

AGA KHAN UNIVERSITY EXAMINATION BOARD
SECONDARY SCHOOL CERTIFICATE
CLASS X
ANNUAL EXAMINATIONS 2022

Chemistry

Total Time: 1 hour 40 minutes

Total Marks: 50 (40-Theory & 10-Alternate to Practical)

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 50 only.
4. Question Distribution:

Theory	Alternate to Practical (ATP)
40 MCQs	10 MCQs

5. 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.

Correct Way	Incorrect Ways
1 (A) (B) (C) (D)	1 (A) (B) (C) (D)
	2 (A) (B) (C) (D)
	3 (A) (B) (C) (D)
	4 (A) (B) (C) (D)

Candidate's Signature

6. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
7. DO NOT write anything in the answer grid. The computer only records what is in the circles.
8. The marks obtained on the 40 MCQs will be equated to the total marks of 65 for the theory examination results.
9. You may use a simple calculator if you wish.

THEORY (Questions 1-40)

- The substance that is classified as a Lewis acid is
 - NH_3
 - AlCl_3
 - Al(OH)_3
 - NH_4OH
- Lemons, oranges and grapefruits have a sour taste due to the presence of
 - citric acid.
 - malic acid.
 - acetic acid.
 - tartaric acid.
- All of the following acids can form acidic salts EXCEPT for
 - acetic acid.
 - sulphuric acid.
 - phosphoric acid.
 - hydrochloric acid.
- The option that shows the INCORRECT categorisation of properties of acids and bases is

	Acid	Base
A	gives hydrogen ion in aqueous solution	gives hydroxyl ion in aqueous solution
B	burns the skin when touched	slippery to touch
C	turns red litmus blue	turns blue litmus red
D	tastes sour	tastes bitter

- Acid + **X** → **Y** + By-product

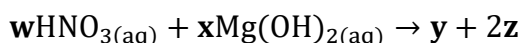
In the given equation, **X**, **Y** and the by-product are identified as

	X	Y + By-product
A	metal	salt + carbon dioxide + water
B	active metal	salt + hydrogen gas
C	metal hydroxide	salt + carbon dioxide + water
D	metal carbonate	salt + hydrogen gas

6. For decorative purposes, the surface of different glasswares is etched to create different designs.

This process is a result of the corrosive action of a/ an

- A. acid.
 - B. base.
 - C. reducing agent.
 - D. bleaching agent.
7. Consider the given neutralisation reaction.



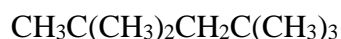
The CORRECT interpretation of **w**, **x**, **y** and **z** in the given equation is

	w	x	y	z
A	1	2	H ₂ O	Mg(NO ₃) ₂
B	1	1	H ₂ O	MgNO ₃
C	2	1	Mg(NO ₃) ₂	H ₂ O
D	2	2	MgNO ₃	H ₂ O

8. With reference to types of salt, Pb(OH)CH₃COO is classified as a/ an

- A. basic salt.
 - B. acidic salt.
 - C. double salt.
 - D. normal salt.
9. Non-polar organic compounds exhibit
- A. high boiling points.
 - B. high melting points.
 - C. weak ionic bonding.
 - D. weak intermolecular forces.
10. The process that does NOT utilise organic compounds is the
- A. synthesis of plastic bottles.
 - B. making of soaps and detergents.
 - C. extraction of a perfume from flowers.
 - D. conversion of hard water into soft water.

11. In the given organic compound, the BASIC hydrocarbon chain is of



- A. pentane.
 - B. hexane.
 - C. octane.
 - D. nonane.
12. If a substituent is added in a straight chain propane, then the resultant would be
- A. propyl.
 - B. propyne.
 - C. propanal.
 - D. propanone.
13. The general formula for the homologous series of alkanes is
- A. $\text{C}_n\text{H}_{2n-2}$
 - B. $\text{C}_n\text{H}_{2n+2}$
 - C. $\text{C}_{2n}\text{H}_{2n-2}$
 - D. $\text{C}_{2n}\text{H}_{2n+2}$
14. In a homologous series, all members contain the same
- A. general formula.
 - B. molecular formula.
 - C. number of carbon atoms.
 - D. number of hydrogen atoms.
15. The functional group in methylamine is
- A. $-\text{CN}$
 - B. $-\text{NH}_2$
 - C. $-\text{NO}_2$
 - D. $-\text{CONH}_2$
16. Dextrose is given intravenously to patients with
- A. high fever.
 - B. low blood sugar.
 - C. low calcium level.
 - D. high blood pressure.
17. In addition to carbon, hydrogen and oxygen, a protein molecule may also contain
- A. sulphur and calcium.
 - B. nitrogen and sulphur.
 - C. calcium and chlorine.
 - D. chlorine and nitrogen.

18. A set of reactions that is involved in the formation and breakdown of peptide linkage in proteins is

	Formation of Peptide Linkage	Breakdown of Peptide Linkage
A	addition	hydrolysis
B	addition	oxidation
C	condensation	hydrolysis
D	condensation	oxidation

19. The enzyme that catalyses the hydrolysis of glycosidic linkages in starch is

- A. lipase.
- B. lactase.
- C. amylase.
- D. protease.

20. Yeast is added in dough-making because it contains enzymes that act on simple sugars.

With reference to the given statement, the enzymes in yeast convert simple sugars to

- A. starch and oxygen.
- B. ethanol and oxygen.
- C. starch and carbon dioxide.
- D. ethanol and carbon dioxide.

21. Lipase enzyme is used in detergents to catalyse the breakdown of

- A. oil stains.
- B. protein stains.
- C. starch based stains.
- D. cellulose based stains.

22. The process of hydrogenation of vegetable oil helps to increase the

- I. cost
- II. stability
- III. resistance to oxidation
- IV. number of double bonds

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

23. The structure of deoxyribonucleic acid does NOT consist of
- an inorganic phosphate group.
 - thymine as one of the nitrogenous bases.
 - six carbon sugars as the backbone of each chain.
 - a double helix with two strands coiled around each other.
24. The set of environmental spheres that are affected by human activities mentioned in the given table is

	Dumping of Waste in Oceans	Overfishing and Habitat Destruction
A	atmosphere	lithosphere
B	biosphere	atmosphere
C	lithosphere	hydrosphere
D	hydrosphere	biosphere

25. Which of the following oxides is produced by electrical discharge of lightning during a thunderstorm?
- Nitric oxide
 - Carbon dioxide
 - Sulphur dioxide
 - Carbon monoxide
26. Catalytic convertors are used in automobile exhaust systems to convert
- carbon dioxide into carbonates.
 - oxides of nitrogen into ammonia
 - nitrogen gas into oxides of nitrogen
 - carbon monoxide into carbon dioxide.
27. It is advised not to sleep in a closed car with its engine running because this action causes a decrease in the level of
- oxygen.
 - blood sodium.
 - blood glucose.
 - carbon monoxide.
28. Highly acidic rain leaches a metal **X** from the soil. This metal reaches water bodies and causes destruction of the aquatic ecosystem.
- The metal **X** identified is
- sodium.
 - calcium.
 - potassium.
 - aluminium.

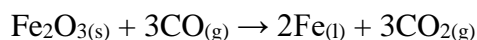
29. The set of conditions that causes global warming and increased amount of ultraviolet radiations to reach the Earth's surface respectively is

	Concentration of Carbon dioxide in Troposphere	Concentration of Ozone in Stratosphere
A	decreased	decreased
B	increased	decreased
C	decreased	increased
D	increased	increased

30. The property of water due to which it is considered as a universal solvent is its
- density.
 - polarity.
 - viscosity.
 - boiling point.
31. When passed through a column of an ion-exchange (zeolite) resin, hard water
- absorbs sodium ions.
 - absorbs calcium ions.
 - releases chloride ions.
 - releases sulphate ions.
32. At a sewage treatment plant, the step that occurs in digesters is that
- grit and sand settle out.
 - methane gas is produced.
 - pathogenic bacteria are killed.
 - smaller particles are coagulated.
33. During water purification at the waterworks, the step that occurs in the sedimentation tank is that the
- coarse filter traps larger particles of solid.
 - carbon is added to remove taste and smell from the water.
 - bacteria destroy harmful substances and produce methane gas.
 - smaller particles stick together and sink to the bottom of the tank.
34. When sodium hypochlorite (NaOCl) is added in swimming pool water, it releases an active sanitising agent that is
- chlorine dioxide (ClO₂).
 - sodium chloride (NaCl).
 - hydrochloric acid (HCl).
 - hypochlorous acid (HOCl).

35. Fluorosis is a water borne disease which shows the symptom of
- weakening of teeth.
 - loss of blood in stool.
 - inflammation of the liver.
 - loss of fluids from the body.
36. In the extraction of aluminium from its ore, all of the following gases are produced EXCEPT
- oxygen.
 - carbon dioxide.
 - sulphur dioxide.
 - carbon monoxide.

37. In a blast furnace, carbon in the form of carbon monoxide is used to react with iron(III) oxide. The reaction is as follows.



The purpose of using carbon monoxide in this reaction is to

- melt iron(III) oxide.
 - reduce iron(III) oxide.
 - decompose iron(III) oxide.
 - remove impurities from iron(III) oxide.
38. Which of the following changes are observed during the refining of copper in an electrolytic cell?

	At the Anode	At the Cathode	In the Electrolyte
A	Anode dissolves	Pure copper deposits	Blue colour fades
B	Pure copper deposits	Cathode dissolves	Blue colour fades
C	Anode dissolves	Pure copper deposits	No change in colour
D	Pure copper deposits	Cathode dissolves	No change in colour

39. Brine is one of the raw materials used in Solvay's process which is a
- decomposed calcium carbonate.
 - decomposed sodium bicarbonate.
 - concentrated aqueous solution of sodium chloride.
 - concentrated aqueous solution of calcium hydroxide.
40. Which of the following statements is TRUE about synthetic fertilisers?
- They add organic content to the soil.
 - They release the nutrients very rapidly.
 - They support microbiological life in the soil.
 - They are derived from plants and human waste.

ALTERNATE TO PRACTICAL (ATP: Questions 41-50)

41. The concentration of H^+ ions in a solution is 1.0×10^{-9} M.

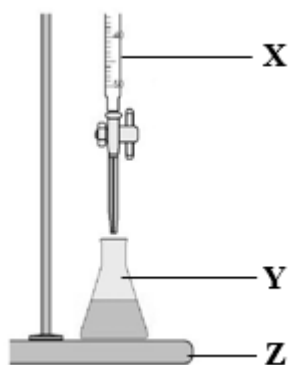
The pH of this solution and the concentration of hydroxide ions in the same solution would be

	pH	$[OH^-]$
A	9	1.0×10^{-9}
B	5	1.0×10^{-9}
C	9	1.0×10^{-5}
D	5	1.0×10^{-5}

42. Altamash is provided with four different gases in gas jars to test their nature with moist litmus paper. He tested each gas and found one to be neutral.

According to his observation, the neutral gas identified would be

- A. oxygen.
 B. ammonia.
 C. carbon dioxide.
 D. sulphur dioxide.
43. Consider the given experimental setup used for volumetric analysis.



The labelled equipment, X, Y and Z, in the given experimental setup are identified respectively as

	X	Y	Z
A	pipette	volumetric flask	tripod stand
B	burette	conical flask	tripod stand
C	pipette	volumetric flask	iron stand
D	burette	conical flask	iron stand

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44. A student determines the following data in a chemistry laboratory experiment.

Experiment	Observation	Inference
Salt + MnO ₂ + conc. H ₂ SO ₄ + heat	Greenish yellow gas which is pungent in smell	Chloride may be present

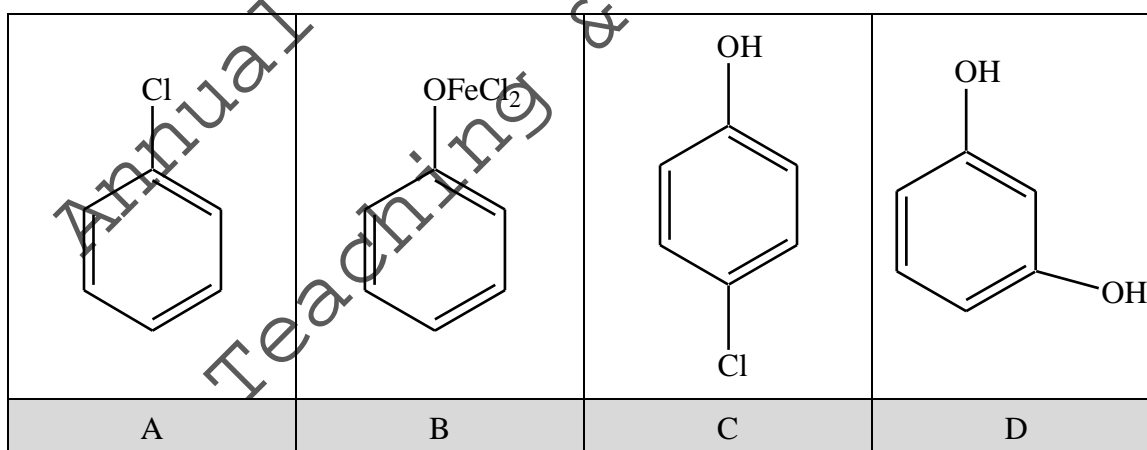
Based on this experiment, the test and result which would further confirm the presence of chloride ions in the salt is

	Test	Result
A	aqueous solution of salt + dilute HNO ₃ + AgNO ₃	white precipitates are formed
B	aqueous solution of salt + NH ₄ OH	white precipitates are formed
C	aqueous solution of salt + dilute HNO ₃ + AgNO ₃	yellow precipitates are formed
D	aqueous solution of salt + NH ₄ OH	yellow precipitates are formed

45. In flame tests, platinum wire is preferred over other metallic wires because it

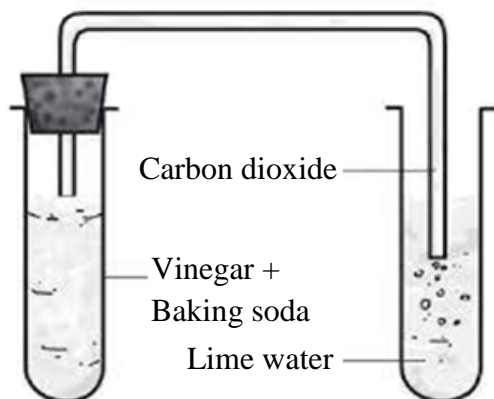
- A. is cheaper.
- B. imparts no colour.
- C. is easier to handle.
- D. takes longer to corrode.

46. When phenol reacts with freshly prepared ferric chloride solution, it gives purple colour. This colour is due to the formation of



Use the given diagram to answer Q.47 and Q.48.

The given diagram shows an experimental setup for the detection of a functional group.



47. Through this reaction, the functional group identified is
- ketone.
 - phenol.
 - aldehyde.
 - carboxylic acid.
48. In this reaction, the resultant carbon dioxide gas turns lime water milky. This milky appearance is due to the formation of a precipitate of
- calcium chloride.
 - calcium sulphate.
 - calcium carbonate.
 - calcium hydroxide.
49. Alishba has been provided with a sample of water containing calcium bicarbonate.

Which option CORRECTLY identifies the type of hardness in the given sample, and the compound that Alishba should add to the sample in order to remove it?

	Type of Hardness	Method to Remove Hardness
A	Permanent	Sodium carbonate
B	Temporary	Calcium hydroxide
C	Permanent	Calcium hydroxide
D	Temporary	Sodium carbonate

50. The burning of sugar is a chemical change for all of the following reasons EXCEPT that
- A. sugar melts showing a reversible reaction.
 - B. fire activates a reaction between sugar and oxygen.
 - C. a black residue is obtained that is different from sugar.
 - D. chemical bonds are broken in sugar to form new products.

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