AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

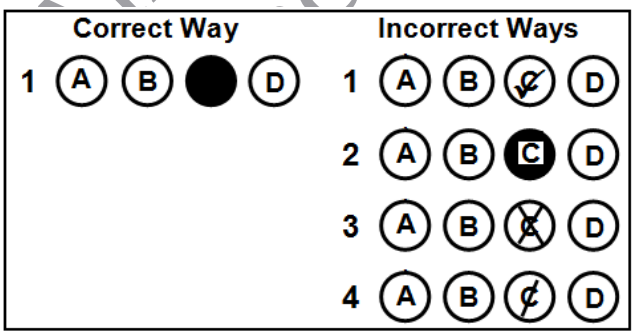
ANNUAL EXAMINATIONS (THEORY) 2023

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 investigation of chemical changes in diseases, drug action and nutrition is carried out by a/ an

   A. biochemist.
   B. physical chemist.
   C. industrial chemist.
   D. inorganic chemist.

2. In $Ca_3(PO_4)_2$, the valencies of calcium and phosphate ions respectively are

	Valency of	
	Calcium Ion	**Phosphate Ion**
A	3	2
B	3	4
C	2	3
D	2	4

3. The mass of 2.5 moles of H_2O is

   (**Note**: ${}^{16}_{8}O$ and ${}^{1}_{1}H$)

   A. 45.0 g.
   B. 42.5 g.
   C. 20.5 g.
   D. 18.0 g.

4. The number of molecules in 2.1 moles of carbon dioxide is

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

   A. 2.87×10^{22}
   B. 2.87×10^{23}
   C. 1.26×10^{24}
   D. 1.26×10^{25}

5. A phenomenon that ALWAYS occurs in a chemical reaction is that it

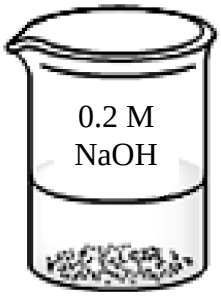
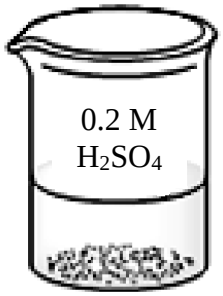
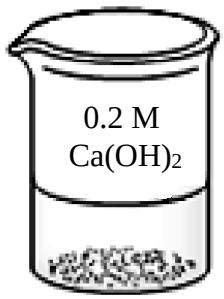
   A. liberates a gas.
   B. produces precipitates.
   C. forms a new substance.
   D. shows a change in colour.

6. Nichrome is prepared by combining

   A. nickel and copper.
   B. iron and chromium.
   C. iron, nickel and copper.
   D. iron, nickel and chromium.

7. Which of the following is a diluted solution?

(**Note**: Molar mass of HNO_3 = 63 g/ mol, NaOH = 40 g/ mol, H_2SO_4 = 98 g/ mol, $Ca(OH)_2$ = 74 g/ mol)

			
A	B	C	D

8. The concentration of a solution containing 53 g of Na_2CO_3 in 1 dm^3 is

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

A. 0.5 M.
B. 0.96 M.
C. 1.03 M.
D. 2 M.

9. The technique that CANNOT separate the components of a homogeneous mixture is

A. filtration.
B. distillation.
C. crystallisation.
D. chromatography.

10. A true solution is a homogeneous mixture of two or more substances.

Based on this information, which of the following is an example of a true solution?

A. Fog
B. Blood
C. Sugar syrup
D. Whipped cream

11. The loss or gain of a particle that does NOT affect the mass of an atom is a/ an

A. proton.
B. neutron.
C. electron.
D. alpha particle.

12. An ion $\mathbf{Y}^{+}$ has 39 nucleons and 18 electrons.

The number of protons and neutrons that the nucleus of this ion contains is

	Number of Protons	Number of Neutrons
A	20	19
B	19	20
C	21	18
D	18	21

13. How many nucleons are present in an isotope of carbon ($^{13}_{6}C$)?

A. 13
B. 12
C. 7
D. 6

14. The limitation of Rutherford atomic model is that the

A. mass and charge of an atom is concentrated in the nucleus.
B. positively charged nucleus resides in the centre of the atom.
C. electrons revolve around the nucleus at a high speed in fixed orbits.
D. revolving electrons continuously loose energy and fall on the nucleus.

15. The electronic configuration of aluminium ion in aluminium oxide, Al_2O_3, is

(**Note**: $^{27}_{13}Al$)

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

16. The STRONGEST oxidising ability among halogens is possessed by

A. fluorine.
B. chlorine.
C. bromine.
D. iodine.

17. The general electronic configuration of ns^2np^3 indicates that the element belongs to

A. period 3.
B. period 5.
C. group VA.
D. group IIIA.

18. Consider the given characteristics of a group of elements.

- Soft
- Low melting point
- Highly electropositive

Based on these characteristics, the group of elements is identified as

A. halogens.
B. alkali metals.
C. carbon family.
D. oxygen family.

19. The number of shells in the atomic structure of an element represents

A. its ionisation potential.
B. the group it belongs to.
C. the period it belongs to.
D. its electrical conductivity.

20. The term, 'electronegativity' is described as the ability of an atom to

A. act as an oxidising agent.
B. accept an electron from another atom.
C. attract shared paired of electrons to itself.
D. absorb maximum energy to lose an electron.

21. Water vapours have a lower density than ice because in water vapours the particles have

A. orderly arrangement.
B. vibrational movement.
C. very low kinetic energy.
D. very weak attractive forces.

22. In a closed system, a change in kinetic energy of particles causes the substance to change its

A. state.
B. mass.
C. volume.
D. boiling point.

23. During extremely cold weather when the temperature is −20°C, a room's temperature is maintained at +20°C with 60% internal humidity.

Under the given conditions, the formation of water drops and ice on the interior of window of the room is the result of

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

24. The term, ‘allotrope’ describes the difference in elements based on their

A. structural forms.
B. number of H^+ ions.
C. number of neutrons.
D. phases (solid, liquid or gas).

25. In industries, graphite is used as a/ an

A. electrode.
B. ornament.
C. electrolyte.
D. cutting tool.

26. The compound that possesses ionic bond between its atoms is

A. CS_2
B. CCl_4
C. HCN
D. MgF_2

27. Chlorine belongs to group VIIA and beryllium belongs to group IIA of the modern periodic table.

In a reaction between chlorine and beryllium, each atom of chlorine

A. gives an electron to an atom of beryllium.
B. shares an electron with an atom of beryllium.
C. accepts an electron from an atom of beryllium.
D. shares an electron pair with an atom of beryllium.

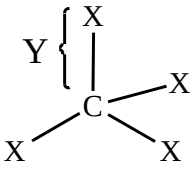
28. Hydrogen can form an ionic compound with

A. carbon.
B. sodium.
C. fluorine.
D. nitrogen

29. HCl is a polar covalent compound showing all of the following properties EXCEPT that it

A. is soluble in water.
B. ionises completely in aqueous medium.
C. has partial positive and negative charges.
D. shows electronegativity difference as zero.

30. In the given structure, the four species **X** are connected to carbon by **Y** bonds.



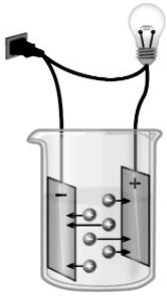
The species **X** and **Y** bonds are identified as

	Species X	**Y Bonds**
A	atoms	weak
B	atoms	strong
C	ions	weak
D	ions	strong

31. The oxidation state of chromium in CrO_3 is

A. –6
B. –3
C. +3
D. +6

32. Samra uses the following setup to test the conductivity of an electrolyte.



The illustration shows high conductivity of the electrolyte. This indicates that the substance she must have used is

A. petrol.
B. glucose.
C. lithium fluoride.
D. carbon tetrachloride.

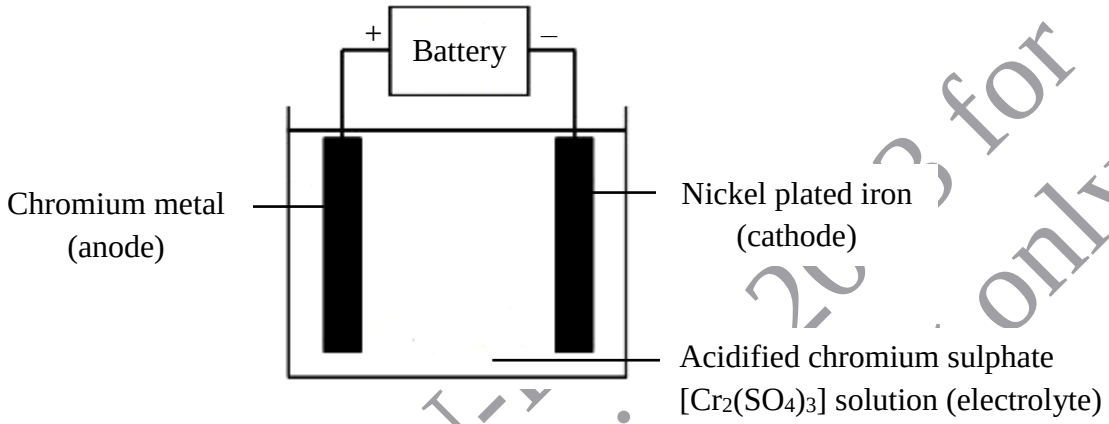
33. Metal electrodes are good conductors of electricity because they

A. contain partial charges.
B. are highly electronegative.
C. are connected to the battery.
D. contain delocalised electrons.

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. The following diagram shows an electrolytic cell used for electroplating iron with chromium.



The chemical reaction that takes place at cathode is

A. $Cr_{(s)} \rightarrow Cr^{2+}_{(aq)} + 2e^-$
B. $Cr^{2+}_{(aq)} + 2e^- \rightarrow Cr_{(s)}$
C. $Cr_{(s)} \rightarrow Cr^{3+}_{(aq)} + 3e^-$
D. $Cr^{3+}_{(aq)} + 3e^- \rightarrow Cr_{(s)}$

36. For an experiment, Asad used a metal oxide, which can act as either an acid or a base to produce salt and water.

The metal oxide used by him is

A. SiO_2
B. CaO
C. Li_2O
D. Al_2O_3

37. Amongst the given group I elements, the first ionisation energy would be the HIGHEST for

A. lithium.
B. sodium.
C. rubidium.
D. potassium.

38. In contrast to sodium, iron is a hard metal because it

A. requires greater energy to break.
B. has weaker metallic bonding.
C. belongs to group IIA.
D. is highly reactive.

39. Consider the given characteristics.

- Solid
- Brittle
- Non-lustrous

The element described by these characteristics is

A. carbon.
B. copper.
C. oxygen.
D. aluminium.

40. The elements of group IIA are known as

A. noble metals.
B. alkali metals.
C. transition metals.
D. alkaline earth metals.

END OF PAPER

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