MEDJEE
DIGITEXT | DEXTERITY | DEVELOPMENT

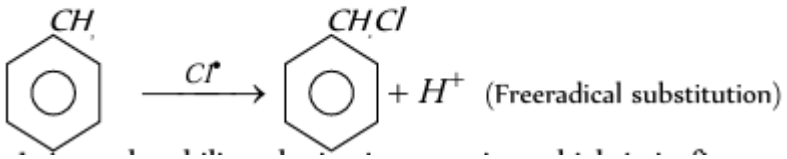
XI STD	DT -85	NEET KEY & HINTS

PHYSICS		CHEMISTRY		BIOLOGY			
1	b	**11**	c	**21**	a	**31**	d
2	a	**12**	a	**22**	b	**32**	b
3	b	**13**	b	**23**	a	**33**	c
4	c	**14**	d	**24**	a	**34**	c
5	a	**15**	a	**25**	a	**35**	b
6	c	**16**	d	**26**	b	**36**	d
7	b	**17**	a	**27**	b	**37**	a
8	d	**18**	a	**28**	d	**38**	c
9	b	**19**	c	**29**	c	**39**	b
10	b	**20**	c	**30**	a	**40**	b

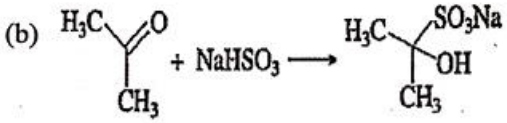
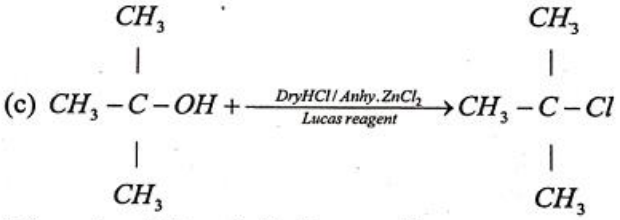
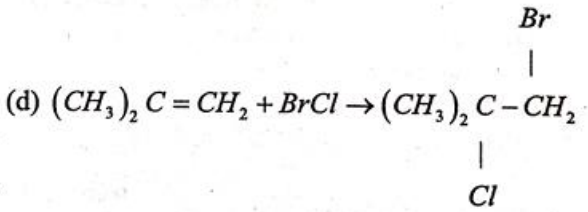
HINTS:

1.	(b) $\Delta Q = \Delta U + \Delta W$; $\Delta Q = 200J$ and $\Delta W = -100J$ $\Rightarrow \Delta U = \Delta Q - \Delta W = 200 - (-100) = 300J$
2.	(a) From FLOT $\Rightarrow dU = dQ - dW \Rightarrow dU = dQ(< 0) \quad (\because dW = 0)$ $\Rightarrow dU < 0$ So temperature will decrease.

3.	(b) From FLOT $\Delta Q = \Delta U + \Delta W$ Work done at constant pressure $(\Delta W)_P = (\Delta Q)_P - \Delta U$ $(\Delta Q)_P - (\Delta Q)_V$ (As we know $(\Delta Q)_V = \Delta U$) Also $(\Delta Q)_P = mc_P\Delta T$ and $(\Delta Q)_V = mc_V\Delta T$ $\Rightarrow (\Delta W)_P = m(c_P - c_V)\Delta T$ $\Rightarrow (\Delta W)_P = 1\times(3.4\times10^3 - 2.4\times10^3)\times10 = 10^4\,cal$
4.	(c) $\Delta Q = \Delta U + \Delta W$ $\because \Delta Q = 200cal = 200\times4.2 = 840J$ and $\Delta W = 40J$ $\Rightarrow \Delta U = \Delta Q - \Delta W = 840 - 40 = 800J$
5.	(a) In first process using $\Delta Q = \Delta U + \Delta W$ $\Rightarrow 8\times10^5 = \Delta U + 6.5\times10^5 \Rightarrow \Delta U = 1.5\times10^5 J$ Since final and initial states are same in both process So ΔU will be same in both process For second process using $\Delta Q = \Delta U + \Delta W$ $\Rightarrow 10^5 = 1.5\times10^5 + \Delta W \Rightarrow \Delta W = -0.5\times10^5 J$
6.	(c) In isothermal expansion temperature remains constant, hence no change in internal energy.
7.	(b) $W = \mu RT\log_e\left(\frac{V_2}{V_1}\right) = 0.2\times8.3\times\log_e 2\times(27+273)$ $= 0.2\times8.3\times300\times0.693 = 345J$
8.	(d) $PV^\gamma = \text{constant} \Rightarrow \frac{P_2}{P_1} = \left(\frac{V_1}{V_2}\right)^\gamma \Rightarrow P_2 = (8)^{5/3}P_1 = 32\,P_1$
9.	(b) $\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{\gamma-1} \Rightarrow T_2 = 300\left(\frac{27}{8}\right)^{\frac{5}{3}-1} = 300\left(\frac{27}{8}\right)^{\frac{2}{3}}$ $= 300\left(\frac{9}{4}\right) = 675\,\text{K}$ $\Rightarrow \Delta T = 675 - 300 = 375\,K$

10.	(b) At constant pressure $W = P\Delta V = \mu R\Delta T = 1 \times 8.31 \times 100 = 831 \approx 814J$
11.	$Cl_2 \xrightarrow{\text{Light}} 2Cl^{\bullet}$  (Freeradical substitution) Starting material: Methylbenzene (toluene) with a free radical dot (·) on the methyl group. Product: Benzyl chloride (CH_2–Cl attached to benzene ring). Reaction type possibilities: a) Nucleophilic substitution • Usually involves nucleophile attacking an electrophilic carbon. • Not likely here, since we start from a free radical intermediate. b) Electrophilic substitution • Happens on the aromatic ring (benzene ring attacked by electrophile). • The substitution here is on the side chain (methyl group), not on the ring. c) Free radical substitution • The reaction involves free radicals (shown by dot on methyl carbon). • Substitution of H by Cl via free radical mechanism is typical for side-chain halogenation in toluene. d) More than one of the above processes • This is possible if the mechanism involves multiple steps. Considering the presence of a radical and substitution at the side chain (not on the ring): • The reaction proceeds by free radical substitution on the methyl group. So the correct answer is: c) Free radical substitution
12.	**Complete step by step answer:** It is known that benzene is an electron-rich compound because of its double bond and it tends to attract electron-deficient species. Electrophiles are the species that can accept electron pairs from other compounds and therefore, it acts as the electron acceptor. In benzene, an additional reaction is very difficult and almost impossible in the benzene ring since addition tends to break the delocalization of electrons in the benzene ring, and thus, it affects the stability of benzene. Thus, substitution is possible and favours in the benzene ring. In nitrobenzene, it is known that the nitro group is an electron-withdrawing species, and therefore, it comes under the category of deactivating species. Thus, it favours meta-position for the upcoming substitution in benzene ring since deactivating groups have higher electron density in meta position than ortho and para position. Thus, the electrophilic substitution reaction for nitrobenzene is meta-directing.
13.	Key points about SN1: • It's a two-step mechanism. • First step: Leaving group departs, forming a carbocation intermediate. • Carbocation has a positively charged carbon with an empty p orbital. Geometry of carbocation intermediate: • The carbon is sp^2 hybridized.

	• The three groups bonded to carbon lie in a plane. • The empty p orbital is perpendicular to this plane. • So the geometry is planar (trigonal planar). So the correct answer is: b) Planar
14.	The correct answer is: d) Addition In an addition reaction, two molecules combine to form a single product, typically by adding across a double or triple bond.
15.	The correct answer is:**a) BCl3** **Explanation:** • **Electrophiles** are species that accept an electron pair because they are electron-deficient. • **BCl3** (boron trichloride) has an incomplete octet on boron, making it electron-deficient and thus an electrophile. The others: • **CH3OH** (methanol) and **NH3** (ammonia) are nucleophiles because they have lone pairs they can donate. $AlCl4^-$ is an anion and generally acts as a nucleophile or a Lewis base.
16.	Phenol will undergo electrophilic substitution more readily than benzene. The correct answer is:**d) Phenol** **Explanation:** • Phenol has an –OH group attached to the benzene ring, which is an activating group. It donates electron density through resonance, making the ring more reactive toward electrophilic substitution. Nitrobenzene, benzoic acid, and benzaldehyde have electron-withdrawing groups (–NO2, –COOH, –CHO respectively) that deactivate the ring and make electrophilic substitution less favorable compared to benzene.
17.	The correct answer is: a) substitution Explanation: In this reaction, the bromine (Br) atom in CH3–Br is replaced by an amino group (NH2) from ammonia (NH3). This is a classic example of a nucleophilic substitution reaction.
18.	Carbocations: • A) Benzyl carbocation with a methoxy group (–OCH3) attached to the ring. • B) Benzyl carbocation without any substituent. • C) Benzyl carbocation with a methyl group (–CH3) attached to the ring. • D) Simple alkyl carbocation (ethyl carbocation). Stability order considerations: 1. Resonance stabilization: Carbocations attached to a benzene ring (benzyl carbocations) are generally more stable due to resonance delocalization of the positive charge. 2. Electron-donating groups (EDGs): Groups like –OCH3 (methoxy) are strong electron-donating groups via resonance and increase carbocation stability by donating electron density into the ring, stabilizing the positive charge. 3. Alkyl groups: Methyl groups are weak electron donors via hyperconjugation and inductive effects, increasing carbocation stability but less effectively than resonance or strong EDGs. 4. Simple alkyl carbocations: No resonance stabilization, so they are less stable compared to benzyl carbocations. Stability ranking for your compounds: • A (methoxy substituted benzyl carbocation): Most stable due to resonance + strong EDG. • C (methyl substituted benzyl carbocation): Next, because of resonance + weak EDG.

	• B (unsubstituted benzyl carbocation): Stable due to resonance, but no EDG. • D (ethyl carbocation): Least stable, no resonance. The order of stability of the given carbocations is: **A > C > B > D**
19.	| | (a) It is Diels Alder's reaction (cyclo addition)  It is nucleophilic addition reaction.  It is nucleophilic substitution reaction.  It is electrophilic addition reaction.
20.	Due to presence of delocalised π - electron in the aromatic compounds, the electron density is maximum inside the ring. Therefore, aromatic compounds undergo electrophilic substitution reaction and resistance to addition reaction. The correct answer is: c) Electrophilic substitution reaction Explanation: • Aromatic compounds like benzene have a stable π-electron system. • This stability resists addition reactions (which would disrupt aromaticity). • Instead, aromatic rings typically undergo electrophilic substitution, where an electrophile replaces a hydrogen atom, preserving aromaticity. Examples: • Nitration • Sulfonation • Halogenation Friedel-Crafts alkylation/acylation