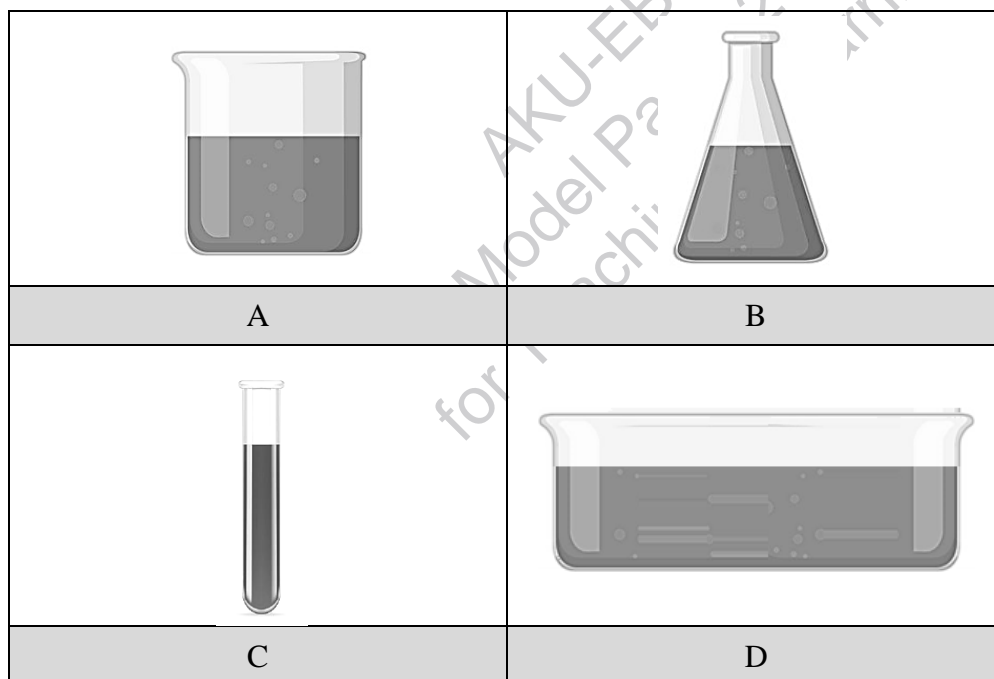
25. Ahmed plotted a graph representing Charles's Law. He placed temperature on *x*-axis and volume of one mole of an ideal gas on *y*-axis.

   At a constant pressure, Ahmed obtained a straight line which intersects the *x*-axis at

   A. − 273.16°C.
   B. − 273.16 K.
   C. 0°C.
   D. 300 K.
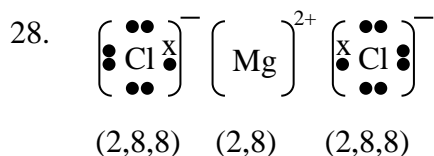
26. In a molecule of ethyne ($C_2H_2$), how many electron pairs are involved in the bonding between carbon-carbon atoms?

    A. 2
    B. 3
    C. 4
    D. 5

27. Read the given characteristics.

    • Usually dissolves in water
    • Carries partial charges on atoms
    • Uneven distribution of electrons

    Based on the given characteristics, an example of polar covalent molecule is

    A. $O_2$
    B. $Cl_2$
    C. $H_2S$
    D. NaCl

28. 

    (2,8,8)   (2,8)   (2,8,8)

    The given dot and cross structure exemplifies the formation of

    A. ionic bonds.
    B. metallic bonds.
    C. covalent bonds.
    D. coordinate covalent bonds.

29. Metals are good conductors of electricity due to the presence of

    A. freely moving electrons.
    B. number of positive charges on the ions.
    C. atoms in the form of rows one above the other.
    D. electrostatic forces of attraction between oppositely charged ions.

30. The elements that combine to form binary molecular compounds are

    A. non-metal and non-metal.
    B. metal and non-metal.
    C. metal and metalloid.
    D. metal and metal.

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31.  Which of the following CORRECTLY matches the redox reaction with its inference?

|  | **Redox Reaction** | **Inference** |
|---|---|---|
| A | $2HI_{(g)} + Cl_{2(g)} \rightarrow I_{2(g)} + 2HCl_{(g)}$ | Hydrogen iodide is reduced to iodine. |
| B | $Mg_{(s)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + H_{2(g)}$ | Magnesium is reduced to magnesium chloride. |
| C | $CuSO_{4(aq)} + Mg_{(s)} \rightarrow MgSO_{4(aq)} + Cu_{(s)}$ | Copper sulphate is reduced to copper. |
| D | $H_2S_{(g)} + Cl_{2(g)} \rightarrow S_{(s)} + 2HCl_{(g)}$ | Hydrogen sulphide is reduced to sulphur. |

32.  The gas(es) produced during the electrolysis of fused sodium chloride in Down's cell is/ are

I.   $Cl_{2(g)}$
II.  $O_{2(g)}$
III. $H_{2(g)}$

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

33.  An example of electrolyte is

A.   benzene.
B.   sulphuric acid.
C.   distilled water.
D.   carbon tetrachloride.

34.  $H_2S_{(g)} + Cl_{2(g)} \rightarrow S_{(s)} + 2HCl_{(g)}$

The oxidation state of chlorine in the given equation changes from

A.   $0 \text{ to} + 1$
B.   $0 \text{ to} - 1$
C.   $- 2 \text{ to } 0$
D.   $- 2 \text{ to} - 1$

35.  Glucose is a non-electrolyte because it

A.   is a polar molecule.
B.   is a covalent compound.
C.   breaks up into ions in water.
D.   dissolves completely in water.

36.  If a solid substance conducts electricity, then it must be a/ an

A.   metal.
B.   non-metal.
C.   ionic compound.
D.   covalent compound.

37. Barium belongs to group IIA while chlorine belongs to group VIIA of the modern periodic table.

    If barium reacts with chlorine, then their product is

    A. BaCl
    B. $BaCl_2$
    C. $Ba_2Cl$
    D. $Ba_2Cl_2$

38. Compared to a sodium metal, an iron metal

    A. is soft in appearance.
    B. has low melting point.
    C. is an alkaline earth metal.
    D. has stronger metallic bond.

39. Sodium metal is always found in nature in the form of oxides or halides because sodium

    A. is highly electropositive.
    B. is highly electronegative.
    C. has high electron affinity.
    D. has high ionisation energy.

40. The shape of non-metals CANNOT be changed by hammering because they are

    A. dense.
    B. brittle.
    C. ductile.
    D. malleable.

END OF PAPER

Chemistry Model Paper IX

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