SSC-II Chemistry: Chapter-wise MCQs

Federal Board (FBISE) | National Book Foundation textbook | 490 MCQs in 13 units plus Federal Board past papers. The correct option in every question is shown in bold.

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Unit 1: History of Chemistry

14 MCQs

1. The principle of conservation of mass states that mass
A. is converted into energy in every reaction
B. remains constant during a chemical reaction
C. is destroyed during a chemical reaction
D. is created during a chemical reaction

2. The principle of conservation of mass was first shown by
A. J.J. Thomson
B. Dmitri Mendeleev
C. Antoine Lavoisier
D. Ernest Rutherford

3. Mendeleev created the periodic table by observing
A. dates of discovery
B. colours of elements
C. alphabetical order of elements
D. patterns in the properties of elements

4. Mendeleev's periodic table was powerful because it
A. predicted elements that had not been discovered yet
B. ignored atomic masses
C. arranged elements by colour
D. listed only metals

5. The process in which other scientists check a piece of scientific work before it is published is called
A. peer pressure
B. controlled experiment
C. peer review
D. reproducibility

6. The peer review process ensures
A. higher funding
B. accuracy and validity of findings
C. faster publication
D. reduced experimentation

7. A scientific paradigm is a
A. set of ideas, methods and rules that guide scientists in their research
B. type of apparatus
C. chemical reaction
D. single experiment

8. Which of the following was an 18th-century chemical paradigm?
A. Periodic table
B. Atomic theory
C. Quantum mechanics
D. Phlogiston theory

9. The phlogiston theory was replaced by the
A. oxygen theory of combustion
B. plum pudding model
C. periodic law
D. kinetic theory

10. The Plum Pudding model of the atom was suggested by
A. Mendeleev
B. J.J. Thomson
C. Bohr
D. Rutherford

11. The atomic model that includes a small, dense, positively charged nucleus was given by
A. Mendeleev
B. Thomson
C. Dalton
D. Rutherford

12. A 95 % confidence level in scientific reporting means that scientists are
A. results are 100 % accurate
B. 95 % of scientists agree
C. 95 % sure the true value lies within the stated range
D. the experiment was repeated 95 times

13. Repeatability refers to getting
A. the same results in different labs
B. results by different methods only
C. different results under the same conditions
D. the same results under the same conditions

14. Reproducibility refers to getting the same or similar results
A. under different conditions, by different methods or in different labs
B. by the same scientist only
C. under exactly the same conditions
D. in the same lab with the same tools

Unit 2: Matter

28 MCQs

1. During a phase transition, the temperature of a pure substance
A. increases steadily
B. remains constant
C. decreases steadily
D. fluctuates

2. Internal energy is made up of kinetic energy and
A. sound energy
B. electrical energy
C. potential energy
D. chemical energy only

3. What happens to the internal energy of a substance during melting?
A. It increases
B. It decreases
C. It stays the same
D. It fluctuates

4. When energy is added to a solid at its melting point, it increases the
A. mass of the particles
B. kinetic energy of the particles
C. temperature of the solid
D. potential energy of the particles

5. The change of a solid directly into a gas is called
A. sublimation
B. condensation
C. freezing
D. melting

6. The change of a gas directly into a solid is called
A. condensation
B. sublimation
C. deposition
D. evaporation

7. During condensation, the particles in a gas
A. gain energy and move slower
B. gain energy and move faster
C. lose energy and move faster
D. lose energy and move slower

8. In a heating curve, the horizontal part where a solid melts represents the latent heat of
A. vaporization
B. fusion
C. condensation
D. sublimation

9. In a heating curve, the horizontal part where a liquid boils represents the latent heat of
A. sublimation
B. fusion
C. freezing
D. vaporization

10. In the flat regions of a heating curve, the absorbed energy is used to
A. overcome intermolecular forces
B. increase the kinetic energy of the particles
C. increase the temperature
D. increase the mass

11. Evaporation is a process occurring
A. only in gases
B. only at 100 °C
C. at the surface of a liquid at any temperature below the boiling point
D. throughout the liquid at the boiling point

12. Boiling occurs
A. at any temperature
B. throughout the liquid at a fixed temperature
C. only at room temperature
D. only at the surface

13. Evaporation causes cooling because the molecules left behind have
A. lower average kinetic energy | B. more mass | C. less mass | D. higher average kinetic energy

14. Evaporation differs from boiling because evaporation
A. occurs throughout the liquid
B. forms bubbles
C. occurs at the surface of a liquid at any temperature
D. occurs only at a fixed temperature

15. Increasing the external pressure on a liquid
A. makes it freeze | B. does not change its boiling point | C. decreases its boiling point | **D. increases its boiling point**

16. A pressure cooker cooks food faster because it
A. cools the food | **B. raises the boiling point of water** | C. removes the water | D. lowers the boiling point of water

17. Boyle's law states that at constant temperature the volume of a fixed amount of gas is
A. unrelated to its pressure | B. directly proportional to its pressure | C. directly proportional to its temperature | **D. inversely proportional to its pressure**

18. Boyle's law is expressed as
A. V/n = constant | B. P/T = constant | **C. PV = constant** | D. V/T = constant

19. Charles's law states that at constant pressure the volume of a fixed amount of gas is
A. directly proportional to its absolute temperature
B. inversely proportional to its pressure
C. independent of temperature
D. inversely proportional to its absolute temperature

20. Charles's law is expressed as
A. V/n = constant | **B. V/T = constant** | C. PV = constant | D. PT = constant

21. Avogadro's law states that at constant temperature and pressure the volume of a gas is
A. independent of the number of moles
B. proportional to pressure
C. directly proportional to the number of moles
D. inversely proportional to the number of moles

22. Avogadro's law is expressed as
A. V/n = constant | B. V/T = constant | C. P/n = constant | D. PV = constant

23. Graham's law states that the rate of diffusion is
A. inversely proportional to the molar mass
B. independent of the molar mass
C. directly proportional to the molar mass
D. inversely proportional to the square root of the molar mass

24. Lighter gas molecules diffuse
A. slower than heavier ones | **B. faster than heavier ones** | C. not at all | D. at the same rate as heavier ones

25. Which factors affect the rate of diffusion of gases?
A. Molecular mass and temperature | B. Colour only | C. Volume of the container only | D. Number of atoms only

26. Sublimation is the process in which a solid changes
A. into a gas through the liquid state
B. into a liquid
C. directly into vapour without passing through the liquid state
D. into a solid

27. Which of the following easily undergoes sublimation?
A. Iron | B. Sodium chloride | C. Sand | **D. Naphthalene**

28. The diffusion of medicine in the body is important because it
A. increases the molecular mass of the medicine
B. ensures the medicine reaches all parts of the body
C. controls the temperature of the medicine
D. keeps the medicine in one place

Unit 3: Stoichiometry

44 MCQs

1. The atomic, formula or molecular mass of a substance expressed in grams is called one
A. mole | B. kilogram | C. gram | D. litre

2. The SI unit used to express the amount of a substance is the
A. gram | **B. mole** | C. kelvin | D. litre

3. One mole of water (H_2O) has a mass of
A. 10 g | B. 16 g | **C. 18 g** | D. 2 g

4. One mole of oxygen molecules (O_2) has a mass of
A. 64 g | B. 8 g | C. 16 g | **D. 32 g**

5. One mole of NaCl has a mass of
A. 58.5 g | B. 85.5 g | C. 23 g | D. 35.5 g

6. In $2H_2 + O_2 \rightarrow 2H_2O$, 2 moles of hydrogen react with _____ mole(s) of oxygen.
A. 3 | B. 2 | C. 4 | **D. 1**

7. In $2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$, the moles of oxygen used to burn 3.50 moles of methanol are
A. 2.33 | B. 7.00 | **C. 5.25** | D. 3.50

8. In $2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$, burning 3.50 moles of methanol produces _____ moles of water.
A. 5.25 | **B. 7.00** | C. 1.75 | D. 3.50

9. In $N_2 + 3H_2 \rightarrow 2NH_3$, the moles of hydrogen required to make 8.0 moles of NH_3 are
A. 12 | B. 24 | C. 8 | D. 4

10. What mass of CO_2 is produced by the combustion of each mole of CH_4?
A. 16 g | **B. 44 g** | C. 32 g | D. 88 g

11. The mass of aluminium in 204 g of Al_2O_3 is (Al = 27, O = 16)
A. 54 g | B. 26 g | **C. 108 g** | D. 27 g

12. One mole of any gas at RTP occupies a volume of
A. 48 dm^3 | B. 1 dm^3 | C. 22.4 dm^3 | **D. 24 dm^3**

13. The volume of 2.5 moles of chlorine gas at RTP is
A. 2.5 dm^3 | B. 24 dm^3 | **C. 60 dm^3** | D. 9.6 dm^3

14. The number of moles of oxygen in 50.0 dm^3 of oxygen gas at RTP is about
A. 0.48 | **B. 2.08** | C. 50 | D. 1.2

15. The volume occupied by 0.80 mole of N_2 at RTP is
A. 19.2 dm^3 | B. 30 dm^3 | C. 24 dm^3 | D. 0.8 dm^3

16. A flask contains 500 cm^3 of SO_2 at RTP. The mass of SO_2 is about (S = 32, O = 16)
A. 2.4 g | B. 64 g | C. 32 g | **D. 1.33 g**

17. The percentage of magnesium in MgO (Mg = 24, O = 16) is
A. 50 | B. 40 | **C. 60** | D. 75

18. Which compound has the highest percentage by mass of nitrogen?
A. NH_3 in water solution only | **B. N_2H_4** | C. NO | D. NH_4OH

19. A limiting reactant is the reactant that
A. is completely consumed in a reaction | B. is left over after the reaction | C. does not react | D. is a catalyst

20. The reactant which is consumed earlier and gives the least quantity of product is the
A. reactant in excess | B. stoichiometric amount | C. catalyst | **D. limiting reactant**

21. 10 moles of H_2 and 7 moles of O_2 react to form water. The limiting reactant is
A. O_2 | B. neither | **C. H_2** | D. H_2O

22. 200 g of Zn reacts with 200 g of H_2SO_4 (Zn = 63.5, H_2SO_4 = 98). The limiting reactant is
A. neither | **B. H_2SO_4** | C. Zn | D. both

23. The mass of hydrogen produced when 2.04 mol of H_2SO_4 reacts completely with zinc is
A. 4.08 g B. 8.16 g C. 2.04 g D. 1.02 g

24. In $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$, 0.480 mol C_2H_4 reacts with 1.08 mol O_2. The limiting reactant is
A. C_2H_4 B. CO_2 C. H_2O **D. O_2**

25. 68.1 g of $CaCO_3$ (100 g/mol) is mixed with 51.6 g of HCl (36.5 g/mol) in $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$. The limiting reactant is
A. both **B. $CaCO_3$** C. neither D. HCl

26. The amount of product actually obtained in a reaction is called the
A. mass defect B. theoretical yield
C. percentage purity **D. actual yield**

27. The percentage yield is calculated as
A. (actual yield − theoretical yield) × 100 B. actual yield × theoretical yield
C. (actual yield / theoretical yield) × 100 D. (theoretical yield / actual yield) × 100

28. The actual yield of $CuSO_4$ is 1.85 g and the theoretical yield is 2.5 g. The percentage yield is
A. 74 % B. 135 % C. 26 % D. 50 %

29. The theoretical yield of Cu is 0.5072 g and the actual yield is 0.392 g. The percentage yield is about
A. 129 % B. 22.7 % **C. 77.3 %** D. 50 %

30. A compound has 40 % C, 6.7 % H and 53.3 % O. Its empirical formula is
A. C_2H_2O B. CHO C. CH_4O **D. CH_2O**

31. A compound with empirical formula CH_2O and molar mass 180 g/mol has the molecular formula
A. CH_2O **B. $C_6H_{12}O_6$** C. $C_2H_4O_2$ D. $C_3H_6O_3$

32. A sample weighs 6.3 g and contains 4.2 g of pure compound. The percentage purity is
A. 66.67 % B. 150 % C. 33.3 % D. 4.2 %

33. An impure sample of $CaCO_3$ weighs 70 g and 56 g is pure. The percentage purity is
A. 125 % B. 56 % **C. 80 %** D. 20 %

34. Molarity is the number of moles of solute per
A. kg of solvent **B. dm^3 of solution**
C. gram of solution D. cm^3 of solvent

35. 40 g of urea (60 g/mol) dissolved to make 500 cm^3 of solution has a molarity of about
A. 0.08 M B. 2.67 M C. 0.667 M **D. 1.334 M**

36. 0.05 mol of $KMnO_4$ in 600 cm^3 of solution has a molarity of about
A. 0.083 M B. 30 M C. 0.83 M D. 0.05 M

37. A solution contains 20 g of salt in 2 dm^3 of solution. Its strength is
A. 40 g/dm^3 **B. 10 g/dm^3** C. 22 g/dm^3 D. 2 g/dm^3

38. 10.0 g of NaCl in 500 cm^3 of solution has a strength of
A. 5 g/dm^3 B. 0.02 g/dm^3
C. 10 g/dm^3 **D. 20 g/dm^3**

39. The mass of NaCl (58.5 g/mol) needed to prepare 250 cm^3 of 0.5 M NaCl is about
A. 7.3 g B. 58.5 g C. 29.25 g D. 14.6 g

40. The dilution formula is
A. $M_1V_2 = M_2V_1$ B. $M_1/V_1 = M_2/V_2$
C. $M_1V_1 = M_2V_2$ D. $M_1 + V_1 = M_2 + V_2$

41. The volume of 4 M KNO_3 needed to prepare 500 cm^3 of 1 M KNO_3 is
A. 250 cm^3 **B. 125 cm^3** C. 500 cm^3 D. 2000 cm^3

42. In the titration of HCl with NaOH using phenolphthalein, the end point is when the
A. pink colour just disappears B. gas is released
C. solution turns red D. solution turns blue

43. In a titration, 25.0 cm^3 of 0.10 M NaOH neutralised 20.0 cm^3 of HCl. The molarity of HCl is
A. 0.25 M B. 0.08 M C. 0.10 M **D. 0.125 M**

44. 1.00 g of impure Na_2CO_3 needs 25.0 cm^3 of 0.1 M HCl ($Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$). The percentage purity is about
A. 100 % B. 26.5 % **C. 13.25 %** D. 50 %

Unit 4: Electrochemistry

47 MCQs

1. An electrochemical cell that uses electrical energy to drive a chemical reaction is a(n)
A. fuel cell **B. electrolytic cell**
C. galvanic cell D. dry cell

2. An electrochemical cell that converts chemical energy into electricity is a(n)
A. electrolytic cell B. electroplating cell
C. galvanic cell D. Down's cell

3. A substance that conducts electricity in molten state or aqueous solution and undergoes chemical change is a(n)
A. electrolyte B. non-electrolyte
C. catalyst D. insulator

4. Electrolysis is the decomposition of ionic compounds by
A. heating only B. light only
C. mixing **D. passage of electric current**

5. In an electrolytic cell, oxidation occurs at the
A. battery B. cathode
C. anode D. salt bridge

6. In an electrolytic cell, reduction occurs at the
A. cathode B. wire
C. electrolyte D. anode

7. In the external circuit of an electrolytic cell, electrons move from the
A. electrolyte to the anode B. cathode to the battery
C. cathode to the anode **D. anode to the cathode**

8. Sodium metal is produced industrially by the electrolysis of fused sodium chloride in
A. fuel cell **B. Down's cell**
C. Nelson cell D. Daniel cell

9. Down's cell uses
A. an iron cathode and a carbon anode B. two zinc electrodes
C. a carbon cathode and an iron anode D. two copper electrodes

10. During electrolysis of molten NaCl, the half-reaction at the anode is
A. $Na \rightarrow Na^+ + e^-$ B. $Cl_2 + 2e^- \rightarrow 2Cl^-$
C. $Na^+ + e^- \rightarrow Na$ **D. $2Cl^- \rightarrow Cl_2 + 2e^-$**

11. During electrolysis of molten NaCl, the half-reaction at the cathode is
A. $Cl_2 + 2e^- \rightarrow 2Cl^-$ B. $Na \rightarrow Na^+ + e^-$
C. $Na^+ + e^- \rightarrow Na$ D. $2Cl^- \rightarrow Cl_2 + 2e^-$

12. Electrolysis of molten lead(II) chloride gives lead at the cathode and _____ at the anode.
A. hydrogen gas **B. chlorine gas**
C. oxygen gas D. lead chloride

13. Electrolysis of concentrated aqueous NaCl (brine) is used to produce
A. sodium metal B. sodium carbonate
C. sodium sulphate **D. sodium hydroxide**

14. In the electrolysis of concentrated aqueous NaCl, chlorine gas is produced at the
A. battery B. salt bridge
C. anode D. cathode

15. In the electrolysis of concentrated aqueous NaCl, hydrogen gas is produced at the
A. cathode B. anode
C. electrolyte D. salt bridge

16. In electrolysis of dilute aqueous NaCl using platinum electrodes, the gas produced at the anode is
A. chlorine **B. oxygen** C. hydrogen D. nitrogen

17. In the electrolysis of aqueous $CuSO_4$ with platinum electrodes, the product at the cathode is
A. sulphur B. hydrogen gas
C. copper metal D. oxygen gas

18. In the electrolysis of aqueous $CuSO_4$ with platinum electrodes, the product at the anode is
A. copper metal B. hydrogen gas
C. sulphur dioxide **D. oxygen gas**

19. During electrolysis of $CuSO_4$ with copper electrodes, the anode reaction is
A. $Cu \rightarrow Cu^{2+} + 2e^-$ B. $2H^+ + 2e^- \rightarrow H_2$
C. $Cu^{2+} + 2e^- \rightarrow Cu$ D. $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$

20. In the purification of copper, the impure copper acts as the
A. cathode **B. anode**
C. electrolyte D. salt bridge

21. In copper refining, silver and gold impurities
A. turn into gas B. dissolve in the electrolyte
C. deposit on the cathode **D. fall to the bottom of the cell**

22. In electrolysis of a concentrated halide solution, the product at the anode is
A. nothing B. oxygen
C. the halogen D. hydrogen

23. The electrolytic process used to deposit one metal on another is called
A. electroplating B. refining only
C. galvanic action D. electrolysis of brine

24. In electroplating, the object to be plated is made the
A. anode **B. cathode**
C. electrolyte D. salt bridge

25. In electroplating, the plating metal is made the
A. anode B. electrolyte
C. cathode D. salt bridge

26. Galvanizing is coating of steel with
A. chromium B. copper C. tin **D. zinc**

27. Tin-plated steel is used to make food cans because tin plating is
A. magnetic **B. non-poisonous and prevents corrosion**
C. poisonous D. very costly

28. A galvanic cell is also called a
A. Down's cell B. plating cell
C. voltaic cell D. electrolytic cell

29. In a Daniel cell, the zinc half-cell acts as the
A. cathode **B. anode**
C. voltmeter D. salt bridge

30. In a Daniel cell, the copper half-cell acts as the
A. anode B. electrolyte
C. salt bridge **D. cathode**

31. In a Daniel cell, electrons flow from the
A. zinc rod to the copper rod through the external wire
B. solution to the wire
C. salt bridge to the zinc rod
D. copper rod to the zinc rod

32. A salt bridge contains
A. pure zinc B. dilute sulphuric acid only
C. an inert electrolyte such as KCl D. pure copper

33. In a voltaic cell, the salt bridge
A. stops electrons in the external circuit
B. stores energy
C. generates extra voltage
D. maintains electrical neutrality by allowing ion movement

34. The oxidation half-reaction in a Daniel cell is
A. $Cu \rightarrow Cu^{2+} + 2e^-$ **B. $Zn \rightarrow Zn^{2+} + 2e^-$**
C. $Cu^{2+} + 2e^- \rightarrow Cu$ D. $Zn^{2+} + 2e^- \rightarrow Zn$

35. The reduction half-reaction in a Daniel cell is
A. $Cu^{2+} + 2e^- \rightarrow Cu$ B. $Zn^{2+} + 2e^- \rightarrow Zn$
C. $Zn \rightarrow Zn^{2+} + 2e^-$ D. $Cu \rightarrow Cu^{2+} + 2e^-$

36. Which statement is NOT correct for a galvanic cell?
A. Oxidation occurs at the anode
B. Anions are oxidised at the anode
C. Electrons flow from the cathode to the anode
D. Cations are reduced at the cathode

37. Which statement is NOT true about the Daniel cell?
A. A salt bridge connects the two half-cells
B. The half-cell of an active metal acts as a cathode
C. A spontaneous redox reaction generates electricity
D. Each half-cell has a metal in contact with its ions

38. Which of the following does NOT involve an electrolytic process?
A. Reduction of a metal oxide by a reducing agent
B. Manufacture of sodium from NaCl
C. Refining of copper
D. Electroplating of steel

39. A table of metals arranged by increasing reduction potentials is called the
A. mole table B. activity of gases
C. periodic table **D. electrochemical series**

40. A metal with a lower reduction potential is
A. inert B. less active
C. more active (more easily oxidised) D. a non-metal

41. In a voltaic cell, the electrode with the lower reduction potential acts as the
A. cathode B. salt bridge
C. electrolyte **D. anode**

42. If metal A has a higher standard reduction potential than metal B, then
A. metal B is more reactive than metal A B. metal A loses electrons more easily
C. metal A is more reactive than metal B D. both have the same reactivity

43. In dilute aqueous NaCl, OH^- ions are discharged at the anode instead of Cl^- because of
A. colour of ions
B. concentration effect and overpotential of chlorine
C. temperature only
D. pressure only

44. A hydrogen-oxygen fuel cell converts the energy of the reaction between hydrogen and oxygen into
A. light only B. nuclear energy
C. electrical energy D. sound

45. The electrodes in a hydrogen-oxygen fuel cell are porous carbon containing _____ as catalyst.
A. zinc B. lead C. iron **D. platinum**

46. In a hydrogen-oxygen fuel cell, the only chemical product is
A. water B. carbon dioxide
C. ammonia D. hydrogen peroxide

47. An advantage of fuel cells over petrol engines is that they
A. emit carbon dioxide
B. emit only water vapour and do not pollute
C. use non-renewable gasoline
D. have many moving parts

Unit 5: Reaction Kinetics

25 MCQs

1. The rate of a chemical reaction is the change in the
A. concentration of a reactant or product in a given time
B. volume of the apparatus
C. mass of the container
D. colour of the solution

2. The unit of the rate of reaction is
A. $dm^3\ s^{-1}\ mol^{-1}$ B. $mol\ dm^{-3}$
C. $mol\ dm^{-3}\ s^{-1}$ D. $g\ dm^{-3}$

3. The rate of a reaction _____ as the reaction proceeds.
A. increases **B. decreases**
C. remains the same D. doubles every time

4. On a concentration-time graph, a steeper slope indicates a
A. reversed reaction B. slower reaction
C. reaction that has stopped **D. faster reaction**

5. On a concentration-time graph, a zero slope (flat line) indicates that the reaction has
A. stopped B. become faster
C. reversed D. become slower

6. If 25 mol dm^{-3} of product forms in 100 minutes, the average rate is about
A. 0.25 mol $dm^{-3}\ s^{-1}$ **B. 0.0042 mol $dm^{-3}\ s^{-1}$**
C. 25 mol $dm^{-3}\ s^{-1}$ D. 4.2 mol $dm^{-3}\ s^{-1}$

7. According to collision theory, for a reaction to occur, particles must
A. only touch
B. be heated to 100 °C
C. collide with enough energy and correct orientation
D. be of equal mass

8. The minimum amount of energy needed for a reaction to occur is called the
A. kinetic energy
B. heat of reaction
C. bond energy
D. activation energy

9. Reactions with high activation energy are usually
A. fast
B. reversible
C. slow
D. exothermic

10. A catalyst is a substance that
A. is used up in the reaction
B. speeds up a reaction without being used up
C. slows down a reaction
D. changes the products

11. A catalyst increases the rate of reaction by
A. providing an alternate pathway with lower activation energy
B. decreasing the temperature
C. increasing the number of particles
D. providing an alternate pathway with higher activation energy

12. In a reversible reaction, a catalyst lowers the activation energy of
A. only the forward reaction
B. only the reverse reaction
C. neither reaction
D. both the forward and reverse reactions

13. At the end of a reaction, a catalyst is
A. completely used up
B. chemically unchanged
C. converted to a gas
D. converted to product

14. Which of the following is NOT a factor affecting the rate of reaction according to collision theory?
A. Activation energy
B. Number of particles per unit volume
C. Presence of a catalyst
D. Molar mass of reactants

15. Which of these is NOT typically affected by the rate of reaction?
A. Colour of the reactants
B. Change in mass
C. Temperature
D. Formation of gas

16. Increasing the concentration of reactants makes the reaction
A. stop
B. slower
C. faster
D. reverse

17. Increasing the surface area of a solid reactant
A. has no effect
B. makes the reaction irreversible
C. decreases the rate of reaction
D. increases the rate of reaction

18. Powdered zinc reacts faster with dilute HCl than a chunk of zinc because the powder has
A. a lower temperature
B. more exposed surface area
C. less mass
D. more activation energy

19. Raising the temperature increases the rate because particles
A. move faster and have more frequent and energetic collisions
B. lose energy
C. become larger
D. move slower

20. How does temperature affect the rate of reaction according to collision theory?
A. Higher temperature decreases the kinetic energy of particles
B. Higher temperature increases the activation energy
C. Higher temperature increases the frequency of collisions and the kinetic energy of particles
D. Higher temperature decreases the frequency of collisions

21. Increasing the pressure of a gaseous reaction mixture
A. has no effect
B. stops the reaction
C. decreases the rate of reaction
D. increases the rate of reaction

22. Enzymes are
A. biological catalysts
B. carbohydrates only
C. inorganic acids
D. fats only

23. Each enzyme catalyses
A. only inorganic reactions
B. only one specific reaction
C. no reactions
D. all reactions

24. Enzymes speed up reactions by holding reactant molecules in the correct
A. mass
B. volume
C. orientation for successful collisions
D. colour

25. In the food industry, chemical kinetics helps to
A. make food radioactive
B. determine the best time to harvest and transport produce
C. change the colour of food
D. increase the mass of food

Unit 6: Salts

24 MCQs

1. Salts are ionic compounds formed due to the electrostatic attraction between
A. electrons only
B. oppositely charged ions
C. neutral atoms
D. like charges

2. In the formation of a salt, the positive ions come from the
A. indicator
B. water
C. acid
D. base

3. The primary reason salts have high melting points is
A. strong electrostatic forces between ions
B. hydrogen bonding
C. weak van der Waals forces
D. covalent bonding

4. Solid salts do not conduct electricity because their ions are
A. neutral
B. absent
C. held in fixed positions in the lattice
D. free to move

5. Molten salts conduct electricity because they have
A. free protons only
B. free-moving ions
C. free atoms
D. free molecules

6. When a salt dissolves in water, its ions
A. form a solid
B. form a gas
C. become mobile
D. become fixed in place

7. All sodium, potassium and ammonium salts are
A. soluble in water
B. coloured
C. gases
D. insoluble in water

8. All nitrate salts are
A. insoluble in water
B. volatile
C. insoluble except sodium nitrate
D. soluble in water

9. Most chlorides are soluble except
A. sodium chloride and potassium chloride
B. lead(II) chloride and silver chloride
C. ammonium chloride only
D. calcium chloride and magnesium chloride

10. Most carbonates are insoluble except those of
A. sodium, potassium and ammonium
B. barium and iron
C. calcium and magnesium
D. lead and silver

11. Which carbonate is insoluble in water?
A. Sodium carbonate
B. Potassium carbonate
C. Ammonium carbonate
D. Calcium carbonate

12. Most common sulphates are soluble except those of
A. magnesium and zinc
B. sodium, potassium and ammonium
C. lead, barium and calcium
D. copper and iron

13. Which of the following salts is soluble in water?
A. Sodium nitrate
B. Silver chloride
C. Lead carbonate
D. Lead chloride

14. Which of the following salts is insoluble in water?
A. Potassium carbonate
B. Calcium chloride
C. Ammonium nitrate
D. Lead chloride

15. A soluble salt can be prepared from an acid and an alkali by
A. decantation
B. distillation
C. titration
D. filtration

16. In titration of HCl with NaOH using phenolphthalein, the end point is when the colour changes from colourless to
A. red
B. light pink
C. blue
D. yellow

17. Which method is the most suitable to prepare a soluble salt from an acid and an alkali?
A. Distillation B. Filtration
C. Crystallisation of a metal **D. Titration**

18. To prepare zinc sulphate from zinc and dilute sulphuric acid, zinc is added in
A. excess B. equal amount only
C. no amount D. small amount

19. When preparing a salt using an excess metal, the excess metal is removed by
A. distillation B. evaporation
C. filtration D. decantation

20. When preparing copper(II) sulphate from sulphuric acid, an excess of _____ is added.
A. sodium **B. copper(II) oxide**
C. water D. copper metal

21. An acid reacting with an excess of an insoluble base gives
A. a salt and carbon dioxide B. a salt and oxygen
C. a salt and water D. a salt and hydrogen

22. When preparing calcium chloride from HCl and excess $CaCO_3$, the gas evolved is
A. hydrogen **B. carbon dioxide**
C. oxygen D. chlorine

23. When an insoluble carbonate reacts with an acid, the gas produced is
A. carbon dioxide B. hydrogen
C. nitrogen D. oxygen

24. The steps in preparing a soluble salt using an excess insoluble solid are reaction, filtration and
A. sublimation B. condensation
C. distillation **D. crystallisation**

Unit 7: Nitrogen, Sulphur and Metals

37 MCQs

1. A key component of photochemical smog formed from NO, NO_2 and unburned hydrocarbons is
A. carbon monoxide **B. peroxyacetyl nitrate (PAN)**
C. sulphuric acid D. ammonia

2. PAN stands for
A. polyacetyl nitrogen B. photoacetyl nitrate
C. peroxy acid nitrite **D. peroxyacetyl nitrate**

3. The oxides of nitrogen involved in photochemical smog are
A. N_2O_5 only B. NH_3 and HNO_3
C. NO and NO_2 D. N_2 and NH_3

4. In sunlight, NO_2 undergoes photodissociation to form NO and
A. an oxygen atom B. ammonia
C. nitrogen D. hydrogen

5. Acid rain is rain having a pH less than
A. 7 **B. 5** C. 9 D. 3

6. Acid rain is caused mainly by dissolving of SO_2 and _____ in rainwater.
A. NO_2 B. H_2 C. N_2 D. O_2

7. In the formation of acid rain, NO_2 acts as a _____ in the oxidation of SO_2.
A. reactant that is used up B. solvent
C. product **D. catalyst**

8. SO_3 reacts with water vapour to form
A. sulphurous acid B. hydrochloric acid
C. sulphuric acid D. nitric acid

9. The Contact process is used for the manufacture of
A. sodium carbonate B. nitric acid
C. ammonia **D. sulphuric acid**

10. The Contact process is based on the catalytic oxidation of
A. SO_2 to SO_3 B. NH_3 to NO
C. H_2 to H_2O D. N_2 to NH_3

11. The balanced equation of the key step in the Contact process is
A. $SO_2 + H_2O \rightarrow H_2SO_3$ B. $S + O_2 \rightarrow SO_2$ only
C. $2SO_2 + O_2 \rightleftharpoons 2SO_3$ D. $N_2 + 3H_2 \rightleftharpoons 2NH_3$

12. In the Contact process, sulphur dioxide is produced by burning sulphur or
A. burning natural gas **B. roasting sulphide ores**
C. electrolysis of water D. burning methane

13. The catalyst used in the Contact process is
A. nickel B. iron
C. platinum **D. vanadium(V) oxide**

14. The typical temperature for the Contact process is
A. 450 °C B. 1000 °C C. 200 °C D. 700 °C

15. The Contact process reaction is
A. reversible and endothermic B. irreversible and exothermic
C. reversible and exothermic D. irreversible and endothermic

16. In the Contact process, SO_3 is absorbed in 98 % H_2SO_4 to give
A. nitric acid **B. oleum ($H_2S_2O_7$)**
C. ammonia D. water

17. The Haber process is used to manufacture
A. ammonia B. sulphuric acid
C. nitric acid D. sodium carbonate

18. The balanced equation for the production of ammonia is
A. $2NH_3 \rightarrow N_2 + 3H_2$ only **B. $N_2 + 3H_2 \rightleftharpoons 2NH_3$**
C. $N_2 + 2H_2 \rightarrow 2NH_3$ D. $N_2 + H_2 \rightarrow NH_3$

19. What are the sources of hydrogen and nitrogen in the Haber process?
A. Methane and water B. Water and air
C. Methane and air D. Water and methane

20. The catalyst used in the Haber process is
A. vanadium(V) oxide B. platinum
C. nickel **D. iron**

21. The temperature typically used in the Haber process is
A. 300 °C B. 600 °C **C. 450 °C** D. 200 °C

22. The pressure typically used in the Haber process is about
A. 20 atm **B. 200 atm** C. 1 atm D. 2 atm

23. The boiling point of ammonia is about
A. 33 °C B. 0 °C C. 100 °C **D. −33 °C**

24. Binary compounds of elements with oxygen are called
A. oxides B. salts C. acids D. hydrides

25. Acidic oxides are generally oxides of
A. alkali metals B. noble gases only
C. metals **D. non-metals**

26. Which of the following is an acidic oxide?
A. CuO B. CaO **C. SO_2** D. Na_2O

27. SO_2 reacts with water to form
A. sulphurous acid (H_2SO_3) B. calcium hydroxide
C. sulphuric acid only D. sodium hydroxide

28. Basic oxides are generally oxides of
A. noble gases **B. metals**
C. non-metals D. halogens

29. Which of the following is a basic oxide?
A. SO_2 B. NO_2 C. CO_2 **D. CaO**

30. Amphoteric oxides react with
A. only acids B. neither acids nor bases
C. both acids and bases D. only bases

31. Which of the following oxides is amphoteric?
A. Al_2O_3 B. CO_2 C. SO_2 D. CuO

32. Atmospheric oxides react with acids and bases to form
A. a base and hydrogen **B. a salt and water**
C. an acid and a gas D. a salt and hydrogen

33. Metals react with dilute acids to form a salt and
A. hydrogen gas B. carbon dioxide
C. oxygen gas D. water only

34. Which metals do not react with dilute acids?
A. Iron and aluminium **B. Copper, silver and gold**
C. Sodium and potassium D. Magnesium and zinc

35. Which metals react vigorously with cold water?
A. Zinc and iron B. Gold and platinum
C. Copper and silver **D. Potassium, sodium and calcium**

36. Which metal does NOT react with steam?
A. Magnesium B. Iron **C. Copper** D. Zinc

37. The correct order of decreasing reactivity is
A. Au > Ag > Cu > Pb > Fe > Zn
B. Na > K > Ca > Al > Mg > Fe > Zn
C. Cu > Fe > Zn > Mg > Na
D. K > Na > Ca > Mg > Al > Zn > Fe > Pb > Cu > Ag > Au

Unit 8: Organic Chemistry

40 MCQs

1. Organic chemistry is the study of
A. salts B. noble gases
C. carbon-based compounds D. metals

2. A displayed formula shows
A. all the bonds between atoms as individual lines
B. only the molecular mass
C. only carbon atoms
D. only the functional group

3. The general formula of alkanes is
A. C_nH_{2n} **B. C_nH_{2n+2}** C. C_nH_n D. C_nH_{2n-2}

4. The general formula of alkenes is
A. C_nH_n B. C_nH_{2n-2} C. C_nH_{2n+2} **D. C_nH_{2n}**

5. The general formula of alkynes (one triple bond) is
A. C_nH_{2n} **B. C_nH_{2n-2}** C. C_nH_n D. C_nH_{2n+2}

6. Alkenes contain at least one carbon-carbon
A. single bond only B. triple bond
C. double bond D. ionic bond

7. Alkynes contain at least one carbon-carbon
A. double bond B. single bond only
C. ionic bond **D. triple bond**

8. IUPAC stands for the International Union of
A. Pure and Applied Chemistry B. Physical and Atomic Chemistry
C. Polymers and Acids Chemistry D. Pure and Atomic Compounds

9. A functional group is
A. a metal ion
B. a type of reaction
C. a salt
D. an atom or group of atoms that determines the properties of a class of compounds

10. The stem 'meth' means
A. two carbon atoms **B. one carbon atom**
C. four carbon atoms D. three carbon atoms

11. The stem 'eth' means
A. three carbon atoms B. four carbon atoms
C. two carbon atoms D. one carbon atom

12. The stem 'prop' means
A. three carbon atoms B. five carbon atoms
C. two carbon atoms D. four carbon atoms

13. The stem 'but' means
A. six carbon atoms B. three carbon atoms
C. five carbon atoms **D. four carbon atoms**

14. The stem 'pent' means
A. seven carbon atoms **B. five carbon atoms**
C. six carbon atoms D. four carbon atoms

15. The ending '-ane' indicates a(n)
A. alkene B. alcohol **C. alkane** D. alkyne

16. The ending '-ene' indicates a(n)
A. alkene B. alkane
C. carboxylic acid D. alkyne

17. The ending '-ol' indicates a(n)
A. alkane B. ester
C. carboxylic acid **D. alcohol**

18. The ending '-oic acid' indicates a(n)
A. ester **B. carboxylic acid**
C. alkene D. alcohol

19. In but-2-ene, the double bond is between
A. C-2 and C-3 B. C-3 and C-4
C. C-1 and C-2 D. C-1 and C-4

20. Which of the following correctly represents but-2-ene?
A. $CH_3C{\equiv}CCH_3$ B. $CH_3CH_2CH{=}CH_2$
C. $CH_3CH{=}CHCH_3$ D. $CH_2{=}CHCH_2CH_3$

21. The condensed formula of but-2-yne is
A. $CH_3CH_2CH_2CH_3$ B. $CH{\equiv}CCH_2CH_3$
C. $CH_3CH{=}CHCH_3$ **D. $CH_3C{\equiv}CCH_3$**

22. The name of $CH_3CH_2CH{=}CHCH_3$ is
A. pent-2-ene B. pent-1-ene
C. pentane D. pent-3-ene

23. Alcohols contain the functional group
A. –CHO B. –COOR
C. –OH (hydroxyl) D. –COOH

24. In naming alcohols, the 'e' of the alkane is replaced by
A. –oic acid **B. –ol** C. –yl D. –ene

25. The name of CH_3OH is
A. ethanol B. methane C. methanal **D. methanol**

26. The name of CH_3CH_2OH is
A. propanol B. ethane **C. ethanol** D. methanol

27. The compound $CH_3CH(OH)CH_3$ is named
A. propan-2-ol B. propanone
C. propan-1-ol D. propanal

28. Which structural formula represents butan-1-ol?
A. $CH_3CH_2CH{=}CH_2$ **B. $CH_3CH_2CH_2CH_2OH$**
C. $CH_3CH{=}CHCH_3$ D. $CH_3CH_2CH_2COOH$

29. Propan-1-ol and propan-2-ol have
A. the same molecular formula B. different elements
C. identical condensed structural formulas D. different molecular formulas

30. Carboxylic acids contain the functional group
A. –COOR B. –OH **C. –COOH** D. –CHO

31. In naming carboxylic acids, the 'e' of the alkane is replaced by
A. –ate B. –ene C. –ol **D. –oic acid**

32. The IUPAC name of CH_3COOH (acetic acid) is
A. propanoic acid **B. ethanoic acid**
C. methanoic acid D. ethanol

33. The correct IUPAC name for $CH_3CH_2CH_2COOH$ is
A. butanol B. butanal
C. butanoic acid D. propanoic acid

34. The general formula of an ester is
A. ROH B. RCOOH C. RCHO **D. RCOOR'**

35. The reaction of an alcohol with a carboxylic acid to form an ester is called
A. esterification B. combustion
C. polymerisation D. hydrolysis

36. The catalyst used in esterification is a few drops of
A. dilute hydrochloric acid **B. dilute sulphuric acid**
C. water D. sodium hydroxide

37. The ester formed from ethanoic acid and methanol is
A. ethyl ethanoate B. methyl methanoate
C. methyl ethanoate D. ethyl methanoate

38. The ester formed from methanol and propanoic acid is
A. methyl propanoate B. propyl ethanoate
C. propyl methanoate D. ethyl propanoate

39. Which ester can be formed from ethanoic acid and butan-1-ol?
A. $CH_3CH_2CH_2CH_2COOH$ B. $CH_3CH_2CH_2COOCH_3$
C. $CH_3CH_2COOCH_3$ **D. $CH_3COOCH_2CH_2CH_2CH_3$**

40. Which name is incorrect for its formula?
A. Butane: $CH_3CH_2CH_2CH_3$ **B. But-2-ene: $CH_3CH_2CH{=}CH_2$**
C. But-1-ene: $CH_2{=}CHCH_2CH_3$ D. Butan-2-ol: $CH_3CH(OH)CH_2CH_3$

Unit 9: Hydrocarbons

52 MCQs

1. Hydrocarbons are compounds containing
A. carbon, hydrogen and nitrogen
B. hydrogen and oxygen only
C. carbon and hydrogen only
D. carbon and oxygen only

2. Hydrocarbons whose carbon-carbon bonds are all single bonds are called
A. unsaturated hydrocarbons
B. alkynes
C. aromatic hydrocarbons
D. saturated hydrocarbons

3. Hydrocarbons containing carbon-carbon multiple bonds are called
A. unsaturated hydrocarbons
B. esters
C. saturated hydrocarbons
D. alkanes

4. Which of the following is an unsaturated hydrocarbon?
A. CH_3CH_3
B. $CH_3CH{=}CH_2$
C. $CH_3CH_2CH_3$
D. CH_4

5. The type of bond present between the carbon atoms in alkynes is
A. ionic bond
B. single covalent bond
C. double covalent bond
D. triple covalent bond

6. Alkenes can be prepared industrially by the
A. fermentation
B. cracking of large alkane molecules
C. burning of alkanes
D. electrolysis

7. Cracking is the breaking of
A. alkenes into alkanes
B. water into hydrogen and oxygen
C. large alkane molecules into smaller hydrocarbons
D. small molecules into large ones

8. Cracking of large alkane molecules requires
A. high temperature and a catalyst
B. low temperature and pressure
C. low temperature and catalyst
D. no heat

9. Which of the following is a product of cracking large alkane molecules?
A. Water
B. Carbon dioxide
C. Oxygen
D. Alkenes

10. Cracking is important because it produces smaller hydrocarbons that are
A. more volatile and better fuels
B. solid at room temperature
C. less useful
D. less volatile

11. When decane ($C_{10}H_{22}$) is cracked, it can give octane and
A. ethane
B. propane
C. ethene
D. methane

12. Dehydration of an alcohol means
A. gain of oxygen
B. loss of water
C. gain of water
D. loss of hydrogen halide

13. Dehydration of ethanol gives
A. ethanal
B. ethyne
C. ethene
D. ethane

14. Dehydration of alcohols is an example of an
A. elimination reaction
B. neutralisation
C. substitution reaction
D. addition reaction

15. Dehydrohalogenation means loss of
A. oxygen
B. water
C. hydrogen
D. hydrogen halide

16. Halogenoalkanes on heating with alcoholic KOH give
A. carboxylic acids
B. alkenes
C. alkanes
D. alcohols

17. Ripening fruits and vegetables give off
A. ethane
B. ethyne
C. ethene
D. methane

18. When bromine water is added to an alkene, the reddish-brown colour
A. becomes darker
B. turns blue
C. does not change
D. disappears

19. The reaction of ethene with bromine gives
A. 1,2-dibromoethane
B. bromoethane only
C. ethanol
D. ethane

20. The test used to distinguish saturated from unsaturated hydrocarbons is the
A. limewater test
B. bromine water test
C. litmus test
D. flame test

21. Saturated hydrocarbons (alkanes) with bromine water
A. decolourise it
B. turn it green
C. turn it blue
D. do not react; the solution stays orange-brown

22. Baeyer's test uses
A. bromine water
B. cold dilute alkaline aqueous $KMnO_4$
C. limewater
D. litmus

23. The reaction of ethene with $KMnO_4$ gives
A. ethane
B. ethanoic acid
C. ethylene glycol
D. ethanol

24. Which compound will discharge the pink colour of $KMnO_4$ solution and be oxidised?
A. Ethene
B. Ethane
C. Butane
D. Methane

25. The addition of hydrogen to an alkene is called
A. dehydration
B. hydration
C. halogenation
D. hydrogenation

26. Hydrogenation of alkenes takes place in the presence of finely divided
A. nickel catalyst at 200–300 °C
B. vanadium oxide
C. water only
D. iron at 450 °C

27. Hydration of an alkene is addition of
A. oxygen
B. hydrogen
C. steam (water)
D. bromine

28. Hydration of ethene with steam using phosphoric acid catalyst gives
A. ethyne
B. ethanol
C. ethanoic acid
D. ethane

29. Alkynes are hydrocarbons with at least one
A. ionic bond
B. single bond
C. double bond between carbon atoms
D. triple bond between carbon atoms

30. Ethyne is commonly used for
A. welding and cutting metals
B. fuel for cars
C. cooking
D. heating homes

31. The oxy-acetylene flame has a temperature of about
A. 320 °C
B. 3200 °C
C. 1000 °C
D. 100 °C

32. Ethyne gas for ripening fruits is produced when _____ comes in contact with moisture.
A. calcium carbonate
B. calcium oxide
C. calcium carbide
D. calcium chloride

33. Fossil fuels include
A. coal, natural gas and petroleum
B. uranium and thorium
C. solar energy and wind
D. wood, coal and hydrogen

34. Fossil fuels are
A. unlimited sources
B. renewable energy sources
C. man-made sources
D. non-renewable energy sources

35. The main constituent of natural gas is
A. ethane
B. propane
C. methane
D. butane

36. Crude oil is separated into fractions by
A. crystallisation
B. fractional distillation
C. electrolysis
D. filtration

37. Fractional distillation of petroleum separates fractions on the basis of
A. density
B. solubility
C. boiling point
D. viscosity

38. From bottom to top of the fractionating column, the chain length
A. increases
B. stays the same
C. doubles
D. decreases

39. From bottom to top of the column, the volatility
A. increases
B. stays the same
C. becomes zero
D. decreases

40. Which property increases from the bottom to the top of the fractionating column?
A. Boiling point
B. Volatility
C. Viscosity
D. Chain length

41. The fraction with the shortest chain, lowest boiling point and highest volatility is
A. fuel oil B. bitumen
C. refinery gas (LPG) D. lubricating oil

42. The fraction with the longest chain, highest boiling point and highest viscosity is
A. bitumen B. kerosene
C. refinery gas D. petrol

43. Refinery gas (LPG) contains molecules with
A. 10 to 16 carbon atoms B. more than 70 carbon atoms
C. 5 to 10 carbon atoms **D. 1 to 4 carbon atoms**

44. The refinery gas fraction is used as
A. road surfacing **B. cylinder gas for cooking and heating**
C. fuel for cars D. lubricant

45. The petrol (gasoline) fraction is mainly used as
A. fuel for cars B. road paving
C. jet fuel D. lubricant

46. The naphtha fraction is mainly used as
A. road surface B. lubricant
C. chemical feedstock D. ship fuel

47. The kerosene fraction is used as
A. lubricant B. chemical feedstock for polymers only
C. road paving **D. jet fuel**

48. The diesel fraction is used as fuel for
A. roads
B. diesel engines of buses, trucks and trains
C. jet planes
D. waxes

49. The fuel oil fraction is used for
A. ships, power stations and home heating B. polishes
C. jet planes D. cooking gas

50. The lubricating oil fraction is used for
A. road making B. fuel for cars
C. cooking **D. lubricants, waxes and polishes**

51. The bitumen fraction is used for
A. jet fuel **B. paving roads**
C. fuel for cars D. cooking

52. The refinery gas fraction is more volatile than fuel oil because it has
A. higher boiling point B. stronger intermolecular forces
C. weaker intermolecular forces D. longer chains

Unit 10: Hydroxy Compounds

27 MCQs

1. The chemical formula of ethanol is
A. C_2H_6 B. CH_3OH C. C_3H_7OH **D. C_2H_5OH**

2. The chemical formula of methanol is
A. CH_3OH B. CH_4 C. C_3H_7OH D. C_2H_5OH

3. Ethanol can be manufactured by
A. electrolysis and filtration
B. cracking and distillation
C. fermentation of glucose and hydration of ethene
D. neutralisation only

4. Which organism is used in the fermentation process to produce ethanol?
A. Mould **B. Yeast** C. Algae D. Bacteria

5. The optimum temperature range for fermentation of glucose is
A. 25–35 °C B. 50–60 °C C. 70–80 °C D. 0–10 °C

6. The equation for fermentation of glucose is
A. $C_2H_4 + H_2O \rightarrow C_2H_5OH$ B. $C_6H_{12}O_6 \rightarrow 6CO_2 + 6H_2O$
C. $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ D. $C_2H_5OH \rightarrow C_2H_4 + H_2O$

7. The primary by-product of ethanol fermentation is
A. methane **B. carbon dioxide**
C. water only D. oxygen

8. Fractional distillation of the fermentation mixture gives
A. 50 % ethanol B. 100 % ethanol
C. 10 % ethanol **D. 96 % ethanol (rectified spirit)**

9. 96 % pure ethanol is called
A. methylated gas B. gasohol
C. rectified spirit D. absolute petrol

10. Rectified spirit is converted into 100 % ethanol using a dehydrating agent such as
A. water B. sodium chloride
C. dilute HCl **D. concentrated H_2SO_4**

11. Ethanol is also made industrially by the catalytic addition of steam to
A. ethene B. methane C. ethyne D. ethane

12. In the hydration of ethene, the temperature is about
A. 30 °C **B. 300 °C** C. 3000 °C D. 100 °C

13. In the hydration of ethene, the pressure is about
A. 200 atm B. 0.1 atm
C. 6 atm (6000 kPa) D. 1 atm

14. The catalyst used in the catalytic hydration of ethene is
A. nitric acid B. sulphuric acid
C. hydrochloric acid **D. phosphoric acid**

15. In the hydration of ethene, only about _____ of ethene is converted into ethanol per pass.
A. 4 % B. 100 % C. 40 % D. 96 %

16. A disadvantage of the hydration method is that it
A. is slow
B. uses non-renewable ethene and high energy
C. produces impure ethanol
D. uses moderate temperature

17. A disadvantage of fermentation is that it is
A. a slow batch process producing impure ethanol
B. a fast continuous process
C. a non-renewable process
D. a high pressure process

18. An advantage of fermentation is that it
A. is continuous B. gives pure ethanol quickly
C. uses crude oil **D. uses renewable resources and low energy**

19. The combustion of ethanol is represented by
A. $C_2H_4 + H_2O \rightarrow C_2H_5OH$ B. $CH_3OH + O_2 \rightarrow CH_4 + H_2O$
C. $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ + heat D. $C_2H_5OH \rightarrow C_2H_4 + H_2O$

20. Methanol as a car fuel has
A. no energy **B. a lower energy content than gasoline**
C. a higher energy content than gasoline D. the same as diesel

21. Petrol blended with 10–20 % ethanol is called
A. gasohol B. kerosene C. naphtha D. bitumen

22. Ethanol is a better fuel in terms of the environment because it is
A. radioactive B. non-renewable
C. renewable and cleaner burning D. very costly

23. Which fuel is commonly blended with petrol to reduce emissions?
A. Kerosene **B. Ethanol** C. Diesel D. Coal gas

24. One advantage of alcohol fuels over fossil fuels is that they
A. are non-flammable B. have higher sulphur content
C. produce more smoke **D. are renewable**

25. A disadvantage of alcohol fuels compared to petrol is
A. higher pollution B. higher sulphur content
C. lower energy content D. more smoke

26. Vinegar is produced by the bacterial oxidation of
A. propanol **B. ethanol**
C. methanol D. ethanoic acid

27. Bacterial oxidation of ethanol to ethanoic acid needs
A. a strong acid B. high pressure
C. absence of oxygen **D. the presence of oxygen**

Unit 11: Carboxylic Compounds

27 MCQs

1. Carboxylic acids contain the functional group
A. –OH B. $–NH_2$ C. –CHO **D. –COOH**

2. The common name of methanoic acid is
A. formic acid B. butyric acid
C. acetic acid D. propionic acid

3. The common name of ethanoic acid is
A. citric acid **B. acetic acid**
C. formic acid D. propionic acid

4. Ethanoic acid can be formed from ethanol by oxidation using
A. sodium chloride
B. dilute HCl
C. acidified potassium permanganate(VII) or potassium dichromate
D. water

5. In the oxidation of ethanol to ethanoic acid, the role of potassium manganate(VII) is that of an
A. reducing agent **B. oxidising agent**
C. catalyst D. inhibitor

6. In the first step of oxidation of ethanol, ethanol is converted to
A. ethanal B. ethene
C. ethane D. ethyl ethanoate

7. Ethanal is further oxidised to
A. ethane B. ethanol
C. ethene **D. ethanoic acid**

8. The equation $C_2H_5OH + 2[O] \rightarrow CH_3COOH + H_2O$ represents
A. reduction of ethanoic acid B. fermentation
C. oxidation of ethanol to ethanoic acid D. esterification

9. Vinegar is produced from ethanol by the action of micro-organisms called
A. acetobacter B. virus
C. algae D. yeast

10. Bacterial oxidation of ethanol to vinegar needs
A. high temperature of 300 °C **B. an aerobic environment (oxygen)**
C. no oxygen D. very high pressure

11. Typical vinegar contains about
A. 100 % acetic acid B. 40–80 % acetic acid
C. 4–8 % acetic acid D. 0.4 % acetic acid

12. The main component of vinegar is
A. propanoic acid B. methanol
C. ethanol **D. ethanoic acid**

13. Carboxylic acids are _____ than mineral acids.
A. neutral **B. weaker acids**
C. equally strong D. stronger acids

14. Ethanoic acid reacts with sodium hydroxide to form
A. sodium bicarbonate B. sodium chloride
C. sodium oxide **D. sodium ethanoate**

15. Ethanoic acid reacts with sodium carbonate to form
A. sodium ethanoate, water and carbon dioxide
B. sodium propanoate
C. sodium chloride
D. sodium hydroxide

16. What gas is produced when a carboxylic acid reacts with a carbonate?
A. Nitrogen B. Hydrogen
C. Carbon dioxide D. Oxygen

17. The gas released when a carboxylic acid reacts with an active metal is
A. hydrogen B. oxygen
C. nitrogen D. carbon dioxide

18. The carboxylic acid reacts with an alcohol in the presence of an acid catalyst to form an
A. alkene **B. ester** C. aldehyde D. ketone

19. The catalyst used in esterification is
A. sodium hydroxide B. hydrochloric acid
C. concentrated sulphuric acid D. potassium manganate(VII)

20. A reaction in which two molecules combine with the elimination of a small molecule like water is called a
A. combustion B. addition reaction
C. neutralisation **D. condensation reaction**

21. The ester formed from methanol and ethanoic acid is
A. methyl methanoate **B. methyl ethanoate**
C. ethyl ethanoate D. ethyl methanoate

22. Sodium salts of fatty acids are used in making
A. soaps and detergents B. fuels
C. metals D. cement

23. Citric acid is used as a natural
A. fuel B. poison
C. preservative D. dye

24. Esters are used as industrial solvents for
A. fertilisers
B. metals
C. fuels
D. dyes, glues, inks and nail polish remover

25. The ester isopentyl acetate has the flavour of
A. orange **B. banana** C. apple D. pineapple

26. Aspirin is an example of an
A. alkane B. alkene C. alcohol **D. ester**

27. Ethanoic acid solution (5 %) is used as
A. vinegar B. polish C. soap D. petrol

Unit 12: Polymers

28 MCQs

1. Polymers are
A. small molecules made of one atom
B. large molecules built from many smaller molecules called monomers
C. metals and non-metals bonded together
D. ions in solution

2. The small repeating units that make up a polymer are called
A. isotopes B. isomers C. ions **D. monomers**

3. Based on synthesis, polymers are classified as addition polymers and
A. condensation polymers B. ionic polymers
C. metallic polymers D. natural salts

4. Addition polymers are formed by
A. losing water in each step
B. losing carbon dioxide
C. adding monomer units without losing any small molecule
D. losing hydrogen

5. Polyethene is formed from the monomer
A. propene **B. ethene**
C. ethane D. chloroethene

6. Polyethene is an example of an
A. condensation polymer B. copolymer of two monomers
C. addition polymer D. natural polymer

7. The repeating unit of polyethene is
A. $–CH_2–CH_2–$ B. $–CH_3–$
C. $–CHCl–CH_2–$ D. –CH=CH–

8. PVC is made from the monomer
A. propene B. ethene
C. styrene **D. vinyl chloride (chloroethene)**

9. Condensation polymers are formed when monomers join with the release of a small molecule such as
A. water B. nitrogen C. oxygen D. ethene

10. Condensation polymers are usually
A. polysaccharides only B. polyethene or polypropene
C. metals **D. polyamides or polyesters**

11. Polyesters such as PET are formed from terephthalic acid and
A. hexamethylenediamine **B. ethylene glycol (a diol)**
C. adipic acid D. ethene

12. Polyamides such as nylon-6,6 are formed from hexamethylenediamine and
A. ethylene glycol B. ethanol
C. adipic acid D. terephthalic acid

13. Polyesters are formed from
A. monocarboxylic acids and diols
B. dicarboxylic acids and diamines
C. diols and diamines
D. dicarboxylic acids and diols

14. The linkage found in polyesters is
A. ester linkage
B. glycosidic linkage
C. phosphodiester linkage
D. amide linkage

15. The linkage found in polyamides is
A. glycosidic linkage
B. ionic linkage
C. amide linkage
D. ester linkage

16. Nylon-6,6 is a
A. polyester
B. polyamide
C. polysaccharide
D. polyurethane

17. PET is a
A. polyamide
B. polysaccharide
C. polyester
D. polypeptide

18. Which process produces water as a by-product?
A. Condensation polymerisation
B. Hydrogenation
C. Addition polymerisation
D. Cracking

19. PET can be converted back into its monomers by
A. filtration
B. acid hydrolysis
C. burning
D. freezing

20. PET is considered recyclable because it
A. is a salt
B. cannot be melted
C. is a metal
D. can be broken down into monomers and re-polymerised

21. The word 'plastic' comes from the Greek word meaning
A. brittle
B. hard
C. malleable or mouldable
D. liquid

22. Most plastics are highly resistant to degradation due to their strong
A. carbon–carbon backbone
B. metallic bonds
C. hydrogen bonds
D. ionic bonds

23. Small plastic particles that contaminate water bodies are called
A. monomers
B. microplastics
C. microbes
D. polymers of sugar

24. Plastics disposed in landfills take up a lot of space and
A. become fertiliser
B. become metals
C. decompose quickly
D. leach dangerous chemicals into soil or groundwater

25. Plastics accumulate in oceans and are mistaken for food by
A. rocks
B. marine animals
C. metals
D. plants

26. Burning plastics releases
A. toxic gases and particulates
B. no gases
C. only water vapour
D. pure oxygen

27. Which statement is NOT true about PET?
A. It can be converted back into monomers
B. It is a polyester
C. It cannot be recycled
D. It is used in clothing

28. Which is NOT a property of plastics?
A. They are durable
B. They are lightweight
C. They are versatile
D. They are easily decomposed by microorganisms

Unit 13: Biochemistry

40 MCQs

1. Proteins are called natural polyamides because they are
A. made of sugars
B. made of fatty acids
C. naturally occurring polymers of amino acids
D. synthetic fibres

2. Which of the following best describes proteins?
A. Polymers of amino acids
B. Simple sugars
C. Polysaccharides
D. Chains of fatty acids

3. The basic structural unit (monomer) of a protein is
A. glycerol
B. an amino acid
C. a fatty acid
D. glucose

4. An amino acid contains an amine group and a
A. hydroxyl group
B. phosphate group
C. carbonyl group only
D. carboxylic acid group

5. Amino acids join together by eliminating a molecule of
A. hydrogen
B. carbon dioxide
C. water
D. oxygen

6. The linkage that joins two amino acid units is called a
A. glycosidic bond
B. hydrogen bond
C. ionic bond
D. peptide bond

7. Which bond is responsible for linking amino acids together in a protein?
A. Hydrogen bond
B. Peptide bond
C. Ionic bond
D. Metallic bond

8. The sequence of amino acids in a protein chain is its
A. primary structure
B. secondary structure
C. quaternary structure
D. tertiary structure

9. A protein consisting of more than one folded amino acid chain has a _____ structure.
A. secondary
B. primary
C. quaternary
D. tertiary

10. Enzymes are
A. carbohydrates
B. proteins that speed up chemical reactions in the body
C. vitamins
D. lipids

11. Haemoglobin in red blood cells carries
A. oxygen
B. carbon dioxide only
C. fat
D. sugar

12. Insulin is a protein hormone made in the
A. liver
B. heart
C. kidney
D. pancreas

13. Which of the following is NOT a function of proteins in the body?
A. Transporting molecules
B. Storing genetic information
C. Acting as enzymes
D. Providing structural support

14. Lipids are components of plant or animal tissue that are
A. soluble in water
B. gaseous
C. insoluble in water but soluble in low-polarity solvents
D. metallic

15. The primary function of lipids in the body is
A. long-term energy storage
B. providing immediate energy
C. storing genetic information
D. catalysing reactions

16. Fats and oils are esters of fatty acids with
A. glucose
B. amino acids
C. ethanol
D. glycerol

17. Carbohydrates have the general formula
A. $R–NH_2$
B. $C_x(H_2O)_y$
C. RCOOH
D. C_nH_{2n+2}

18. Plants prepare carbohydrates by
A. cracking
B. distillation
C. photosynthesis
D. fermentation

19. The primary function of carbohydrates is to
A. provide energy to the body
B. store genetic information
C. carry oxygen
D. make enzymes

20. Nucleic acids are the main _____ molecules of the cell.
A. structural metal
B. water-storing
C. energy-storing
D. information-carrying

21. DNA stands for
A. deoxyribose nitric acid
B. deoxyribonucleic acid
C. dioxyribonucleic acid
D. dinucleic acid

22. The acid that carries genetic information is
A. sulphuric acid
B. amino acid
C. ascorbic acid
D. nucleic acid

23. Vitamins are
A. organic molecules needed in small quantities for proper metabolic function
B. inorganic molecules
C. sources of direct energy
D. the primary source of protein

24. The number of essential vitamins is
A. 3 B. 5 **C. 13** D. 20

25. The fat-soluble vitamins are
A. B, C and D B. B and C
C. A and C **D. A, D, E and K**

26. The water-soluble vitamins are
A. B and C B. E and K
C. A and D D. A, D, E and K

27. Vitamin A supports
A. blood clotting **B. vision, immune function and skin health**
C. calcium absorption D. red blood cells only

28. Vitamin C is found in
A. nuts only B. meat only
C. oranges, strawberries and tomatoes D. cheese only

29. Vitamin D is essential for
A. bone health and calcium absorption B. blood clotting
C. vision D. skin colour

30. Vitamin K is essential for
A. calcium absorption B. vision
C. blood clotting D. digestion

31. Vitamin E acts as an
A. hormone **B. antioxidant**
C. enzyme D. fuel

32. Biochemistry is the study of
A. metals B. stars
C. rocks **D. chemical processes within a cell**

33. A pregnancy test checks urine or blood for the hormone
A. testosterone B. insulin
C. hCG (human chorionic gonadotropin) D. adrenaline

34. Which biochemistry application is used to determine parentage?
A. Parental genetic testing B. Pregnancy test
C. Genetic engineering D. Cancer screening

35. Genetics is the branch of biology that studies
A. metals **B. genes, heredity and variation**
C. rocks D. acids

36. Genetic engineering is a process that uses laboratory technology to
A. make metals B. cook food
C. measure temperature **D. modify the DNA of an organism**

37. Gene therapy is a medical technique that
A. changes all DNA in the body
B. cooks food
C. modifies a person's genes to treat or prevent disease
D. makes vitamins

38. Cloning means
A. killing cells
B. producing an exact genetic copy of a gene, cell or organism
C. producing a different organism
D. mixing acids

39. Therapeutic cloning produces
A. embryonic stem cells for medical research
B. proteins
C. vitamins
D. identical animals

40. Stem cells are special cells that can
A. never divide B. make vitamins
C. produce metals **D. transform into different types of cells**

Federal Board Past Paper MCQs

57 MCQs from FBISE SSC-II Chemistry papers (original option order). Figure-based questions are left out.

Annual 2026, Set B (Paper code 2SA-I 26005 (B))

1. Which half-equation shows reduction?
A. $Ag^+ + e^- \rightarrow Ag$ B. $Zn \rightarrow Zn^{2+} + 2e^-$
C. $Cu \rightarrow Cu^{2+} + 2e^-$ D. $Fe \rightarrow Fe^{3+} + 3e^-$

2. In sublimation, a substance changes directly from
A. Gas to liquid B. Solid to liquid
C. Liquid to gas **D. Solid to gas**

3. In an electrolytic cell, the anode is
A. Grounded **B. Positively charged**
C. Negatively charged D. Neutral

4. Which physical parameter increases when an exothermic reaction occurs rapidly?
A. Pressure B. Mass
C. Volume **D. Temperature**

5. Which of the following salts is soluble in water?
A. Calcium carbonate **B. Sodium chloride**
C. Silver chloride D. Lead chloride

6. Which method is used to prepare a soluble salt from an acid and an alkali?
A. Sublimation B. Crystallization
C. Filtration **D. Titration**

7. Which catalyst is used in the reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$ + heat?
A. V_2O_5 B. Fe_2O_3 C. Pt D. Ni

8. On a rate of reaction graph, a steeper slope (or gradient) indicates
A. Faster reaction B. Slower reaction
C. No reaction D. Reaction has stopped

9. When preparing a salt using an excess metal, the excess metal is removed by
A. Decantation B. Evaporation
C. Filtration D. Distillation

10. 1 dm^3 =
A. 1 cm^3 B. 100 cm^3 **C. 1000 cm^3** D. 10 cm^3

11. $C_2H_5OH + 2[O] \rightarrow H_2O +$ _____ ($KMnO_4/H_2SO_4$)
A. C_2H_6 B. CH_3OH **C. CH_3COOH** D. C_2H_4

12. Which fuel is commonly blended with petrol to reduce emissions?
A. Coal gas **B. Ethanol** C. Kerosene D. Diesel

Annual 2026, Set D (Paper code 2SA-I 26005 (D))

1. Which half-equation occurs at the anode during electrolysis of molten NaCl?
A. $2Cl^- \rightarrow Cl_2 + 2e^-$ B. $Na^+ + e^- \rightarrow Na$
C. $Cl_2 + 2e^- \rightarrow 2Cl^-$ D. $Na \rightarrow Na^+ + e^-$

2. Change in state of a substance from gas to liquid is called
A. Freezing B. Sublimation
C. Condensation D. Deposition

3. The cathode in an electrolytic cell is always
A. Insulated B. Positively charged
C. Negatively charged D. Neutral

4. Rapid formation of gas during a reaction indicates
A. Endothermic reaction B. Slow reaction rate
C. No reaction **D. High reaction rate**

5. Carbonates of _____ are usually soluble in water.
A. Na, K B. Ca, Mg C. Fe, Cu D. Ag, Pb

6. Which technique is used to remove excess insoluble solid from salt solution?
A. Distillation B. Evaporation
C. Crystallization **D. Filtration**

7. In the Contact process, SO_2 is converted into SO_3 at about
A. 650 °C B. 250 °C C. 350 °C **D. 450 °C**

8. A graph of product concentration against time shows
A. Pressure rate B. Molarity rate
C. Temperature rate **D. Reaction rate**

9. Salts are generally good conductors of electricity in _____ state.
A. Powdered B. Solid **C. Molten** D. Gas

10. Maximum amount of product in a reaction is determined by
A. Limiting reactant B. Reactant in excess
C. Catalyst D. Solvent

11. Vinegar is produced by bacterial oxidation of
A. Ethanoic acid **B. Ethanol**
C. Propanol D. Methanol

12. One major advantage of alcohol fuels over fossil fuels is that they
A. Are non-flammable **B. Are renewable**
C. Produce smoke D. Have higher sulfur content

Annual 2026, Set M (Paper code 2SA-I 26005 (M))

1. Which half reaction will occur at cathode?
A. $Cu^{2+} + 2e^- \rightarrow Cu$ B. $Zn \rightarrow Zn^{2+} + 2e^-$
C. $Ag^+ + e^- \rightarrow Ag$ D. $Fe \rightarrow Fe^{3+} + 3e^-$

2. With the increase in temperature, the change of liquid into gas is called
A. Sublimation B. Melting
C. Boiling D. Freezing

3. In an electrolytic cell, oxidation reaction occurs at
A. Nowhere **B. Anode**
C. Cathode D. Electrolyte

4. Which observation best indicates an increase in reaction rate?
A. Rapid rise in temperature B. No visible change
C. Less gas bubbles D. Constant mass

5. Which chloride is insoluble in water according to solubility rules?
A. Ammonium chloride B. Sodium chloride
C. Potassium chloride **D. Silver chloride**

6. When an insoluble carbonate reacts with an acid, which gas is produced?
A. Carbon dioxide B. Hydrogen
C. Oxygen D. Nitrogen

7. The main purpose of using a catalyst in the Contact process is to lower
A. Activation energy B. Temperature
C. Pressure D. Volume

8. On a rate of reaction graph, zero slope (or gradient) indicates
A. Faster reaction B. Slower reaction
C. Reverse reaction **D. Reaction has stopped**

9. The most suitable method to prepare a soluble salt from an acid and an alkali is
A. Distillation B. Crystallization
C. Filtration **D. Titration**

10. Maximum amount of product in a reaction is determined by
A. Solvent B. Reactant in excess
C. Limiting reactant D. Catalyst

11. Which condition is necessary for bacterial oxidation of ethanol to ethanoic acid?
A. Strong acid B. Absence of oxygen
C. High pressure **D. Presence of oxygen**

12. A disadvantage of alcohol fuels compared to petrol is
A. High sulfur content **B. Lower energy content**
C. Higher pollution D. Non-renewable

Annual 2025

1. Bromine water test is used to indicate the presence of all EXCEPT
A. $H_2C{=}CH_2$ **B. $H_3C{-}CH_3$**
C. $HC{\equiv}CH$ D. $H_3C{-}CH{=}CH_2$

2. Which of the following is classified as an Arrhenius base?
A. HCl B. NH_3 **C. NaOH** D. NH_4Cl

3. Which of the following is a straight chain hydrocarbon?
A. C_4H_{10} B. C_6H_6
C. $CH_3CH(CH_3)CH_3$ D. $C_6H_{12}O_6$

4. Which of the following substances is a Bronsted-Lowry base?
A. H_2SO_4 B. KOH **C. NH_3** D. NaCl

5. Which bonds are responsible for holding amino acids together in proteins?
A. Hydrogen bonds B. Ionic bonds
C. Peptide bonds D. Glycosidic bonds

6. Which pollutant is primarily responsible for acid rain?
A. CO B. N_2 C. O_2 **D. SO_2**

7. What type of impurity causes temporary hardness in water?
A. $CaSO_4$ B. NaCl C. $MgCl_2$ **D. $Ca(HCO_3)_2$**

8. Which process is used in the industrial manufacturing of sodium carbonate?
A. Contact Process B. Haber Process
C. Solvay Process D. Ostwald Process

9. Which of the following functional groups is present in carboxylic acids?
A. –CHO B. –OH C. $–NH_2$ **D. –COOH**

10. Which condition favors the forward direction of an exothermic reaction?
A. High temperature **B. Low temperature**
C. High pressure D. Increased concentration

11. Which solution turns blue litmus paper red?
A. Soap **B. Vinegar**
C. Baking soda D. Detergent

12. Which compound will discharge pink color of $KMnO_4$ solution and will be oxidized?
A. Ethane **B. Ethene** C. Methane D. Butane

Annual 2023

1. Dark brownish viscous liquid (petroleum) is formed underground due to
A. Pressure, bacterial effects, air and absence of heat
B. Air, pressure and absence of bacterial effects
C. Heat, pressure, bacterial effects and absence of air
D. Heat, bacterial effects, air and absence of pressure

2. The chemical method used to recognize chemical equilibrium state is called
A. Spectroscopy B. Filtration
C. Absorption of light **D. Titration**

3. Predict the unit of equilibrium constant (K_c) for $2ICl(g) \rightleftharpoons I_2(g) + Cl_2(g)$.
A. $dm^3\ mol^{-1}$ **B. No units** C. $mol\ dm^{-3}$ D. $mol^2\ dm^6$

4. Identify the Lewis base from the following:
A. HCl **B. Cl^-** C. $AlCl_3$ D. BF_3

5. Urea contains _____ percentage of nitrogen.
A. 56 **B. 46** C. 96 D. 86

6. Water is used as an excellent cooler (coolant) in industries because of its
A. Low heat of vaporization B. 100 °C boiling point
C. High heat capacity D. High density

7. _____ is a good source of protein.
A. Water **B. Meat**
C. Sodium chloride D. Spinach

8. The purpose of using a Hoffmann voltameter is
A. Hydrolysis of acidified water B. Hydrolysis of water
C. Electrolysis of acidified water D. Electrolysis of water

9. The chemical equation $H_2O(l) \rightleftharpoons H^+(aq) + OH^-(aq)$ represents
A. Decomposition of water B. Formation of water
C. Neutralization of water **D. Autoionization of water**