Tripura JEE 2024 Chemistry Set Q Question Paper

Time Allowed :45 Minutes	**Maximum Marks :**120	**Total questions :**30

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The Tripura Joint Entrance Examination will be conducted in a single day as notified.
2. There will be three shifts: the first shift will consist of Physics and Chemistry question papers, and the subsequent two shifts will consist of Biology and Mathematics question papers.
3. The Board is conducting the examination through Optical Marks Recognition (OMR) system. The pattern of questions is Multiple Choice Question (MCQ) type.
4. The medium of the Question Paper shall be in English and Bengali.
5. There will be 30 (thirty) compulsory questions for each subject, taking 3 (three) questions from each Module.
6. Each question will carry 4 (four) marks, i.e., the total marks will be 120 (30×4) for each subject.

31. Cite the name of the enzyme responsible for the following biochemical transformation:

$$C_6H_{12}O_6(\text{Glucose}) \xrightarrow{\text{Enzyme}} 2C_2H_5OH + 2CO_2(\text{Ethanol})$$

(A) Diastase

(B) Maltase

(C) Urease

(D) Xylose

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32. In aqueous medium, cations like H^+ and Li^+ undergo hydration and exist in the hydrated form. Predict the numbers of water molecules surrounded with H^+ and Li^+ ions to form stable complex structure respectively.

(A) 1, 1

(B) 4, 6

(C) 4, 4

(D) 6, 6

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33. Upon addition of phenolphthalein to the aqueous solution of borax, pink colour generates i.e. solution becomes pink. At this stage, if glycerol is being added to the pink coloured solution, it turns colourless. Highlight the phenomenon.

(A) Final solution becomes neutral

(B) Glycerol binds phenolphthalein

(C) Final solution becomes acidic

(D) Final solution becomes strongly alkaline

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34. SiF_6^{2-} exists but CF_6^{2-} does not. Offer reason.

(A) Due to difference in atomic radius (Si = 1.17 Å, C = 0.77 Å)

(B) Si is more electronegative than carbon (Pauling scale)

(C) C lacks d-orbital but Si possesses vacant 3d-orbital

(D) C cannot extend its coordination number beyond 4 but Si does so

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35. In solid state, nitrogen exists in two different allotropic forms (α and β). Give an idea regarding their shapes and stability.

(A) α (hexagonal) is more stable than β (cubic)

(B) α (hexagonal) is less stable than β (cubic)

(C) α (cubic) is more stable than β (hexagonal)

(D) α (cubic) is less stable than β (hexagonal)

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36. How would you differentiate between O_3 and H_2O_2 (chemically)?

(A) Analyzing the reaction with reductant

(B) Analyzing the reaction with oxidant

(C) Observing the bleaching property

(D) Assessing their antimicrobial properties

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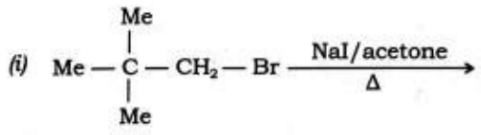
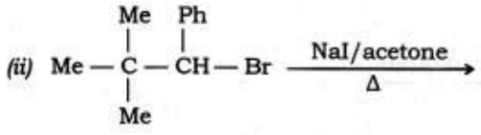
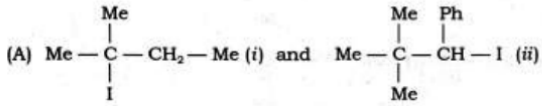
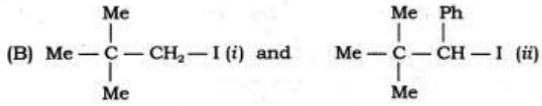
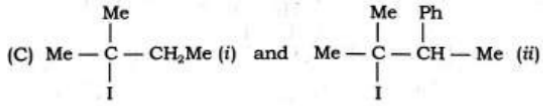
37. Identify the product(s) of the following two reactions (i) and (ii):

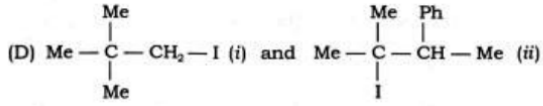




(A)  and

(B)  and

(C)  and

(D)  and

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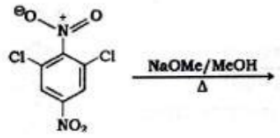
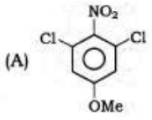
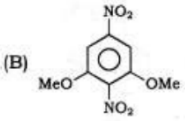
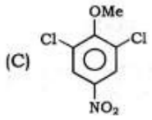
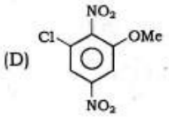
38. Write the end product of the following reaction:



(A) 

(B) 

(C) 

(D) 

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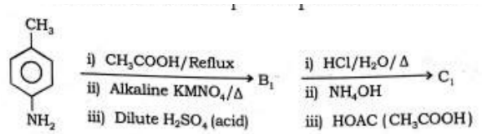
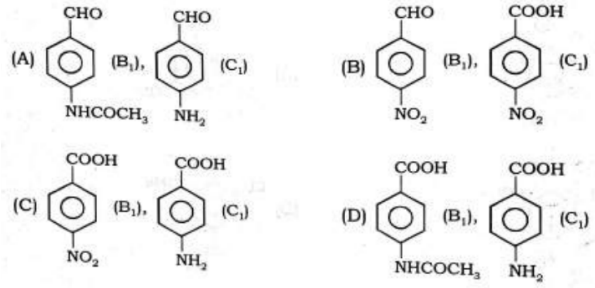
39. Ascertain the products B_1 and C_1 of the following reaction:





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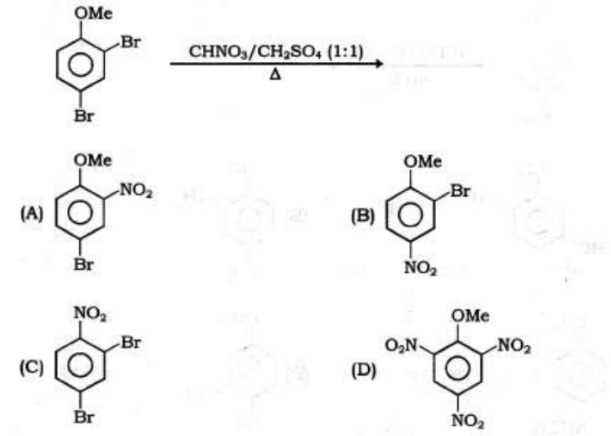
40. Explain the following nitration reaction:



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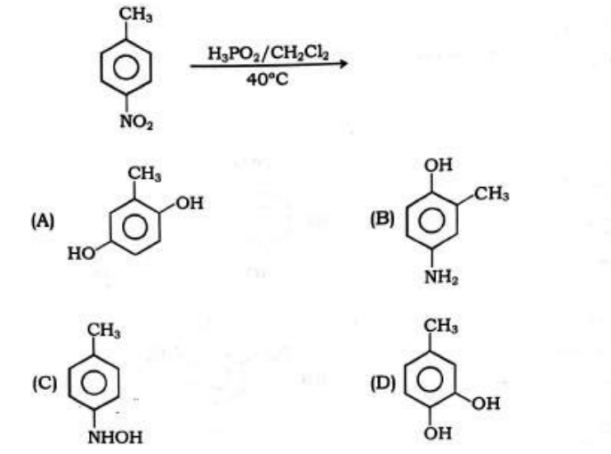
41. Analyzing the following reaction, ascertain the final product:



42. Metal oxides of A(m) and B(m) are structurally similar. Atomic weight of A is 52 and vapor density of its chloride is 79. Oxide of B contains 47.1% oxygen. Considering the above data, calculate the atomic weight of B (in nearest whole number).

(A) 27

(B) 9

(C) 23

(D) 24

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43. If energy of an electron in the first orbit is -13.6 eV, then predict the amount of energy required to transfer it to the fourth orbit.

(A) 2.55 eV

(B) 12.75 eV

(C) 12.75 eV

(D) 2.55 eV

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44. First ionisation potential energy of Li(m) is 520 kJ/mol^{-1}, hence calculate the energy required to convert Li-atoms present in 70 mg Li(m) into Li^{+} ion.

(A) 52 kJ

(B) 5.2 kJ

(C) 52×10^3 kJ

(D) 3640 kJ

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45. In HF molecule, internuclear distance is 0.92 Å and dipole moment approximates 2 D. Estimate the percentage ionic character of HF molecule.

(A) 55

(B) 65

(C) 35

(D) 45

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46. 15 mole of an ideal gas at 27°C is kept in a cylinder of 15 L capacity. Through the small leakage of the cylinder, all gases are passed out and mixed at the atmosphere. Considering atmospheric pressure to be 1 atm, find the amount of work done by the ideal gas.

(A) 354 Joule

(B) 472 Joule

(C) 35860 Joule

(D) 911700 Joule

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47. Standard heat of formation values for $\mathbf{C_2H_6}(g)$, $\mathbf{CO_2}(g)$, and $\mathbf{H_2O}(l)$ are -21.1, -94.1, and -68.3 kcal mol^{-1}, respectively. Indicate the standard heat of combustion value of $\mathbf{C_2H_6}(g)$ involving the above data.

(A) -188.2 kcal/mole

(B) -372 kcal/mole

(C) -204.9 kcal/mole

(D) -183.5 kcal/mole

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48. Consider the following reaction:

$$\mathrm{CO}(g) + \frac{1}{2}\mathrm{O_2}(g) \rightarrow \mathrm{CO_2}(g)$$

At 27°C, the standard entropy change of the process becomes -0.094 kJ/mol·K. Moreover, standard free energies for the formation of $CO_2(g)$ and $CO(g)$ are -394.4 and -137.2 kJ/mol, respectively. Predict the nature of the above chemical reaction.

(A) Exothermic and spontaneous

(B) Endothermic and spontaneous

(C) Exothermic and non-spontaneous (driven)

(D) Exothermic and equilibrating

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49. At 30°C, a substance being dissolved in CCl_4 (solvent) exhibits its dissociation half-life as 2.5 hrs. If 256 g of the substance is taken initially, then tell how much of it will remain as such after 20 hrs.

(A) 16 g

(B) 4 g

(C) 1 g

(D) 2 g

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50. At 12°C and 756 mm atmospheric pressure, a balloon contains 450 ml air. If the balloon is shifted to a place of temperature 5°C and atmospheric pressure 765 mm, then indicate the nature (shape) and degree (volume) of change of the balloon.

(A) Increase in shape by a volume of 16.22 ml

(B) Decrease in shape by a volume of 16.22 ml

(C) Decrease in shape by a volume of 450 ml

(D) Increase in shape by a volume of 883.78 ml

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51. At 27°C temperature and 770 mm pressure, 243 ml of a dry gas weighs 280 mg. Determine the molecular weight of the gas.

(A) 42

(B) 14

(C) 56

(D) 28

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52. At 15 atm pressure, $NH_3(g)$ is being heated in a closed container from 27°C to 347°C and as a result, it partially dissociates following the equation:

$$2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g)$$

If the volume of the container remains constant and pressure increases to 50 atm, then calculate the percentage dissociation of $NH_3(g)$.

(A) 63

(B) 38.7

(C) 61.3

(D) 37

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53. If equilibrium constant for the equation

$$A_2 + B_2 \rightleftharpoons 2AB \quad \text{is } K_p,$$

then find the equilibrium constant for the equation

$$AB \rightleftharpoons \frac{1}{2}A_2 + \frac{1}{2}B_2.$$

(A) $\frac{1}{K_p}$

(B) $\frac{1}{\sqrt{K_p}}$

(C) $\sqrt{K_p}$

(D) K_p^2

54. A solution contains 0.1 M Mg^{2+} ion. Indicate the optimum pH value so that $Mg(OH)_2$ can be precipitated from this solution ($K_{sp}[Mg(OH)_2] = 1.0 \times 10^{-11}$).

(A) 9

(B) 5

(C) 8

(D) 6

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55. An aqueous HCl solution has the pH = 5. If 1 ml of this solution is being diluted to 1 L, then predict the pH of the resulting solution.

(A) 3.98

(B) 9.02

(C) 6.02

(D) 6.98

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56. Find the values of a, b, c, and d for the following redox equation:

$$a\mathrm{I_2} + b\mathrm{NO} + 4\mathrm{H_2O} = c\mathrm{HNO_3} + d\mathrm{HI}$$

(A) 3, 2, 2, 6

(B) 2, 3, 2, 6

(C) 3, 2, 6, 2

(D) 6, 3, 2, 2

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57. 1 molal NaCl solution has the density 1.21 gm/cc. Find the molar concentration of the same solution.

(A) 1 M

(B) 0.95 M

(C) 0.87 M

(D) 1.14 M

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58. At 10°C, a urea solution has the osmotic pressure 500 mm of Hg. Now, if the solution is being diluted and the temperature is increased to 25°C, then osmotic pressure becomes 105.3 mm of Hg. Predict the degree of dilution of the urea solution.

(A) 0.2 times

(B) 4.5 times

(C) 5 times

(D) 1.6 times

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59. Calculate the EMF of the Galvanic cell:

$$\text{Zn}|\text{Zn}^{2+}(1.0M) \parallel \text{Cu}^{2+}(0.5M)|\text{Cu}$$

Given: $E^{\circ}_{\text{Zn}^{2+}/\text{Zn}} = -0.763\,\text{V}$ and $E^{\circ}_{\text{Cu}^{2+}/\text{Cu}} = +0.350\,\text{V}$

(A) 1.40 V

(B) 1.10 V

(C) 0.40 V

(D) 0.92 V

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60. What kind of colloid particle would result if ($AgNO_3$)

solution is being added to excess KI solution?

(A) Negatively charged $[AgI]^-$

(B) Positively charged $[Ag]^+Ag$

(C) Negatively charged $[AgNO_3]^-$

(D) Negatively charged $[AgI]^{-}NO_3^{-}$
