

**AGA KHAN UNIVERSITY EXAMINATION BOARD**

**SECONDARY SCHOOL CERTIFICATE**

**CLASS X**

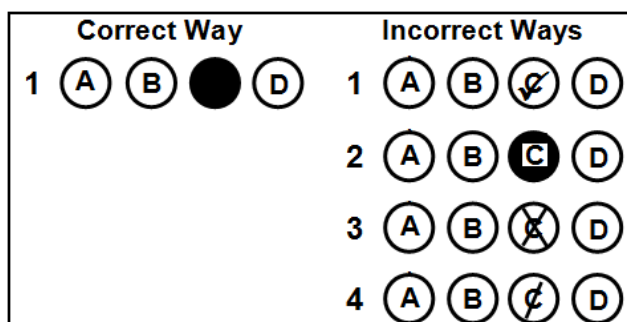
**MODEL EXAMINATION PAPER 2023 AND ONWARDS**

**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.

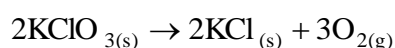
- In an endothermic reversible reaction, an increase in temperature will
  - stop the reaction from proceeding further.
  - shift the equilibrium in the reverse direction.
  - shift the equilibrium in the forward direction.
  - equalise the rate of forward and reverse reactions.
- The condition that is NOT required for equilibrium is a/ an
  - closed system.
  - constant temperature.
  - equal amounts of reactants and products.
  - equal rates of both forward and backward reactions.
- Which of the given reactions will have the unit of  $K_c$  as  $\text{mol}^{-1}\text{dm}^3$ ?
  - $\text{SO}_3(\text{g}) + \text{NO}(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \text{NO}_2(\text{g})$
  - $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$
  - $2\text{SO}_3(\text{g}) \rightleftharpoons 2\text{SO}_2(\text{g}) + \text{O}_2(\text{g})$
  - $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$
- In a closed container at 900 K,  $6.0 \times 10^{-3}$  M of  $\text{CH}_4$  reacts with  $4.0 \times 10^{-3}$  M of  $\text{H}_2\text{O}$  to produce  $8.0 \times 10^{-3}$  M of  $\text{CO}$  and  $3.0 \times 10^{-3}$  M of  $\text{H}_2$ . The equation for the reaction is as under.



Which of the following combinations is CORRECT as the system proceeds towards equilibrium?

	Relationship of $Q_c$ to $K_c$	Direction of Net Reaction
A	$Q_c > K_c$	Forward
B	$Q_c < K_c$	Forward
C	$Q_c > K_c$	Backward
D	$Q_c < K_c$	Backward

- Which of the following options is CORRECT about the given endothermic reaction?

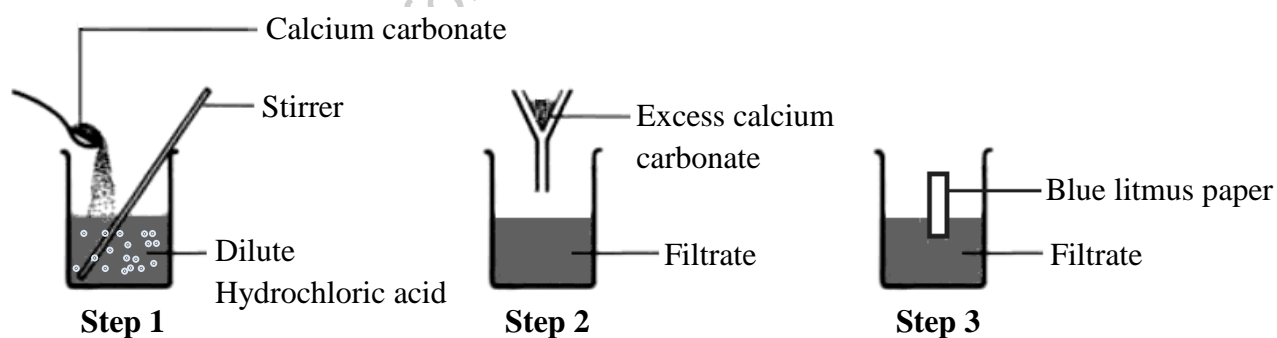


	Temperature of the system	Reaction
A	Increases	Takes in energy
B	Decreases	Takes in energy
C	Increases	Gives out energy
D	Decreases	Gives out energy

6. What happens when the following two soluble salts are mixed?



- A. Two soluble salts are produced.  
 B. Two insoluble salts are produced.  
 C. One insoluble salt, water and a gas are produced.  
 D. One soluble salt and one insoluble salt are produced.
7. The given chemical reaction exemplifies
- $$\text{Ca}(\text{OH})_{2(\text{aq})} \xrightleftharpoons{\text{Water}} \text{Ca}_{(\text{aq})}^{2+} + 2\text{OH}_{(\text{aq})}^{-}$$
- A. Lewis concept.  
 B. Arrhenius concept.  
 C. Faraday's concept.  
 D. Bronsted-Lowry concept.
8. If the hydroxyl ion concentration of a solution is  $1 \times 10^{-12}$ , then the nature of the solution would be
- A. highly basic.  
 B. highly acidic.  
 C. slightly basic.  
 D. slightly acidic.
9. A student performs a reaction in three steps as follows and carefully records his observations.

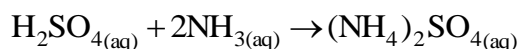


Which of the following results will be observed in step 1 and 3?

	Step 1	Step 3
A	Chlorine bubbles off	No change
B	Chlorine bubbles off	Litmus paper turns red
C	Carbon dioxide bubbles off	No change
D	Carbon dioxide bubbles off	Litmus paper turns red

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10. 10 cm<sup>3</sup> of ammonia solution was neutralised by 12 cm<sup>3</sup> of 2 M sulphuric acid. The reaction is shown below.



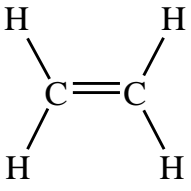
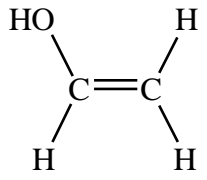

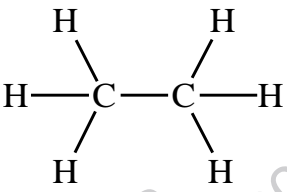
Which of the following will be the concentration of the ammonia solution?

- A. 1.2 M  
B. 2.4 M  
C. 2.8 M  
D. 4.8 M
11.  $\text{H}_2\text{C} = \text{CH} - \text{CH} = \text{CH} - \text{CH}_3$

The IUPAC (International Union of Pure and Applied Chemistry) name of the given organic compound is

- A. 1,3-pentene.  
B. 2,4-pentene.  
C. 1,3-pentadiene.  
D. 2,4-pentadiene.
12. Under normal conditions, alkanes do not react with strong oxidising agents such as potassium permanganate (KMnO<sub>4</sub>). This is because of all of the following reasons EXCEPT that alkanes
- A. have non-polar bonds.  
B. give substitution reactions.  
C. are saturated hydrocarbons.  
D. are soluble in polar solvents.
13. C<sub>2</sub>H<sub>5</sub>OH can be converted into C<sub>2</sub>H<sub>4</sub> by the process of
- A. reduction.  
B. dehydration.  
C. neutralisation.  
D. polymerisation.
14. The complete combustion of methane in the presence of two moles of oxygen gas releases
- A. 2 moles of water, 1 mole of carbon and heat.  
B. 2 moles of hydrogen gas, 1 mole of carbon and heat.  
C. 2 moles of water, 1 mole of carbon dioxide and heat.  
D. 2 moles of hydrogen gas, 1 mole of carbon dioxide and heat.

15. A substitution reaction takes place when bromine reacts with

	
A	B
	
C	D

16. Alkanes, alkenes and alkynes are classified as organic compounds. This is because they all

- are hydrocarbons.
- are saturated molecules.
- have high melting points.
- have high rate of reaction.

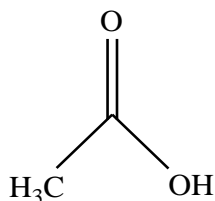
17. Nonane is an alkane containing nine carbon atoms per molecule.

The molecular formula of nonane is

- $C_9H_{16}$
  - $C_9H_{18}$
  - $C_9H_{20}$
  - $C_9H_{22}$
18. A compound that contains ester functional group is
- $CH_3CH_2CHO$
  - $CH_3CH_2COOH$
  - $CH_3COCH_2CH_3$
  - $CH_3COOCH_2CH_3$
19. If  $CH_3COCH_3$  is compared with  $CH_3OCH_2CH_3$ , it would be concluded that they both
- have same molecular formula.
  - are chain isomers of each other.
  - have different functional groups.
  - belong to the same homologous series.

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20. The functional group present in the given molecule of vinegar is the



- A. ketone.  
 B. alcohol.  
 C. aldehyde.  
 D. carboxylic acid.
21. Compared to ribonucleic acid (RNA), a molecule of deoxyribonucleic acid (DNA) is
- I. single stranded  
 II. self-replicating  
 III. located in mitochondria
- A. I only.  
 B. I and II.  
 C. III only.  
 D. II and III.
22. Maltose is a disaccharide in which two molecules of glucose join together by a/an
- A. ester linkage.  
 B. peptide bond.  
 C. glycosidic linkage.  
 D. phosphodiester bond.
23. Examples of micro-minerals are
- A. iron and zinc.  
 B. sodium and iodine.  
 C. potassium and sulphur.  
 D. calcium and phosphorus.
24. The hydrogenation of vegetable oils in the presence of nickel as a catalyst at 60°C results in the formation of a compound **X** having **Y** bonds.

Which of these represents **X** and **Y**?

	<b>X</b>	<b>Y</b>
A	Saturated fats	Single bonds
B	Unsaturated fats	Single bonds
C	Saturated fats	Double bonds
D	Unsaturated fats	Double bonds

25. Amylase enzyme is used in making bread as they facilitate the breakdown of
- starch.
  - lactose.
  - maltose.
  - cellulose.
26. Permanent hardness in water is due to the presence of chlorides and sulphates of
- sodium.
  - potassium.
  - aluminium.
  - magnesium.
27. When hard water is passed through a column of an ion exchange resin, the resin absorbs
- sodium ions.
  - calcium ions.
  - chloride ions.
  - sulphate ions.
28. Jaundice is caused due to an increase in the amount of
- iron in the blood.
  - red cells in the blood.
  - uric acid in the blood.
  - bile pigments in the blood.
29. Which of the following compounds of calcium precipitates out when hard water is treated with slaked lime?
- Sulphates
  - Chlorides
  - Carbonates
  - Bicarbonates
30. When calcium carbide ( $\text{CaC}_2$ ) reacts with water ( $\text{H}_2\text{O}$ ), it forms
- calcium oxide and ethyne.
  - calcium oxide and methane.
  - calcium hydroxide and ethyne.
  - calcium hydroxide and methane.
31. It is advised to switch off gas heaters before going to sleep.
- This is because the combustion of natural gas in a poorly ventilated room produces
- carbon dioxide.
  - sulphur dioxide.
  - nitrogen dioxide.
  - carbon monoxide.

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32. Presence of pollutants in air has an adverse effect on the environment.

In order to control air pollution, a country's government should ensure that its citizens AVOID the

- A. use of private vehicles.
  - B. plantation of more trees.
  - C. use of non-combustible sources of energy.
  - D. setting up of industries away from residential areas.
33. When decomposers feed on dead organic matter, they return carbon to air as carbon dioxide.

This information shows an interaction between

- A. lithosphere and biosphere.
  - B. biosphere and atmosphere.
  - C. atmosphere and lithosphere.
  - D. hydrosphere and lithosphere.
34. Which of the following is an adverse effect of acid rain?

- A. Greenhouse effect
- B. Melting of glaciers
- C. Depletion of ozone
- D. Death of aquatic life

35. In the soil, acid rain causes an increase in

- I. pH value
- II. toxic metals
- III. the number of microorganisms

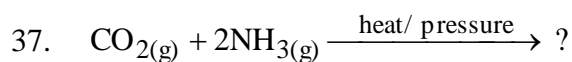
- A. I only.
- B. II only.
- C. I and III.
- D. II and III.

36. In the Haber process, nitrogen and hydrogen are combined to form ammonia.

Which of the following is TRUE for this process?

	<b>Combination Ratio of Nitrogen : Hydrogen</b>	<b>Overall Energy Change</b>
A	1 : 3	Exothermic
B	2 : 3	Endothermic
C	3 : 1	Endothermic
D	3 : 2	Exothermic





The product(s) of the given reaction is/ are

- A.  $\text{NH}_4\text{HCO}_{3(s)}$
  - B.  $(\text{NH}_4)_2\text{CO}_{3(s)}$
  - C.  $\text{NH}_2\text{COOH}_{(s)} + \text{H}_{2(g)}$
  - D.  $(\text{NH}_2)_2\text{CO}_{(s)} + \text{H}_2\text{O}_{(g)}$
38. During the extraction of copper, impurities float in the form of slag over the molten mixture of copper compounds.
- The slag obtained in this extraction is
- A. FeS
  - B. FeO
  - C.  $\text{FeSiO}_3$
  - D.  $\text{CuFeS}_2$
39. Which of the following chemicals are used in the recovery of ammonia in Solvay's process?
- A. Sodium carbonate + Ammonium chloride
  - B. Ammonium chloride + Calcium hydroxide
  - C. Sodium chloride + Ammonium bicarbonate
  - D. Ammonium chloride + Calcium carbonate
40. During the extraction of copper, the process of roasting involves the conversion of
- A. oxides into silicates.
  - B. oxides into sulphates.
  - C. sulphides into oxides.
  - D. carbonates into oxides.

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