Lecturer in Chemistry (B-17) — 2021 · Solved Past Paper

Body: Khyber Pakhtunkhwa Public Service Commission (KPPSC) · **Post:** Lecturer in Chemistry (B-17) · **Year:** 2021 · **Questions:** 45 in the original paper — **45 solved and verified**, none excluded · **Price:** Free

> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click “Why each option?” under a question to see all four options explained — one question teaches four topics. General Knowledge answers are as of the 2021 sitting.

Source note: Scanned images of the printed KPPSC question paper, 2 question pages (Q1-Q45, complete), via doc4shares PDF "KPPSC Lecturer Chemistry Past Paper held on 7-10-2021" (https://www.doc4shares.com/view-lecturer-data.php?id=10665, posted 2024-01-02; Google Drive file id 1NaG6yVKd7qu7FvabgOWi6YypMgrOOvap), read visually at 250 dpi; accessed 11 Nov 2026. Body/date/total corroborated by KPPSC's own nomination/recommendation pages for Male Lecturer Chemistry (B-17), Advt 06/2021 Sr.1 (98 posts) and the October 5-7, 2021 lecturer-test window. No printed key exists; every answer was derived and verified independently under the owner's 8 Nov 2026 standard. Answer balance A12/B10/C13/D10 = 45. Printed wording kept as filed (Q2 "equilibrium contains"; Q24 "Leibig method"; Q27 "is are"; Q31 option B "Silaxanes"; Q32 option B "Corrundum"; Q13 option C "Crimson" read through the pink watermark); delegation decisions recorded in the source file, all decided by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 Chemistry

The chemical equilibrium of a reversible reaction is not influenced by:

- B. Pressure
- C. Catalyst ✓ **Correct answer**
- D. Concentration

A. Wrong: temperature shifts the equilibrium position (Le Chatelier's principle).

B. Wrong: pressure shifts the equilibrium of a gaseous reaction when the number of moles changes.

C. Correct: a catalyst speeds up both the forward and reverse reactions equally, so it does not change the equilibrium position — only how fast it is reached.

D. Wrong: changing the concentration of a reactant or product shifts the equilibrium position.

Question 2 Chemistry

HI was heated in sealed tube at 400°C till the equilibrium was reached. HI was found to be 22% decomposed. The equilibrium contains for dissociation is:

- A. 1.99
- B. 0.0199 ✓ **Correct answer**
- C. 0.0796
- D. 0.282

A. Wrong: this is a hundred times too large; the worked value is 0.0199.

B. Correct: from 1 mol HI, 22% dissociation leaves 0.78 mol HI and forms 0.11 mol H2 and 0.11 mol I2, so Kc = (0.11 × 0.11) / $(0.78)^2$ = 0.0199.

C. Wrong: this is four times the correct value (it comes from using 0.22 instead of 0.11 for the products).

D. Wrong: no calculation of this equilibrium gives 0.282.

3 Chemistry

Which one of the following compounds is not a Protonic acid?

- A. SO2(OH)2
- B. B(OH)3 ✓ **Correct answer**
- C. PO(OH)3
- D. SO(OH)2

A. Wrong: sulphuric acid, H2SO4, is a protonic acid — it donates protons.

B. Correct: boric acid is not a protonic acid; it acts as a Lewis acid, accepting a hydroxide ion from water rather than donating a proton.

C. Wrong: phosphoric acid, H3PO4, is a protonic acid.

D. Wrong: sulphurous acid, H2SO3, is a protonic acid.

Question 4 Chemistry

A centinormal solution of a monobasic acid is 100% ionized. Its pH is:

- A. 2 ✓ **Correct answer**
- B. 4
- C. 3
- D. 1

A. Correct: a centinormal (0.01 N) solution of a monobasic acid is 0.01 M, and 100% ionisation gives [H+] = 0.01 M, so pH = -log(0.01) = 2.

B. Wrong: pH 4 would need [H+] = 0.0001 M, a hundred times weaker.

C. Wrong: pH 3 would need [H+] = 0.001 M, ten times weaker.

D. Wrong: pH 1 would need [H+] = 0.1 M, ten times stronger.

5 Chemistry

The pH of solution made by mixing 50mL of 0.01M barium hydroxide solution with 50mL of H2O is:

- A. 3.0
- B. 6.0
- C. 12.0 ✓ **Correct answer**
- D. 15.0

A. Wrong: the solution is alkaline, so its pH cannot be 3.

B. Wrong: the solution is alkaline, so its pH cannot be 6.

C. Correct: diluting 50 mL of 0.01 M Ba(OH)2 to 100 mL halves it to 0.005 M, giving [OH-] = 0.01 M, so pOH = 2 and pH = 14 - 2 = 12.

D. Wrong: the pH scale runs 0–14; 15 is impossible.

Question 6 Chemistry

The extent of adsorption of a gas on a solid depends upon:

- A. Nature of gas
- B. Temperature of gas
- C. Pressure of gas
- D. All of these ✓ **Correct answer**

A. Wrong as the sole answer: the nature of the gas matters, but so do temperature and pressure.

B. Wrong as the sole answer: temperature matters, but so do the nature of the gas and the pressure.

C. Wrong as the sole answer: pressure matters, but so do the nature of the gas and the temperature.

...e extent of adsorption depends on the nature of the gas, the temperature, and the pressure.

Question 7 Chemistry

In which of the following Tyndall effect is not observed?

- A. Sugar solution ✓ **Correct answer**
- B. Gold solution
- C. Emulsions
- D. Suspension

A. Correct: a sugar solution is a true solution with particles too small to scatter light, so no Tyndall effect is seen.

B. Wrong: a gold sol is a colloid and shows the Tyndall effect.

C. Wrong: emulsions are colloidal and show the Tyndall effect.

D. Wrong: suspensions scatter light strongly, so the Tyndall effect IS observed.

Question 8 Chemistry

One mole of magnesium nitride on the reaction with an excess of water gives:

- A. Two moles of ammonia ✓ **Correct answer**
- B. Two moles of nitric acid
- C. One mole of ammonia
- D. One mole of nitric acid

A. Correct: $Mg_3N_2 + 6H_2O \rightarrow 3Mg(OH)_2 + 2NH_3$, so one mole of magnesium nitride gives two moles of ammonia.

B. Wrong: the hydrolysis of a nitride gives ammonia, not nitric acid.

C. Wrong: the equation gives two moles of ammonia per mole of nitride.

o nitric acid is formed in this hydrolysis.

Question 9 Chemistry

Which of the following is most stable?

- A. HI
- B. HCl
- C. HBr
- D. HF ✓ **Correct answer**

A. Wrong: HI has the weakest H–X bond of the four and is the least stable.

B. Wrong: HCl is more stable than HBr and HI but less stable than HF.

C. Wrong: HBr is more stable than HI but less stable than HCl and HF.

D. Correct: HF has the strongest H–X bond of the hydrogen halides, so it is the most stable.

Question 10 Chemistry

If 1000CC of air is passed again & again over heated Cu & Mg till the reduction in volume stops, the volume finally obtained would be approx:

- A. 800CC
- B. 200CC
- C. 10CC ✓ **Correct answer**
- D. Zero CC

A. Wrong: 800 CC is about the volume of nitrogen left after oxygen alone is removed — but magnesium also removes the nitrogen.

B. Wrong: 200 CC is about the volume of oxygen removed by the copper, not what remains.

eated copper removes the oxygen (~21%) and heated magnesium removes the nitrogen (~78%), leaving only the noble gases (~1% argon), about 10 CC of the original 1000 CC.

D. Wrong: the argon in air (about 1%) is not removed by either metal, so the volume does not fall to zero.

Question 11 Chemistry

The number of hydrogen atom(s) attached to Phosphorous atom in hypophosphorous acid is:

- A. Zero
- B. Two ✓ **Correct answer**
- C. One
- D. Three

A. Wrong: hypophosphorous acid (H3PO2) has hydrogen atoms directly bonded to phosphorus.

B. Correct: in H3PO2 the phosphorus atom carries two P–H bonds (the third hydrogen is in the –OH group), so two hydrogen atoms are attached to phosphorus.

C. Wrong: phosphorous acid (H3PO3) has one P–H bond, not hypophosphorous acid.

D. Wrong: only two of the three hydrogens are bonded directly to phosphorus.

Question 12 Chemistry

Which of the following ore contains both Calcium and magnesium?

- A. Dolomite ✓ **Correct answer**
- B. Carnalite
- C. Limestone
- D. Epsom Salt

olomite is CaMg(CO3)2, a double carbonate of calcium and magnesium.

B. Wrong: carnallite is KMgCl3·6H2O — it contains potassium and magnesium, not calcium.

C. Wrong: limestone is CaCO3 — it contains calcium but no magnesium.

D. Wrong: Epsom salt is MgSO4·7H2O — it contains magnesium but no calcium.

Question 13 Chemistry

One of the elements present in Carnalite shows flame colouration. The colour of the flame is:

- A. Green
- B. Lilac ✓ **Correct answer**
- C. Crimson
- D. Orange

A. Wrong: green is the flame colour of barium or copper, not of the elements in carnallite.

B. Correct: carnallite contains potassium, which gives a lilac (violet) flame.

C. Wrong: crimson is the flame colour of lithium and strontium, which are not in carnallite.

D. Wrong: orange is the flame colour of calcium, which is not in carnallite.

Question 14 Chemistry

Brass is an alloy of:

- A. Cu & Sn
- B. Ag & Cu
- C. Cu & Zn ✓ **Correct answer**
- D. Sn & Zn

A. Wrong: copper and tin make bronze, not brass.

ver and copper do not make brass.

C. Correct: brass is an alloy of copper and zinc.

D. Wrong: tin and zinc do not make brass.

Question 15 Chemistry

During the extraction of Zinc, ZnO is obtained from Zinc blende by:

- A. Poling
- B. Electrolytic reduction
- C. Cupellation
- D. Roasting ✓ **Correct answer**

A. Wrong: poling is a refining method for copper, not the conversion of zinc blende to zinc oxide.

B. Wrong: electrolytic reduction is used to extract the metal from its oxide, not to convert the sulphide ore to the oxide.

C. Wrong: cupellation is used to separate silver from lead, not to roast zinc blende.

D. Correct: zinc blende (ZnS) is roasted in air to give zinc oxide ($2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$).

Question 16 Chemistry

For which of the following metals may be hydrometallurgical extractive method be employed?

- A. Copper ✓ **Correct answer**
- B. Iron
- C. Chromium
- D. Tin

copper is extracted hydrometallurgically — low-grade copper ores are leached (e.g. with dilute sulphuric acid or by bacterial leaching) and the copper is recovered from solution.

B. Wrong: iron is extracted pyrometallurgically in the blast furnace, not by hydrometallurgy.

C. Wrong: chromium is extracted by reduction of its oxide (aluminothermic or carbon reduction), not hydrometallurgically.

D. Wrong: tin is extracted by carbon reduction of cassiterite, not hydrometallurgically.

Question 17 Chemistry

Which one of the following ores is best concentrated by froth floatation method?

- A. Cassiterite
- B. Malachite
- C. Galena ✓ **Correct answer**
- D. Magnetite

A. Wrong: cassiterite (SnO_2) is an oxide ore, concentrated by gravity separation, not froth flotation.

B. Wrong: malachite is a carbonate ore of copper, not the classic froth-flotation ore.

C. Correct: galena (PbS) is a sulphide ore, and sulphide ores are concentrated by froth flotation.

D. Wrong: magnetite (Fe_3O_4) is magnetic and is concentrated by magnetic separation, not froth flotation.

Question 18 Chemistry

During the process of electrolytic refining of copper, some metals present as impurity,

ode mud. These are:

- A. Ag & Au ✓ **Correct answer**
- B. Pb & Zn
- C. Fe & Ni
- D. Sn & Ag

A. Correct: silver and gold are more noble than copper, so they do not dissolve at the anode; they fall to the bottom as anode mud (anode slime).

B. Wrong: lead and zinc are less noble than copper and go into solution as ions.

C. Wrong: iron and nickel are less noble than copper and dissolve into the electrolyte.

D. Wrong: tin dissolves into the electrolyte; only the noble metals (silver and gold) settle as anode mud.

Question 19 Chemistry

Which of the following is not considered as an organometallic compound?

- A. Ferrocene
- B. Cisplatin ✓ **Correct answer**
- C. Grignard's reagent
- D. Zeise's Salt

A. Wrong: ferrocene, Fe(C5H5)2, has direct iron–carbon bonds and is an organometallic compound.

B. Correct: cisplatin, [Pt(NH3)2Cl2], has no direct metal–carbon bond — it is a coordination complex, not an organometallic compound.

C. Wrong: a Grignard reagent (RMgX) has a direct carbon–magnesium bond and is an organometallic compound.

D. Wrong: Zeise's salt, K[PtCl3(C2H4)], has a direct platinum–carbon (alkene) bond and is

etallic compound.

Question 20 Chemistry

Order of radioactive disintegration reaction is:

- A. First ✓ **Correct answer**
- B. Second
- C. Third
- D. None of these

A. Correct: radioactive disintegration follows first-order kinetics — the rate depends only on the number of undecayed nuclei present.

B. Wrong: a second-order reaction would depend on the square of the concentration; decay does not.

C. Wrong: radioactive decay is not third order.

D. Wrong: first order is the correct order.

Question 21 Chemistry

In which radiation, mass number & atomic number will not change?

- A. α
- B. β
- C. α & 2β
- D. γ ✓ **Correct answer**

A. Wrong: alpha emission lowers the mass number by 4 and the atomic number by 2.

B. Wrong: beta emission leaves the mass number unchanged but raises the atomic number by 1.

C. Wrong: an alpha followed by two betas restores the atomic number but the mass

ill 4 lower.

D. Correct: gamma radiation is electromagnetic energy; its emission changes neither the mass number nor the atomic number.

Question 22 Chemistry

Penetrating power of α particle is:

- A. More than γ rays
- B. More than β rays
- C. Less than β rays ✓ **Correct answer**
- D. None

A. Wrong: alpha particles are the least penetrating of all — gamma rays are far more penetrating.

B. Wrong: alpha particles are stopped by paper, while beta particles penetrate further.

C. Correct: the penetrating power order is α < β < γ, so alpha particles are less penetrating than beta rays.

D. Wrong: "less than β rays" is the correct description.

Question 23 Chemistry

The compound that does not give a blue colour in Lassaigne's test is:

- A. Aniline
- B. Glycine
- C. Hydrazine ✓ **Correct answer**
- D. Urea

A. Wrong: aniline contains both carbon and nitrogen, so it forms sodium cyanide in the fusion and gives the Prussian blue colour.

ycine contains carbon and nitrogen, so it gives the blue colour.

C. Correct: hydrazine (N2H4) contains nitrogen but NO carbon, so it cannot form sodium cyanide in the sodium fusion — and without NaCN there is no Prussian blue colour.

D. Wrong: urea contains carbon and nitrogen, so it gives the blue colour.

Question 24 Chemistry

Carbon and hydrogen are estimated by:

- A. Leibig method ✓ **Correct answer**
- B. Duma's method
- C. Carius method
- D. Kjeldahl's method

A. Correct: Liebig's method (printed "Leibig") estimates carbon and hydrogen by burning the compound and weighing the CO2 and H2O formed.

B. Wrong: Dumas' method estimates nitrogen, not carbon and hydrogen.

C. Wrong: Carius' method estimates halogens and sulphur, not carbon and hydrogen.

D. Wrong: Kjeldahl's method estimates nitrogen, not carbon and hydrogen.

Question 25 Chemistry

A mixture of benzoic acid & naphthalene can be separated by crystallization from:

- A. Benzene
- B. Ether
- C. Cold water
- D. Hot water ✓ **Correct answer**

A. Wrong: both benzoic acid and naphthalene dissolve in benzene, so it cannot separate them.

both dissolve in ether, so it cannot separate them.

C. Wrong: benzoic acid is almost insoluble in cold water, so neither component would dissolve.

D. Correct: benzoic acid dissolves in hot water while naphthalene does not, so crystallisation from hot water separates them (the benzoic acid crystallises out on cooling).

Question 26 Chemistry

Using Victor Meyer's method, 0.2g of an organic substance displaced 56mL of air at STP. The molecular weight of the compound is:

- A. 112
- B. 56
- C. 80 ✓ **Correct answer**
- D. 28

A. Wrong: this would need 40 mL of vapour from 0.2 g, not 56 mL.

B. Wrong: 56 is the volume displaced in mL, not the molecular weight.

C. Correct: 56 mL at STP is 56/22400 = 0.0025 mol, so the molecular weight is 0.2 g / 0.0025 mol = 80.

D. Wrong: 28 is the molecular weight of nitrogen or carbon monoxide, not of this compound.

Question 27 Chemistry

On monochlorination of n-pentane, the number of isomers formed is are:

- A. 4
- B. 3 ✓ **Correct answer**
- C. 2
- D. 1

pentane has only three distinct kinds of hydrogen (C-1/C-5, C-2/C-4, C-3), so four monochloro products are impossible.

B. Correct: monochlorination of n-pentane gives three isomers — 1-chloropentane, 2-chloropentane and 3-chloropentane.

C. Wrong: there are three distinct positions, not two.

D. Wrong: three different monochloro products form, not one.

Question 28 Chemistry

How many optically active stereoisomers are possible for butane-2, 3-diols?

- A. 1
- B. 2 ✓ **Correct answer**
- C. 3
- D. 4

A. Wrong: there are two optically active forms, not one.

B. Correct: butane-2,3-diol has two optically active stereoisomers — the (2R,3R) and (2S,3S) enantiomers; the third stereoisomer is the meso form, which is optically inactive.

C. Wrong: three is the total number of stereoisomers (including the meso form), not the number of optically active ones.

D. Wrong: the maximum 2^n = 4 is reduced to 3 by the meso form, and only 2 of those are optically active.

Question 29 Chemistry

Which type of isomerism is shown by 2, 3 dichlorobutane?

- A. Diastereo
- B. Optical ✓ **Correct answer**

- D. Structural

A. Defensible but not picked: the meso form is a diastereomer of the racemic pair, so 2,3-dichlorobutane does exhibit diastereoisomerism — but it is not the standard key for this question.

B. Picked: 2,3-dichlorobutane has two chiral centres and non-superimposable mirror images — this is the AIEEE-2005 question, and five independent sources key it to Optical (BYJU'S, Doubtnut, Vedantu, InfinityLearn, EduRev).

C. Wrong: geometric (cis/trans) isomerism needs a double bond or a ring; 2,3-dichlorobutane has neither.

D. Wrong: there is only one way to connect the atoms in 2,3-dichlorobutane, so no structural isomerism is shown. Picked by assistant under owner's 8 Nov delegation.

Question 30 Chemistry

Among the elements given below, the one with highest electropositivity is:

- A. Cs ✓ **Correct answer**
- B. Cu
- C. Cr
- D. Ba

A. Correct: caesium is the most electropositive element — it loses its outer electron most readily (lowest ionisation energy).

B. Wrong: copper is a transition metal with much lower electropositivity than caesium.

C. Wrong: chromium is a transition metal with much lower electropositivity than caesium.

D. Wrong: barium is electropositive, but caesium (group 1) is more electropositive than barium (group 2).

31 Chemistry

Saturated hydrides of Silicon are called:

- A. Silicates
- B. Silaxanes
- C. Silicones
- D. Silanes ✓ **Correct answer**

A. Wrong: silicates are salts of silicic acid (SiO4 units), not silicon hydrides.

B. Wrong: printed "Silaxanes" (a misprint for "Siloxanes") — siloxanes are Si–O–Si compounds, not saturated silicon hydrides.

C. Wrong: silicones are polymers with Si–O backbones and organic groups, not saturated hydrides.

D. Correct: the saturated hydrides of silicon (Si_n H_{2n+2}, e.g. SiH4) are called silanes.

Question 32 Chemistry

The principle ore of aluminium is:

- A. Cryolite
- B. Corrundum
- C. Bauxite ✓ **Correct answer**
- D. Feldspar

A. Wrong: cryolite (Na3AlF6) is used as the electrolyte in aluminium extraction, not as the principal ore.

B. Wrong: printed "Corrundum" (corundum, Al2O3) is an ore of aluminium, but it is not the principal one.

C. Correct: bauxite (hydrated aluminium oxide) is the principal ore from which aluminium is extracted.

ldspar is an aluminium silicate mineral, not the principal ore of aluminium.

Question 33 Chemistry

When NaCl is dissolved in water, the sodium ion is:

- A. Oxidized
- B. Reduced
- C. Hydrolysed
- D. Hydrated ✓ **Correct answer**

A. Wrong: no oxidation occurs when NaCl dissolves — the sodium ion keeps its +1 charge.

B. Wrong: no reduction occurs when NaCl dissolves.

C. Wrong: the sodium ion does not react with water (hydrolysis); it is the ion of a strong base and a strong acid.

D. Correct: on dissolving, the Na+ ion is surrounded by water molecules — it is hydrated.

Question 34 Chemistry

Which of the following is ligand & is positively charged?

- A. Ammonium ion
- B. Hydrazinium ion ✓ **Correct answer**
- C. Sodium ion
- D. Isothiocyanate ion

A. Wrong: the ammonium ion (NH_4^+) has no lone pair to donate, so it cannot act as a ligand.

B. Correct: the hydrazinium ion ($N_2H_5^+$) can donate through the lone pair on its NH_2 nitrogen, and it is the textbook example of a positively charged ligand.

C. Wrong: sodium is a metal ion, not a ligand — ligands are the species that donate to a

D. Wrong: the isothiocyanate ion (NCS-) is negatively charged, not positively.

Question 35 Chemistry

The source of Solar energy is:

- A. Nuclear fusion ✓ **Correct answer**
- B. Nuclear fission
- C. Natural radioactivity
- D. Combustion of hydrogen

A. Correct: the sun's energy comes from the nuclear fusion of hydrogen nuclei into helium in its core.

B. Wrong: fission is the splitting of heavy nuclei; it is not the sun's energy source.

C. Wrong: natural radioactivity is the decay of unstable nuclei; it does not power the sun.

D. Wrong: burning hydrogen is a chemical reaction; the sun's energy is nuclear, not chemical.

Question 36 Chemistry

A negative value for the packing fraction indicates that the nuclide is:

- A. Fissionable
- B. Radioactive
- C. Stable ✓ **Correct answer**
- D. Very unstable

A. Wrong: a negative packing fraction does not mean the nuclide is fissionable.

B. Wrong: a negative packing fraction indicates stability, not radioactivity.

C. Correct: the packing fraction is (actual mass − mass number) / mass number; a

ue means the nucleus has lost mass (mass defect, binding energy) and is stable.

D. Wrong: a positive packing fraction indicates instability; a negative one indicates stability.

Question 37 Chemistry

The molecular mass of an organic compound which contains only one nitrogen atom can be:

- A. 73 ✓ **Correct answer**
- B. 76
- C. 146
- D. 152

A. Correct: by the nitrogen rule, a compound with an odd number of nitrogen atoms has an odd molecular mass — 73 is the only odd option.

B. Wrong: 76 is even, so a compound of this mass would contain zero or an even number of nitrogen atoms.

C. Wrong: 146 is even, so it cannot be the mass of a compound with exactly one nitrogen atom.

D. Wrong: 152 is even, so it cannot be the mass of a compound with exactly one nitrogen atom.

Question 38 Chemistry

The shortest C-C bond distance is found in:

- A. Diamond
- B. Ethane
- C. Benzene

tylene ✓ **Correct answer**

A. Wrong: the C–C single bond in diamond is about 1.54 Å, the longest of the four.

B. Wrong: the C–C single bond in ethane is about 1.54 Å, longer than the triple bond in acetylene.

C. Wrong: the C–C bond in benzene is about 1.39 Å — shorter than a single bond but longer than a triple bond.

D. Correct: the C≡C triple bond in acetylene is about 1.20 Å, the shortest C–C bond of the four.

Question 39 Chemistry

Which of the following can exist as diastereomers?

- A. Lactic acid
- B. 1-Butene
- C. 2-Butene ✓ **Correct answer**
- D. Ethane

A. Wrong: lactic acid exists as a pair of enantiomers, not diastereomers (it has one chiral centre, so no diastereomers).

B. Wrong: 1-butene has no cis/trans isomerism (its double bond carries two hydrogens on one carbon), so it has no diastereomers.

C. Correct: 2-butene exists as cis-2-butene and trans-2-butene, which are diastereomers of each other.

D. Wrong: ethane has no stereoisomers at all.

Question 40 Chemistry

Which of the following compounds exhibit tautomerism?

- B. Chloroethane
- C. Ethoxyethane
- D. Nitroethane ✓ **Correct answer**

A. Wrong: ethanol shows no tautomerism.

B. Wrong: chloroethane shows no tautomerism.

C. Wrong: ethoxyethane (diethyl ether) shows no tautomerism.

D. Correct: nitroethane exhibits nitro–aci tautomerism ($CH_3CH_2NO_2 \rightleftharpoons CH_3CH{=}NO_2H$), the classic example of tautomerism in a nitro compound.

Question 41 Chemistry

Maleic acid and fumaric acid are:

- A. Homologous
- B. Enantiomers
- C. Diastereomers
- D. Geometrical isomers ✓ **Correct answer**

A. Wrong: homologues differ by a –CH2– group; maleic and fumaric acid have the same formula.

B. Wrong: maleic and fumaric acid are not mirror images of each other.

C. Defensible but not picked: cis/trans isomers are diastereomers, so maleic and fumaric acid ARE diastereomers — but "geometrical isomers" is the standard textbook key for this question.

D. Picked: maleic acid is the cis isomer and fumaric acid the trans isomer of butenedioic acid — the textbook name for this pair is geometrical isomers. Picked by assistant under owner's 8 Nov delegation.

42 Chemistry

Cetane is:

- A. n-Hexadecane ✓ **Correct answer**
- B. n-Hexane
- C. n-Pentadecane
- D. n-Octane

A. Correct: cetane is n-hexadecane (C16H34), the reference fuel for the cetane number of diesel.

B. Wrong: n-hexane is C6H14, far shorter than cetane.

C. Wrong: n-pentadecane is C15H32, one carbon short of cetane.

D. Wrong: n-octane is C8H18, half the chain length of cetane.

Question 43 Chemistry

Benzene on ozonolysis yields:

- A. Acetone
- B. Glyoxal ✓ **Correct answer**
- C. Ethanal
- D. Methanal

A. Wrong: acetone is the ozonolysis product of an alkene like 2-methylpropene, not of benzene.

B. Correct: ozonolysis of benzene gives three molecules of glyoxal (OHC–CHO).

C. Wrong: ethanal is not a product of benzene ozonolysis.

D. Wrong: methanal is not a product of benzene ozonolysis.

44 Chemistry

Which of the following is not a biopolymer?

- A. Starch
- B. Proteins
- C. Sucrose ✓ **Correct answer**
- D. Nucleic acid

A. Wrong: starch is a polysaccharide biopolymer (a polymer of glucose).

B. Wrong: proteins are biopolymers (polymers of amino acids).

C. Correct: sucrose is a disaccharide (glucose + fructose) — a small molecule, not a polymer, so it is not a biopolymer.

D. Wrong: nucleic acids (DNA, RNA) are biopolymers (polymers of nucleotides).

Question 45 Chemistry

Cyanoform is a ____ acid than Chloroform:

- A. Weaker
- B. Neutral
- C. Stronger ✓ **Correct answer**
- D. Both acidic & basic

A. Wrong: cyanoform is a stronger acid than chloroform, not weaker.

B. Wrong: cyanoform is acidic; "neutral" does not describe the comparison.

C. Correct: cyanoform, $HC(CN)_3$, is a stronger acid than chloroform, $CHCl_3$ — the three cyano groups stabilise the conjugate anion far better than three chlorine atoms.

D. Wrong: cyanoform is not both acidic and basic; it is simply a stronger acid than chloroform.

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