

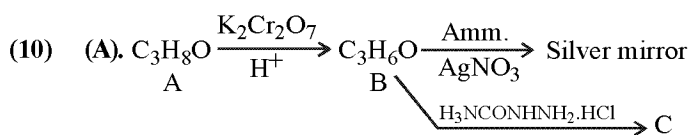
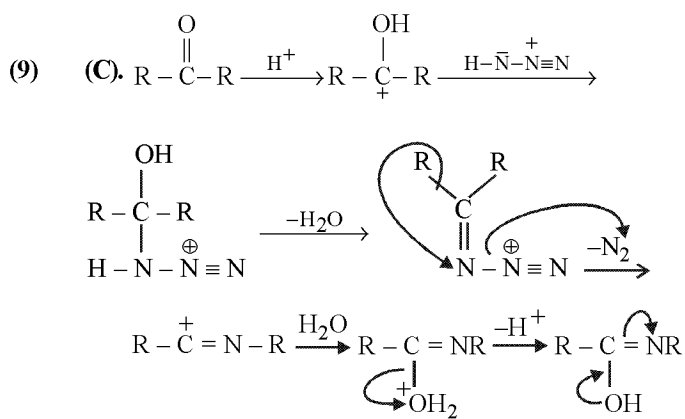
NEET

TEST-9-SOLUTIONS

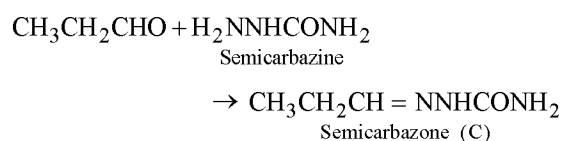
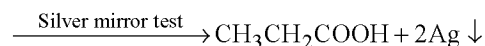
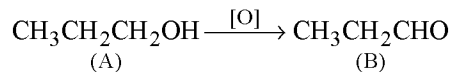
STANDARD ANSWER KEY											
Q	1	2	3	4	5	6	7	8	9	10	11
A	B	B	C	B	C	C	B	B	C	A	C
Q	12	13	14	15	16	17	18	19	20	21	22
A	C	A	C	A	A	D	A	A	C	C	C
Q	23	24	25	26	27	28	29	30	31	32	33
A	D	B	B	B	B	A	A	A	B	B	B
Q	34	35	36	37	38	39	40	41	42	43	44
A	A	C	B	A	B	C	A	C	B	A	C
Q	45	46	47	48	49	50	51	52	53	54	55
A	C	A	D	D	B	C	A	A	A	A	A
Q	56	57	58	59	60	61	62	63	64	65	66
A	C	A	D	D	B	A	C	B	C	A	B
Q	67	68	69	70	71	72	73	74	75	76	77
A	D	A	C	A	C	A	D	B	D	D	B
Q	78	79	80	81	82	83	84	85	86	87	88
A	C	B	D	A	C	C	D	B	D	B	B
Q	89	90	91	92	93	94	95	96	97	98	99
A	A	C	B	C	B	B	B	D	B	A	D
Q	100	101	102	103	104	105	106	107	108	109	110
A	B	D	D	C	D	A	B	B	D	A	B
Q	111	112	113	114	115	116	117	118	119	120	121
A	A	C	B	A	C	C	D	B	B	B	D
Q	122	123	124	125	126	127	128	129	130	131	132
A	C	D	B	A	C	D	D	C	C	A	B
Q	133	134	135	136	137	138	139	140	141	142	143
A	C	D	B	C	C	A	C	B	D	D	A
Q	144	145	146	147	148	149	150	151	152	153	154
A	C	B	A	A	B	A	B	A	A	B	B
Q	155	156	157	158	159	160	161	162	163	164	165
A	C	C	B	C	C	C	D	B	B	B	C
Q	166	167	168	169	170	171	172	173	174	175	176
A	B	B	D	C	B	A	B	A	C	A	C
Q	177	178	179	180							
A	C	D	A	B							

- (1) (B). A quaternary ammonium salt has four substituents attached to the nitrogen, resulting in a positive charge on this atom. As a result, this compound forms a salt where X^- is usually a halide. Primary amines have the general formula RNH_2 , secondary amines have the general formula R_2NH , and tertiary amines have the general formula R_3N . Therefore, choices A, C, and D are incorrect.
- (2) (B). Fractional distillation is the most effective procedure for separating two liquids that boil within a few degrees of each other. Ethyl acetate and ethanol, choice B, boil within three degrees of each other and thus would be good candidates for fractional distillation. In the other three answer choices, the compounds have widely separated boiling points. Fractional distillation could be used, but is not needed; simple distillation or vacuum distillation, which are easier to do, would be effective.
- (3) (C). Amines form weaker hydrogen bonds than alcohols, since nitrogen has a lower electro negativity than oxygen. The molecules are not held together as tightly and are therefore more volatile.
- (4) (B). The reaction between methyl bromide and phthalimide results in the formation of methyl phthalimide. Subsequent hydrolysis then yields methylamine, so answer choice B is the correct response. Therefore, the overall reaction is the conversion of a primary alkyl halide into a primary amine. Choice A is wrong because this contains an ethyl group, not a methyl group. In order to form this compound, the initial reactant should be ethyl bromide. Choices C and D are incorrect as these are tertiary and quaternary nitrogen compounds respectively and the reaction only converts primary alkyl halides into primary amines. Again, the correct answer is choice B.
- (5) (C). Lithium aluminum hydride is a good reducing agent and is used to reduce amides to amines. Reduction of benzamide will result in the formation of benzylamine: choice C. Hydrolysis of benzamide would result in the formation of benzoic acid, so choice A is incorrect. Benzotrile would be formed by the dehydration of amides, so choice B is also wrong. To form ammonium benzoate (choice D) benzamide would first have to be hydrolyzed and then reacted with ammonia, so this answer choice is also incorrect.
- (6) (C). By extracting with sodium hydroxide, benzoic acid will be converted to its sodium salt, sodium benzoate. Sodium benzoate, unlike its acid counterpart, will dissolve in an aqueous solution. The aqueous layer simply has to be acidified in order to retrieve benzoic acid. Choice A is wrong because diethyl ether and tetrahydrofuran are miscible; this answer choice can be discarded. Hydrochloric acid will not transform benzoic acid into a soluble salt, so choice B is incorrect. Finally, choice D is wrong because benzoic acid is insoluble in water. Again, choice C is the correct answer.

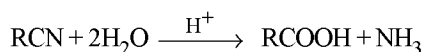
- (7) (B). As the molecular weights of amines increase, so do their boiling points. Of the choices given, choice B, heptylamine, has the highest molecular weight and therefore the highest boiling point, 142-144°C. Choice A, methylamine, has a boiling point of -6.3°C. Butylamine, choice C, has a boiling point of 77.5°C, and t-butylamine, choice D, has a boiling point of 44.4°C.
- (8) (B). Treatment of an amine with excess methyl iodide, silver oxide, and water is called exhaustive methylation or Hofmann elimination. The products formed are a trisubstituted amine and an alkene. Since 2-amino-3-methylbutane is a primary amine, it will take up three methyl groups; the trisubstituted amine produced will be trimethylamine. The predominant alkene product will be the least substituted alkene, because removal of a secondary hydrogen is sterically hindered. Therefore, this reaction will produce 3-methyl-1-butene, plus trimethylamine, choice B. Choices A and D are incorrect; ammonia cannot be a product of this reaction since the mechanism involves the addition of methyl groups. Choice C is incorrect because 2-methyl-2-butene, the more substituted alkene, would not be the predominant product.



Reaction of B indicates that B is an aldehyde thus B should be C_2H_5CHO or CH_3CH_2CHO and therefore C should be $CH_3CH_2CH=NNHCONH_2$.



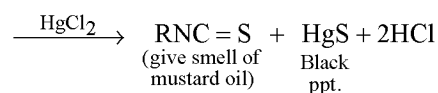
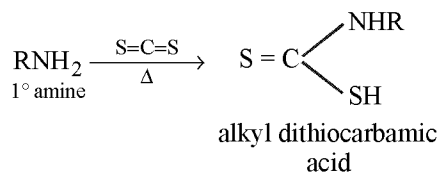
(11) (C). Cyanides, on hydrolysis, give acids



while all other reactions give amines.

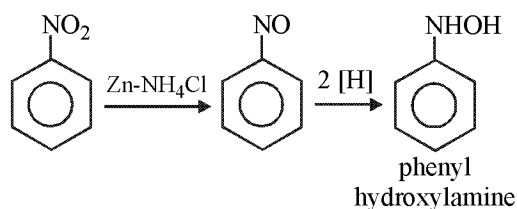
(12) (C).

(13) (A). Primary amines react with CS_2 to form alkyl derivatives of dithiocarbamic acid which is decomposed by mercuric chloride to give alkyl isothiocyanate and black ppt of HgS . This reaction is known as Hofmann's mustard oil reaction and is used as a test for primary amines.

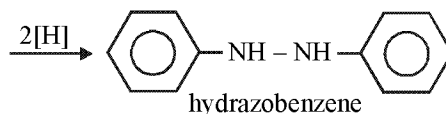
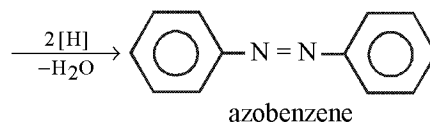
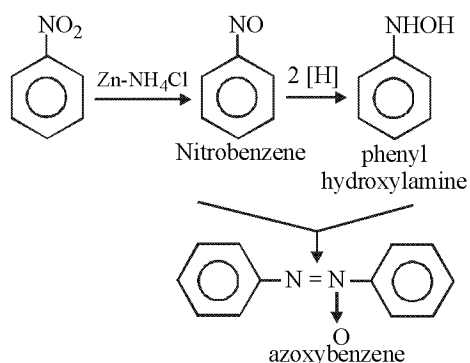


(14) (C).

(i) On reduction in neutral media, using Zn dust and NH_4Cl solution nitrobenzene gives phenyl hydroxylamine.

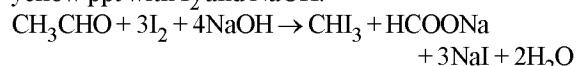


(ii) While in alkaline medium, using Zn-NaOH, mononuclear intermediate products (nitrobenzene and phenylhydroxylamine) interact to each other to give dinuclear product. Final product using Zn-NaOH is hydrazobenzene, which is formed viz the formation of azoxybenzene and azobenzene.

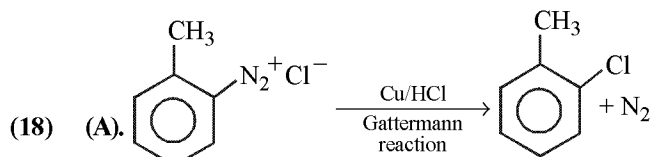
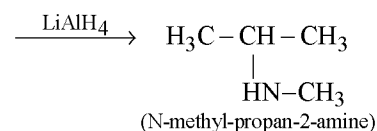
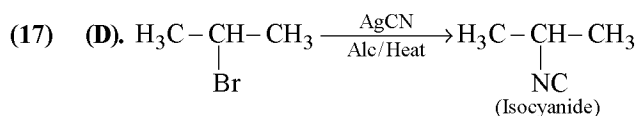
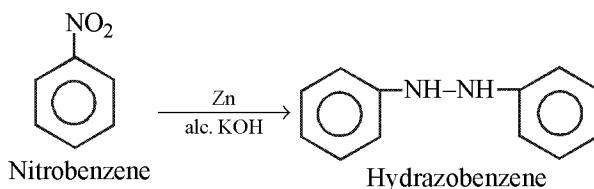


(15) (A). Alcohols containing $\text{CH}_3\text{CH}(\text{OH})-$ group and carbonyl compounds containing $\text{CH}_3\text{CO}-$ group give yellow precipitate with iodine and NaOH solution. This reaction is called iodoform test.

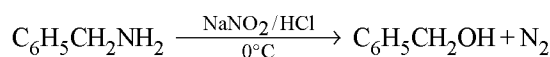
Thus, CH_3CHO due to presence of CH_3CO group gives yellow ppt with I_2 and NaOH.



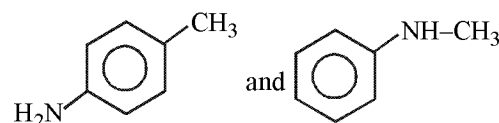
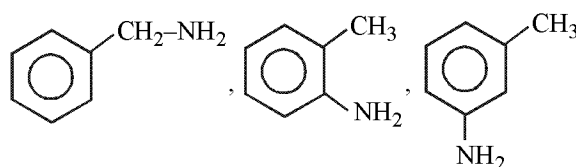
(16) (A). Reduction of nitrobenzene with Zn and alcoholic KOH results in the formation of hydrazobenzene.

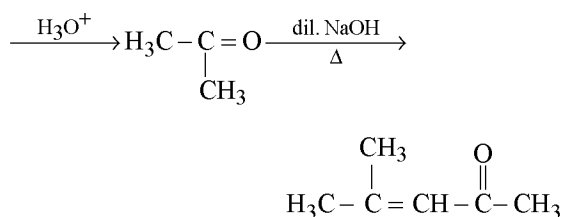
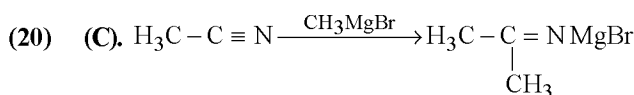


(19) (A). The Aromatic compound is

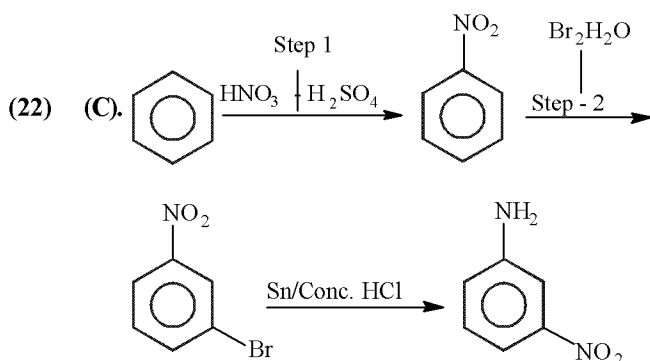
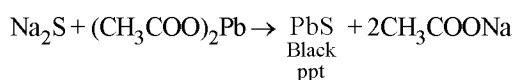


The isomers of benzylamine are





- (21) (C). The sulphur containing organic compounds when fused with sodium metal give Na_2S which react with lead acetate and forms black ppt. of PbS .



Step 1 → Nitration
Step 2 → Bromination
Step 3 → Reduction

- (23) (D). Kjeldahl's and Duma's methods are used for the quantitative estimation of nitrogen in an organic compound. In the Kjeldahl method, the nitrogen element of organic compound is changed to the ammonia.

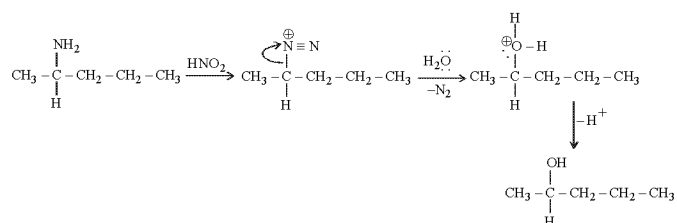
- (24) (B). Mixture of benzoic acid and naphthalene can be separated from hot water in which benzoic acid dissolves but naphthalene does not.



- (27) (B). The lone pair of electrons on the nitrogen atom in aniline is delocalized.

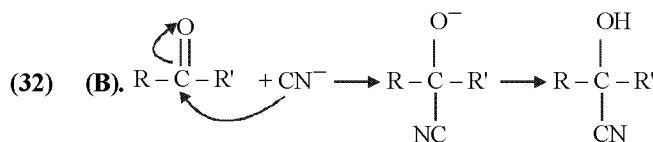
- (28) (A).

- (29) (A).



- (30) (A). The lone pair of electrons has no significant effect on an amine's melting point.

- (31) (B). $\text{CH}_3\text{CONHCH}_3$ is an example for secondary amide. Hoffmann bromamide reaction is answered by primary amide.



Initial attack by nucleophile (CN^-)

- (33) (B).
$$\frac{1.4 \times 30 \times 0.1}{5} = 0.84$$

- (34) (A). Percentage of Nitrogen

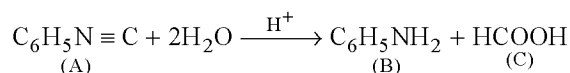
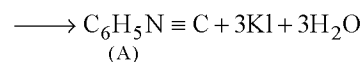
$$= \frac{1.4 \times \text{Normality of acid} \times \text{Volume used with } \text{NH}_3}{\text{Weight of organic compound}}$$

$$= \frac{1.4 \times 1 \times 30}{1.2} = 35$$

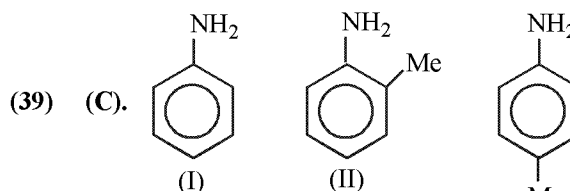
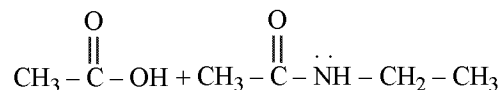
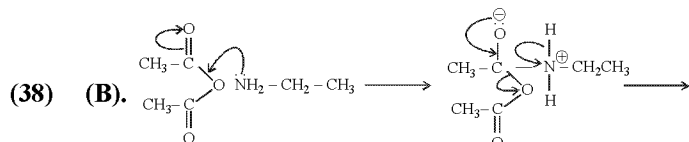
- (35) (C). Mol. Mass = $2 \times \text{V.D} = 2 \times 23 = 46$
Molecular formula = $\text{C}_2\text{H}_5\text{OH}$ by analysis of % C, % H & % O

Functional isomer of $\text{C}_2\text{H}_5\text{OH}$ is $\text{CH}_3-\text{O}-\text{CH}_3$

- (36) (B).
$$\text{C}_6\text{H}_5\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH}$$

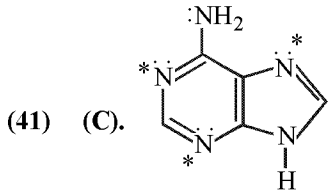
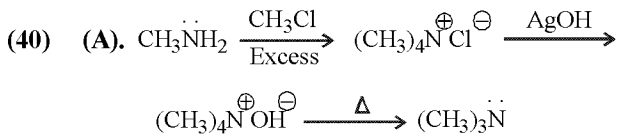


- (37) (A). These two reagents combine to form nitrous acid, HNO_2 , which reacts with H^+ and decomposes to H_2O and NO^+ , the nitrosating agent.



SIP

III > I > II SIP decreases basicity of aniline.



* Active basic sites
Lone pairs at * marked nitrogen are not involved in resonance hence available for reaction with acids.

- (42) (B). Hybridisation of carbon in $\text{R}-\text{C}\equiv\text{N}$ is sp while that of the carbon in RCH_2NH_2 is sp^3 .
So, percentage change in s -character

$$= \frac{\frac{1}{2} - \frac{1}{4}}{\frac{1}{2}} \times 100 = \frac{\frac{1}{4}}{\frac{1}{2}} \times 100 = 50\%$$

- (43) (A). Mass of organic compound = 0.2325g

$$\text{Pressure of dry N}_2 = (755.8 - 23.8) = 732.0 \text{ mm Hg} = \frac{732}{760} \text{ atm}$$

$$\text{Value of N}_2 = 31.7 \text{ mL} = 0.0317 \text{ L}$$

$$\text{Temperature of N}_2 = 298 \text{ K}$$

$$\text{Moles of N}_2 = \frac{732 \times 0.0317}{760 \times 0.0821 \times 298}$$

$$\text{Percentage of N} = \frac{732 \times 0.0317 \times 28 \times 100}{760 \times 0.0821 \times 298 \times 0.2325} = 15.03\%$$

- (44) (C). In sodium fusion test of organic compounds, the nitrogen of an organic compound is converted to sodium nitrite.

- (45) (C). Sodium extract of an organic compound gives blood red colour with FeCl_3 . It contains N and S.

- (46) (A). If both photons are completely absorbed, all of their energy is transferred to the target, regardless of the nature of the target. The energy of a photon is given by $E = hf = hc/\lambda$

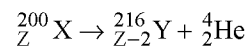
Therefore, a smaller wavelength corresponds to a higher-energy photon.

- (47) (D). The cutoff frequency corresponds to the energy of a photon that is just sufficient to free an e^- from the electrode. This is, by definition, the work function, ϕ .
 $\phi = E = hf = (4.14 \times 10^{-15} \text{ eV} \cdot \text{s}) (2.00 \times 10^{15} \text{ Hz}) = 8.28 \text{ eV}$

- (48) (D). The maximum kinetic energy depends on the incident photon energy and the work function of the material, neither of which changes in this problem. The current is a measure of how many electrons are emitted per unit time from the photoelectrode. More intense light corresponds to more photons per unit time, which in turn leads to more electrons being emitted per unit time.

(49) (B). $-\frac{dN}{dt} = \lambda N \Rightarrow N_2 = \lambda N_1$

- (50) (C). Let the reaction be represented as



\therefore energy released in the reaction is 5 MeV

$$\Rightarrow \frac{1}{2} m_Y v_Y^2 + \frac{1}{2} m_\alpha v_\alpha^2 = 5 \text{ MeV}$$

$$\Rightarrow \frac{1}{2} (216) v_Y^2 + \frac{1}{2} 4 (v_\alpha)^2 = 5 \text{ MeV} \dots\dots\dots (1)$$

Also using conservation of linear momentum.

$$m_Y v_Y = -m_\alpha v_\alpha \Rightarrow v_Y = \frac{-m_\alpha}{m_Y} v_\alpha$$

$$v_Y = -\frac{4}{216} v_\alpha = \frac{-1}{54} v_\alpha$$

Putting in eqn. (1)

$$\frac{1}{2} (216) \left(\frac{v_\alpha}{54} \right)^2 + \frac{1}{2} 4 (v_\alpha)^2 = 5 \text{ MeV}$$

$$\Rightarrow \frac{1}{2} (216) \left(\frac{v_\alpha}{54} \right)^2 + \text{K.E.}_\alpha = 5 \text{ MeV}$$

$$\Rightarrow \frac{1}{2} \times 4 \frac{v_\alpha^2}{54} + \text{K.E.}_\alpha = 5 \text{ MeV}$$

$$\Rightarrow \frac{1}{54} (\text{K.E.}_\alpha) + \text{K.E.}_\alpha = 5 \text{ MeV}$$

$$\Rightarrow \text{K.E.}_\alpha = \frac{5 \times 54}{55} = \frac{54}{11} \text{ MeV}$$

- (51) (A). Wavelengths of the K_α lines for given isotopes of lead (Pb) can be given by a general expression

$$\frac{1}{\lambda} = R (Z-1)^2 \left(\frac{1}{1^2} - \frac{1}{2^2} \right)$$

where R = Rydberg's constant, Z = atomic number of the isotopes. Though Pb^{208} , Pb^{206} and Pb^{204} have different atomic masses, Z will be same for them i.e. 82.

$$\therefore \frac{1}{\lambda_1} = R (82-1)^2 \left(\frac{1}{1^2} - \frac{1}{2^2} \right) = \frac{3}{4} R (81)^2$$

$$\frac{1}{\lambda_2} = \frac{3}{4} R (81)^2 ; \quad \frac{1}{\lambda_3} = \frac{3}{4} R (81)^2$$

$$\Rightarrow \left(\frac{1}{\lambda_2} \right)^2 = \frac{1}{\lambda_1} \times \frac{1}{\lambda_3} \Rightarrow \lambda_2 = \sqrt{\lambda_1 \lambda_3}$$

(52) (A). $T = \frac{T_\alpha T_\beta}{T_\alpha + T_\beta} = \frac{4 \times 12}{4 + 12} ; \quad n = \frac{t}{T} = \frac{12}{3} = 4$

$$\frac{N}{N_0} = \left(\frac{1}{2} \right)^n = \left(\frac{1}{2} \right)^4 = \frac{1}{16} = 6.25\%$$

(53) (A). $r = \frac{n^2}{Z} \times 0.529$

For He^+ , $n = 2$, $Z = 1$

$$r = \frac{4}{2} \times 0.529 = 1.058 \text{ \AA}$$

(54) (A). Here $R_1 = 2 \text{ fm}$, $R_2 = 1 \text{ fm}$
The radius of nucleus is, $R \propto A^{1/3}$

$$\therefore \frac{A_1}{A_2} = \left(\frac{R_1}{R_2}\right)^3 = \left(\frac{2}{1}\right)^3 = 8$$

(55) (A). Here, $t = 25 \text{ years}$, $T_{1/2} = 5 \text{ years}$

$$\text{Number of half lives, } n = \frac{t}{T_{1/2}} = \frac{25}{5} = 5$$

Percentage of radio active material remained after 25

$$\text{years is } \left(\frac{1}{2}\right)^n \times 100 = \left(\frac{1}{2}\right)^5 \times 100 = 3.125\%$$

(56) (C). Maximum KE = $\frac{hc}{\lambda} - \phi_0$

Given, $\lambda = 3000 \text{ \AA} = 3000 \times 10^{-10} \text{ m}$,
 $h = 6.6 \times 10^{-34} \text{ J-s}$, $c = 3 \times 10^8 \text{ m/s}$, $\phi = 2 \text{ eV}$

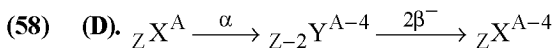
$$\text{Maximum KE} = \frac{6.6 \times 10^{-34} \times 3 \times 10^8}{3000 \times 10^{-10}} \times \frac{1}{1.6 \times 10^{-19}} - 2$$

$$= 4.13 - 2 = 2.13 \text{ eV}$$

In Joules : $2.13 \times 1.6 \times 10^{-19} = 3.41 \times 10^{-19} \text{ J}$

(57) (A). $E = \phi_0 + K_{\max}$
 $1 = 0.5 + K_1 \Rightarrow K_1 = 0.5$
 $2.5 = 0.5 + K_2 \Rightarrow K_2 = 2$

$$\frac{K_1}{K_2} = \frac{0.5}{2} = \frac{1}{4} ; \quad \frac{v_1}{v_2} = \sqrt{\frac{K_1}{K_2}} = \frac{1}{2}$$



(59) (D). $t_2 - t_1 = \frac{T}{\ln 2} \ln \left(\frac{N_1}{N_2}\right) = \frac{20}{\ln 2} \ln \left(\frac{50}{12.5}\right)$
 $= \frac{20}{\ln 2} \ln 4 = 40 \text{ min}$

(60) (B). $m_1 v_1 = m_2 v_2$

$$\frac{v_1}{v_2} = \frac{m_2}{m_1} = \left(\frac{R_2}{R_1}\right)^3 ; m \propto A \propto R^3$$

$$\frac{v_1}{v_2} = \left(\frac{2}{1}\right)^3 = \frac{8}{1}$$

(61) (A). $E = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{E} = \frac{1240}{10.2} \Rightarrow \lambda \approx 122 \text{ nm}$

For least energetic photon $E = E_2 - E_1 = 10.2 \text{ eV}$

(62) (C). $v = \frac{c}{\lambda} = RC \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right] = RC \left[\frac{1}{4} - \frac{1}{9} \right] = \frac{5RC}{36}$

(63) (B). $\lambda = \frac{2\pi r}{n} = \frac{2 \times 3.14 \times 0.53}{1} = 3.33 \text{ \AA}$

(64) (C). $\frac{\lambda_e}{\lambda_p} = \frac{h/m_e v}{h/m_p v} = \frac{m_p}{m_e} = \frac{1.67 \times 10^{-27}}{9.1 \times 10^{-31}}$
 $= 0.18 \times 10^4 = 1836$

(65) (A). $E = W + K.E$

$$K.E. = E - W = \frac{hc}{\lambda} - \frac{hc}{\lambda_0} = hc \left[\frac{1}{\lambda} - \frac{1}{\lambda_0} \right] = hc \left[\frac{\lambda_0 - \lambda}{\lambda \lambda_0} \right]$$

(66) (B). The positively charged central core of an atom.

(67) (D). $\frac{1}{\lambda} = R \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$

$$n_1 = 2, n_2 = 4$$

$$\frac{1}{\lambda} = R \left[\frac{1}{4} - \frac{1}{16} \right] = R \left[\frac{4-1}{16} \right] = \frac{3R}{16} ; \quad \lambda = \frac{16}{3R}$$

(68) (A). In carbon cycle carbon is a reactant as well as end product.

(69) (C). $\lambda \propto n^2$

$$\frac{\lambda_{\text{Lyman}}}{\lambda_{\text{Balmer}}} = \left(\frac{1}{2}\right)^2 = \frac{1}{4} = 0.25$$

(70) (A). $N = \frac{N_0}{2^n} = \frac{N_0}{2^{1/2}} = \frac{N_0}{\sqrt{2}}$

(71) (C). $1 \text{ ci} = 3.7 \times 10^{10} \text{ dis/sec}$

(72) (A).

(73) (D). Magnetic dipole moment

$$M = IA = \frac{e}{2\pi r/v} \times \pi r^2 = \frac{erv}{2}$$

Angular momentum $L = mvr$

$$\therefore \frac{M}{L} = \frac{erv}{2} \times \frac{1}{mvr} = \frac{e}{2m}$$

(74) (B). Same velocity but of different frequencies or different wavelengths. ($c = f\lambda$)

(75) (D). $E = \frac{-13.6}{n^2} \text{ eV} ; E \propto -\frac{1}{n^2}$

(76) (D). $R = R_0 (A)^{1/3}$
 $R = R_0 [64]^{1/3} = 4.8 \text{ fermi}$

(77) (B). $X_Z^A \rightarrow Y_D^C$
 $C = A - 16$
 $D = Z - 8 + 3 = Z - 5$

(78) (C). $p = \frac{nhv}{c} = \frac{nh}{c} \left(\frac{c}{\lambda}\right) = \frac{nh}{\lambda}$

- (79) (B). $E_2 > E_1$
Because of decrease in mass number more stability will come.

(80) (D). $\lambda \propto \frac{1}{\sqrt{mq}}$; $\frac{\lambda_p}{\lambda_\alpha} = \frac{\sqrt{m_\alpha q_\alpha}}{\sqrt{m_p q_p}} = \frac{\sqrt{4m_p \times 2e}}{\sqrt{m_p \times e}} = \sqrt{8}$

(81) (A).

- (82) (C). Velocity $v \propto 1/n$
And radius $r \propto n^2 \Rightarrow r \propto 1/v^2$

$$\therefore \frac{r_2}{r_1} = \left(\frac{v_1}{v_2}\right)^2 = \left(\frac{v}{v/3}\right)^2 = 9 \quad \therefore r_2 = 9r_1 = 9R$$

- (83) (C). $N = N_0 e^{-\lambda t}$

For A, $N_A = N_0 e^{-15x \times \frac{1}{6x}} = N_0 e^{-5/2}$

For B, $N_B = N_0 e^{-3x \times \frac{1}{6x}} = N_0 e^{-1/2}$

$$\therefore \frac{N_A}{N_B} = \frac{e^{1/2}}{e^{5/2}} = e^{\frac{1-5}{2}} = e^{-2}$$

- (84) (D). Energy released $Q = BE_p - BE_R$

(i) $D \rightarrow 2B$

$$Q = 2 \times 8.5 \times 60 - 7 \times 120 = 180 \text{ meV}$$

(ii) $C \rightarrow B + A$

$$Q = [8.5 \times 60 + 5 \times 30] - 8 \times 90 = -60 \text{ J}$$

(iii) $B \rightarrow 2A$

$$Q = 2 \times 5 \times 30 - 8.5 \times 60 = 300 - 510 = -210 \text{ J}$$

(85) (B).

(86) (D).

- (A) $(h\nu)_{2-1} > (h\nu)_{3-2} \Rightarrow$ Photo electric effect is possible
(B) $(h\nu)_{3-1} > (h\nu)_{3-2} \Rightarrow$ Photo electric effect is possible
(C) $(h\nu)_{5-2} > (h\nu)_{3-2} \Rightarrow$ Photo electric effect is possible
(D) $(h\nu)_{4-3} < (h\nu)_{3-2} \Rightarrow$ Photo electric effect is not possible

(87) (B). $\lambda = \frac{h}{\sqrt{2mE_k}}$

If E_K is increased 4 times then λ becomes half.

$$\therefore \text{Additional KE supplied} = 4E_K - E_K = 3E_K$$

- (88) (B). Energy required to remove 2nd electron

$$= z^2 (13.6) \text{ eV} = 2^2 (13.6) \text{ eV} = 54.4 \text{ eV}$$

$$\therefore \text{Total energy} = 24.6 + 54.4 = 79 \text{ eV}$$

- (89) (A). $h\nu = 3E - E$ or $\frac{hc}{\lambda} = 2E$ (1)

In the 2nd case, $\frac{5E}{3} - E = \frac{hc}{\lambda'}$

$$\frac{hc}{\lambda'} = \frac{5E - 3E}{3} = \frac{2E}{3} ; \frac{hc}{\lambda'} = \frac{2}{3} \left(\frac{hc}{2\lambda}\right) \text{ [From eq. (1)]}$$

$$\lambda' = 3\lambda$$

(90) (C). $eV_0 = \frac{1}{2}mv^2 \Rightarrow V_0 \frac{e}{m} = \frac{v^2}{2}$

$$V_0 \times 1.8 \times 10^{11} = \frac{1.8 \times 1.8 \times 10^{12}}{2}$$

$$V_0 = \frac{1.8 \times 10}{2} = 9V$$

- (91) (B). Processes of recombinant DNA technology involves isolation of DNA of a desired DNA fragment. In order to cut the DNA with restriction enzymes, it needs to be in pure form, free from other macro molecules. The DNA is enclosed within the membranes, we have to break the cell open to release DNA along with other macromolecules such as RNA, proteins, polysaccharides and also lipids. This can be achieved by treating the bacterial cells/plant or animal tissue with enzymes such as lysozyme (bacteria), cellulase (plant cells), chitinase (fungus). The RNA can be removed by treatment with ribonuclease whereas proteins can be removed by treatment with protease.

- (92) (C). The cloning vector M 13 has ss DNA as genetic material.

- (93) (B). In the nomenclature of enzyme restriction endonuclease, the roman numeral indicates the order of discovery from source.

- (94) (B). Transgenic mice is mostly used as experimental animal to study effects of drugs, toxicity, to study diseases, because they are small in size, easy to reproduce and quick results.

- (95) (B). The 'Cry' gene codes for the Bt toxin.

- (96) (D). GEAC - Genetic Engineering Approval Committee.

- (97) (B).

- (98) (A). Endonucleases are enzymes that produce internal cuts called cleavage in DNA molecule. A class of endonucleases cleave DNA only within or near those sites, which have specific base sequences, such endonucleases are known as restriction endonucleases and sites recognised by them are called recognition sites. Restriction endonucleases have major role in genetic engineering.

The enzyme reverse transcriptase causes synthesis of DNA (c-DNA) from the RNA in retro virus (HIV).

- (99) (D). Palindromic sequences are a section of double-stranded DNA in which the sequence of bases on one strand is inverted and repeated on the other. They are common in DNA and are the sites at which the DNA is cleaved by restriction enzymes.

- (100) (B). Polymerase Chain Reaction (PCR) is a technique used to replicate a fragment of DNA so as to produce many copies of a particular DNA sequence. In this technique, two strands of DNA are separated by heating and short sequences of a single DNA strand (primers) are added, together with a supply of free nucleotides and DNA polymerase obtained from a bacterium that can withstand extreme heat.

- In a series of heating and cooling cycles, the DNA sequence flanked by the primers doubles with each cycle and is thus rapidly amplified.
- (101) (D). Restriction endonuclease → Ethylene diamine tetra acetic acid → DNA ligase → Calcium chloride
1. Isolation of donor DNA for cloning – Restriction endonuclease
 2. Isolation of vector – ethylene diamine tetracetic acid to dissolve bacterial cell wall.
 3. Formation of chimeric DNA – DNA ligase
 4. Uptake of chimeric DNA – Chimeric DNA can be introduced directly by using calcium chloride.
- (102) (D).
- (103) (C). Transfer of DNA fragments from electrophoresis gel into nitrocellulose sheet.
Developed by E.M Southern
- (104) (D).
- (105) (A). REN to cut DNA molecules and ligases to join DNA strands.
- (106) (B). Dolly (sheep) first animal to be cloned.
- (107) (B). Recognition site of ECOR, is GAATTC CTTAAG.
- (108) (D).
- (109) (A).
- (110) (B).
- (111) (A).
- (112) (C). Plasmid is a structure in bacterial cells consisting of DNA that can exist and replicate independently of the chromosome. These are extrachromosomal circular dsDNA which provide genetic instructions for certain cell activities (e.g. resistance to antibiotic drugs). They can be transferred from cell to cell in a bacterial colony. Plasmids are widely used as vectors to produce recombinant DNA for gene cloning.
- (113) (B).
- (114) (A). Reverse Transcription Polymerase Chain Reaction (RT-PCR) is a variant of Polymerase Chain Reaction (PCR), a laboratory technique commonly used in molecular biology to generate many copies of a DNA sequence, a process termed “amplification”.
RNA silencing (also called as post-transcriptional gene silencing PTGS) refers to a family of gene silencing effects by which the expression of one or more genes is down regulated or entirely suppressed by the introduction of an antisense (single stranded) RNA molecule. Transcription is the process of creating a complementary RNA copy of a sequence of DNA.
- (115) (C). Cloning is the reproduction and growth of genetically identical cells or organisms. Recombinant DNA is used along with cloning to create genetically engineered bacterial cells that can produce human growth hormone or other chemicals.
- (116) (C). This is the method of selection of transformant.
- (117) (D). Because of genetic variation, any particular restriction enzyme will cut the DNA of individuals of the same species in different places. Thus, the resulting DNA will have different lengths. Comparison of these lengths can be used to identify individuals.
- (118) (B)
- (119) (B)
- (120) (B). One of the first bacterial genomes to be sequenced was that of Escherichia coli, a common bacterium that lives in the human intestine where it helps digest food.
- (121) (D)
- (122) (C)
- (123) (D)
- (124) (B)
- (125) (A)
- (126) (C)
- (127) (D)
- (128) (D)
- (129) (C)
- (130) (C)
- (131) (A)
- (132) (B)
- (133) (C)
- (134) (D)
- (135) (B)
- (136) (C)
- (137) (C). Restriction enzymes are a form of protein that can recognize, bind, and cut specific sequences of DNA. They are also called endonuclease, and are powerful tools for isolating specific genes.
- (138) (A). DNA fragments are cleaved by enzymes, and then combined with DNA fragments from another source to form recombinant DNA.
- (139) (C). The liver is the organ with a genetic defect for lipid production.
- (140) (B).
- (141) (D). Scientists who study diseases especially use this technique, which reveals patterns of gene expression.
- (142) (D). This illustration shows the creation of "recombinant DNA," which can be used to produce hormones artificially.
- (143) (A). Gene therapy requires that genes be brought into cells and then moved into the cells' DNA.
- (144) (C). The human growth hormone is produced using recombinant DNA.
- (145) (B). Restriction enzymes free DNA fragments that contain desired genes from the chromosome.
- (146) (A). PCR is also used in forensic DNA testing.
- (147) (A). Gene therapy is proving easier in some types of tissues and organs than in others.
- (148) (B). Proteases are enzymes that degrade proteins by hydrolyzing the peptide bonds.
A member of several classes of enzymes that cut DNA internally are referred to as restriction endonucleases.
- (149) (A).
- (150) (B). Monoclonal antibodies are a single type of antibodies specific for one antigenic determinant that is secreted by a hybridoma clone derived from a single B cell.
DNA ligase can join DNA fragments that have complementary sticky ends or blunt ends.
- (151) (A). A buffer solution is utilized to submerge the agarose slab into during agarose gel electrophoresis.
- (152) (A). Replication is the process of duplicating DNA for distribution to daughter cells.
- (153) (B). Plaques are clear, circular areas formed after a bacterial colony cultured on solid medium has been lysed by bacteriophages
- (154) (B). Polymerase chain reaction is a method for selectively amplifying regions of DNA by in vitro replication.

- (155) (C). Plasmids are extrachromosomal circular double-stranded DNA molecules that replicate independently from the chromosome.
A portion of DNA into which a second DNA segment can be inserted and incorporated into a cell is termed a vector.
- (156) (C). A bacteriophage is a virus that infects a bacterium. Cosmids are plasmids with a small portion of lambda DNA.
- (157) (B). A portion of DNA into which a second DNA segment can be inserted and incorporated into a cell is termed a vector.
DNA cloning is the process of making multiple, identical DNA copies.
- (158) (C).
- (159) (C).
- (160) (C).
- (161) (D).
- (162) (B). Stirred tank fermenters are the most common type of fermenters which relies on an agitator to circulate oxygen. In continuous fermentation nutrients are fed into the fermenter while an equal volume of products, cells, and medium is collected.
- (163) (B). Gene targeting is the delivery of the gene to the right cells. Gene activation is making sure that the gene is turned on at the right time and is regulated properly.
- (164) (B). During the PCR procedure, small DNA sequences are used as the primer to start copying DNA to make multiple copies.
- (165) (C)
- (166) (B)
- (167) (B). DNA polymerase is used to make multiple copies of DNA.
- (168) (D). Gel electrophoresis can be used to separate DNA, RNA or proteins.
- (169) (C). When special restriction enzymes are used, DNA is cut to leave short, single stranded ends of the fragments.
- (170) (B).
- (171) (A). The enzyme reverse transcriptase uses single stranded RNA as a template.
- (172) (B)
- (173) (A)
- (174) (C)
- (175) (A)
- (176) (C)
- (177) (C)
- (178) (D). Transgenic organisms have genes from other species.
- (179) (A)
- (180) (B)