AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

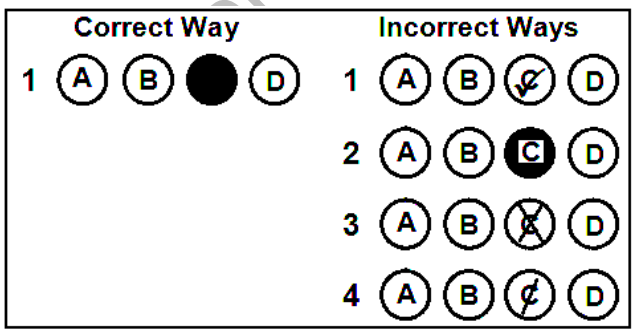
ANNUAL EXAMINATIONS (THEORY) 2024

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 branch of chemistry that deals with the study of producing valuable materials in significant quantities by manipulating the raw materials is

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

2. Which of the following examples represents a type of chemical reaction?

   A. Melting of ice cream
   B. Dissolution of sugar in water
   C. Vapourisation of ethyl alcohol
   D. Mixing of baking soda and vinegar

3. Which of the following options shows the CORRECT classification of substances in the given table?

	Element	**Mixture**	**Compound**
A	Brass	Carbon	Ammonium Chloride
B	Carbon	Ammonium Chloride	Brass
C	Ammonium Chloride	Brass	Carbon
D	Carbon	Brass	Ammonium Chloride

4. A compound **X** has an empirical formula C_3H_3O and its molecular mass is 110.

   Which of the following represents the molecular formula of compound **X**?

   A. CHO
   B. $C_3H_3O_3$
   C. C_6H_6O
   D. $C_6H_6O_2$

5. In humans and other animals, starch is broken down into its constituent sugar molecules through the process of

   A. synthesis.
   B. hydrolysis.
   C. displacement.
   D. condensation.

6. A gaseous solution is formed when

   A. copper combines with tin.
   B. ammonia dissolves in water.
   C. naphthalene ball sublimes in air.
   D. iron amalgamates with chromium.

7. A student is given 0.1 M stock solution of sodium carbonate (Na_2CO_3) to dilute it up to 0.01 M in 100 cm^3 measuring flask.

   If the volume of the stock solution is 500 cm^3, then the amount of sodium carbonate used in the stock solution would be

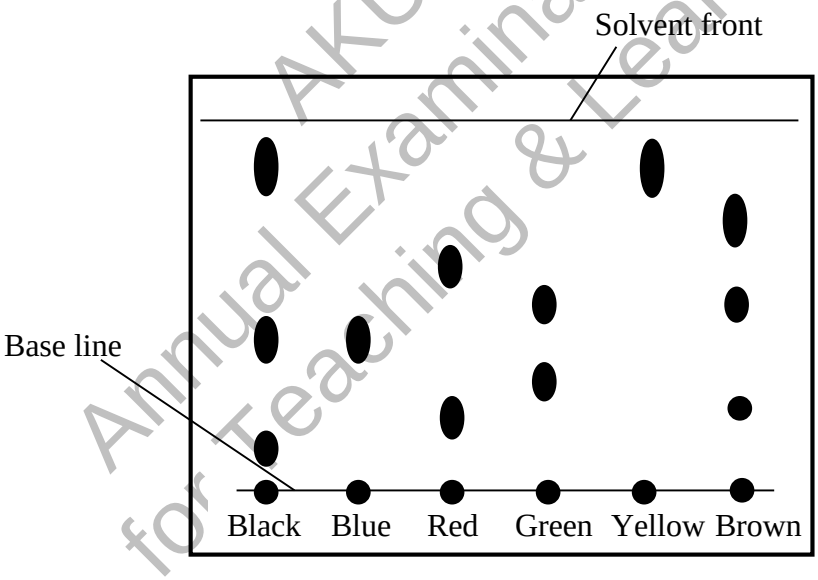
   (**Note**: $^{12}_{6}C$, $^{16}_{8}O$ and $^{23}_{11}Na$)

   A. 53 g.
   B. 10.6 g.
   C. 5.3 g.
   D. 0.106 g.

8. When a seed crystal is added to a supersaturated solution, it causes the

   A. solution to turn into a colloid.
   B. solution to become unsaturated.
   C. solute to solidify out of the solution.
   D. solute to dissolve completely in water.

9. The given diagram shows a chromatogram of several inks.



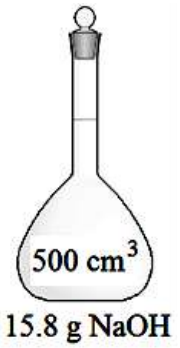
Chromatogram

   Based on the given chromatogram, it can be inferred that

   A. red and blue inks are present in brown ink.
   B. yellow and blue inks are present in black ink.
   C. black is a mixture of blue, red and green inks.
   D. brown is a mixture of red, green and black inks.

10. The molarity of the given sodium hydroxide solution will be

(**Note**: Atomic mass of Na = 23 amu, O = 16 amu, H = 1 amu)



A. 0.03 M.
B. 0.19 M.
C. 0.79 M.
D. 1.26 M.

11. A metal compound has the formula $\mathbf{X}Cl_2$ and a relative formula mass of 95.211.

The relative atomic mass of **X** is

(**Note**: $^{35.5}_{17}Cl$)

A. 24.211
B. 59.711
C. 61.211
D. 78.211

12. How many protons are present in an ion with atomic number 8, mass number 16 and a 2– charge?

A. 06
B. 08
C. 14
D. 16

13. Each p sub-shell can hold a maximum number of

A. 2 electrons.
B. 3 electrons.
C. 6 electrons.
D. 8 electrons.

14. Uranium has two isotopes, ^{235}U and ^{238}U. ^{238}U differs from ^{235}U by having 3 more

A. protons.
B. neutrons.
C. protons and electrons.
D. neutrons and electrons.

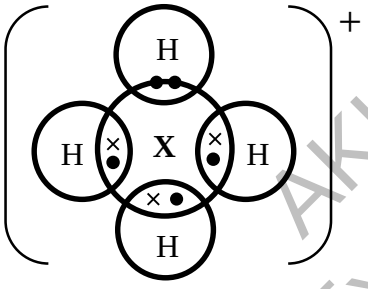
15. In Rutherford's experiment, when α-particles are passed through a thin metal foil, most of them go straight through the foil because of the

    A. repulsion of protons.
    B. empty spaces in an atom.
    C. high speed of α-particles.
    D. negative charge of electrons.

16. Neon and argon are classified as noble gases because they have

    A. coloured vapours.
    B. same atomic number.
    C. non-metallic character.
    D. full outer electron shell.

17. Consider the given dot and cross diagram representing the valence shell electrons of the bonded elements.



    Which group of the modern periodic table does the element **X** belong to?

    A. IA
    B. IIIA
    C. VA
    D. VIA

18. Given is the electronic configuration of an element.

    $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}$

    Which block of the periodic table does the element belong to?

    A. s
    B. p
    C. d
    D. f

19. Which of the TWO given elements belong to the same group of the modern periodic table?

I	Phosphorus (2, 8, 5)	II	Silicon (2, 8, 4)
III	Nitrogen (2, 5)	IV	Oxygen (2, 6)

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

20. Metallic character of elements depends on their ability to

A. form anions.
B. show low density.
C. lose valence electrons.
D. attract shared electrons.

21. A substance **X** has the following characteristics.

I. Indefinite shape and volume
II. Can easily be compressed

The substance **X** could be identified as

A. steam.
B. coffee.
C. mercury.
D. table salt.

22. Some of the gases with their relative molecular masses are given in the table below.

I	Helium	4
II	Ethene	28
III	Methane	16
IV	Chlorine	71
V	Oxygen	32

Which option shows the CORRECT sequence of gases according to their rates of diffusion, i.e., from fastest to slowest?

A. I, III, II, V, IV
B. II, III, IV, V, I
C. III, V, I, II, IV
D. IV, V, II, III, I

23. When rubbing alcohol is applied on a cut, it feels cold on the skin because of the process of

A. condensation.
B. sublimation.
C. evaporation.
D. freezing.

24. When few drops of ink are added in water, they slowly start to disperse. This spreading of molecules can be enhanced by increasing temperature.

What will be the impact on the molecules when the temperature is increased?

A. Velocity of the molecules will increase.
B. Pressure on the molecules will decrease.
C. Intermolecular forces of attraction will increase.
D. Volume occupied by the molecules will decrease.

25. Plastic and rubber are the examples of amorphous solids because they

A. show a regular three-dimensional geometry.
B. exhibit the phenomenon of anisotropy.
C. melt over a wide range of temperature.
D. possess definite cleavage planes.

26. The ion of which of these elements will have the same number of electrons as an atom of neon ($^{20}_{10}$Ne)?

A. $^{7}_{3}$Li
B. $^{9}_{4}$Be
C. $^{24}_{12}$Mg
D. $^{39}_{19}$K

27. The given table shows the electronic structures of two different elements.

Element **X**	2, 8, 8, 2
Element **Y**	2, 8, 6

What will be the type and formula of the compound formed when elements **X** and **Y** react together?

	Type of Compound	**Formula**
A	Ionic Compound	XY
B	Ionic Compound	XY_2
C	Covalent Compound	X_2Y
D	Covalent Compound	X_2Y_2

28. Consider the given pairs of elements.

    I. Hydrogen and potassium
    II. Oxygen and potassium
    III. Hydrogen and carbon
    IV. Oxygen and carbon

    Which pairs of elements can form covalent bonds when they react with each other?

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

29. A polar covalent compound is formed, when one atom of

    A. sulphur combines with two atoms of oxygen.
    B. carbon combines with four atoms of chlorine.
    C. sulphur combines with three atoms of oxygen.
    D. carbon combines with four atoms of hydrogen.

30. Which of the following bonds is present between copper atoms that allows copper to conduct electricity?

    A. Ionic bond
    B. Metallic bond
    C. Covalent bond
    D. Co-ordinate covalent bond

31. Reduction is defined as a chemical process which involves

    A. loss of electrons.
    B. addition of oxygen.
    C. removal of hydrogen.
    D. decrease in oxidation state.

32. The reaction between hydrogen and black copper(II) oxide is written as follows:

    $CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_2O_{(l)}$

    In this reaction, which substance is oxidised?

    A. $H_{2(g)}$
    B. $Cu_{(s)}$
    C. $H_2O_{(l)}$
    D. $CuO_{(s)}$

33. The oxidation state of chlorine in ClO_3^- is

A. +1
B. +3
C. +5
D. +7

34. A voltaic (galvanic) cell is an electrochemical cell which

A. converts electrical energy into chemical energy.
B. generates electricity through spontaneous redox reaction.
C. comprises of two electrodes made up of the same inert metal.
D. consists of a positively charged anode and a negatively charged cathode.

35. Galvanising is one of the methods to prevent iron from rusting. This method involves coating of iron with a protective layer of

A. tin.
B. zinc.
C. aluminium.
D. magnesium.

36. A metallic anchor is used to prevent ships from drifting due to wind or ocean current.

Anchors are often made up of iron because it

A. is sonorous.
B. is unreactive.
C. has high density.
D. has low melting point.

37. All of the following metals exist in combined state in nature EXCEPT

A. magnesium.
B. aluminium.
C. platinum.
D. sodium.

38. A carbonate of metal **X** has the following characteristics.

- White, odourless powder
- Insoluble in water
- Decomposes into lime and carbon dioxide

The metal **X** can be identified as

A. sodium.
B. calcium.
C. platinum.
D. magnesium.

39. An element **X** exists as a diatomic gas at room temperature. Each atom of element **X** requires one electron to form a stable $\mathbf{X^{-1}}$ ion.

    Based on the given information, the element **X** is a/ an

    A. alkaline earth metal.
    B. alkali metal.
    C. inert metal.
    D. non-metal.

40. Halogens react with hydrogen gas to produce hydrogen halides that are water soluble gases.

    When dissolved in water, all of these gases produce strong acids EXCEPT

    A. hydrogen bromide.
    B. hydrogen chloride.
    C. hydrogen fluoride.
    D. hydrogen iodide.

END OF PAPER

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