FINAL JEE–MAIN EXAMINATION – SEPTEMBER, 2020
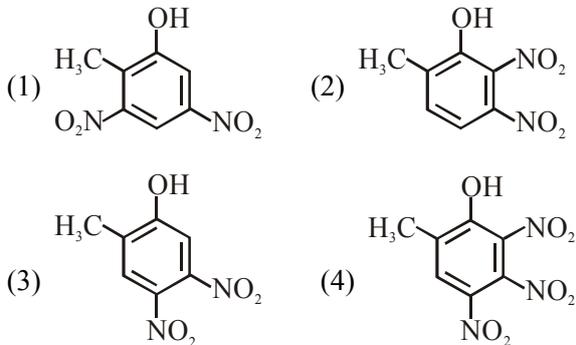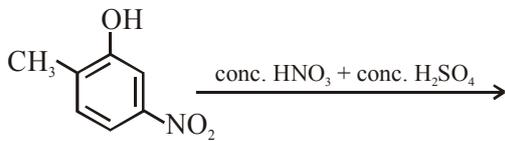
(Held On Wednesday 02nd SEPTEMBER, 2020)   TIME : 3 PM to 6 PM

CHEMISTRY	TEST PAPER WITH ANSWER

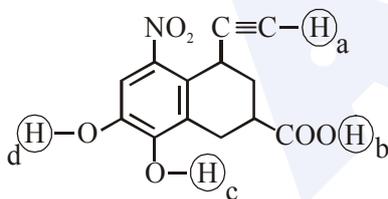**1.** The major product of the following reaction is:

Official Ans. by NTA (3)

2. If you spill a chemical toilet cleaning liquid on your hand, your first aid would be :

(1) aqueous NH_3

(2) vinegar

(3) aqueous $NaHCO_3$

(4) aqueous $NaOH$

Official Ans. by NTA (3)

3. Arrange the following labelled hydrogens in decreasing order of acidity :

(1) b > c > d > a

(2) c > b > a > d

(3) b > a > c > d

(4) c > b > d > a

Official Ans. by NTA (1)

4. Cast iron is used for the manufacture of :

(1) wrought iron and pig iron

(2) wrought iron and steel

(3) wrought iron, pig iron and steel

(4) pig iron, scrap iron and steel

Official Ans. by NTA (2)

5. Two compounds A and B with same molecular formula (C_3H_6O) undergo Grignard's reaction with methylmagnesium bromide to give products C and D. products C and D show following chemical tests.

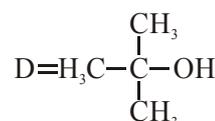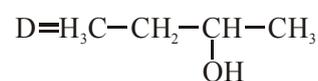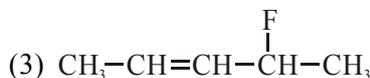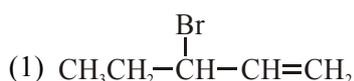| Test	C	D
Ceric ammonium nitrate Test	Positive	Positive
Lucas Test	Turbidity obtained after five minutes	Turbidity obtained immediately
Iodoform Test	Positive	Negative

C and D respectively are :
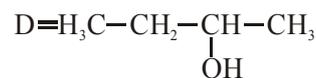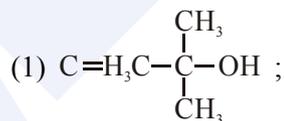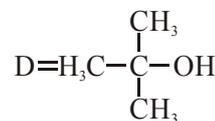
Official Ans. by NTA (3)

6. The shape/structure of $[XeF_5]^-$ and XeO_3F_2, respectively, are :

(1) pentagonal planar and trigonal bipyramidal

(2) trigonal bipyramidal and pentagonal planar

(3) octahedral and square pyramidal

(4) trigonal bipyramidal and trigonal bipyramidal

Official Ans. by NTA (1)

7. The major product obtained from E_2-elimination of 3-bromo-2-fluoropentane is:

(1) $\underset{\underset{\displaystyle Br}{|}}{CH_3CH_2-CH}-CH=CH_2$

(2) $\underset{\underset{\displaystyle Br}{|}}{CH_3-CH_2-C}=CH-CH_3$

(3) $CH_3-CH=CH-\underset{\underset{\displaystyle F}{|}}{CH}-CH_3$

(4) $CH_3CH_2CH=\underset{\underset{\displaystyle CH_3}{|}}{C}-F$

Official Ans. by NTA (4)

8. Three elements X, Y and Z are in the 3rd period of the periodic table. The oxides of X, Y and Z, respectively, are basic, amphoteric and acidic. The correct order of the atomic numbers of X, Y and Z is :
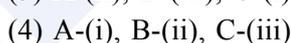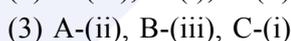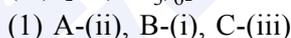
(1) Z < Y < X

(2) X < Z < Y
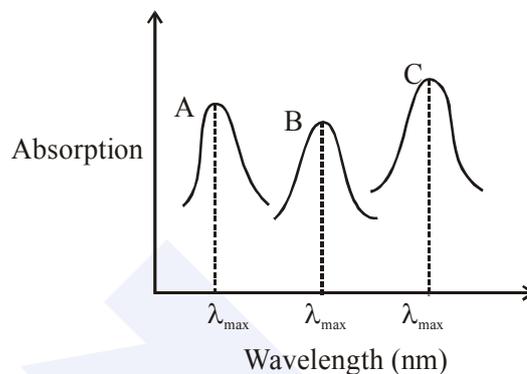
(3) X < Y < Z

(4) Y < X < Z

Official Ans. by NTA (3)

9. The number of subshells associated with n = 4 and m = –2 quantum numbers is :

(1) 4   (2) 8

(3) 16   (4) 2

Official Ans. by NTA (4)

10. Simplified absorption spectra of three complexes ((i), (ii) and (iii)) of M^{n+} ion are provided below; their λ_{max} values are marked as A, B and C respectively. The correct match between the complexes and their λ_{max} values is :

(i) $[M(NCS)_6]^{(-6+n)}$
(ii) $[MF_6]^{(-6+n)}$
(iii) $[M(NH_3)_6]^{n+}$

(1) A-(ii), B-(i), C-(iii)

(2) A-(iii), B-(i), C-(ii)

(3) A-(ii), B-(iii), C-(i)

(4) A-(i), B-(ii), C-(iii)

Official Ans. by NTA (2)

11. Consider the reaction sequence given below :
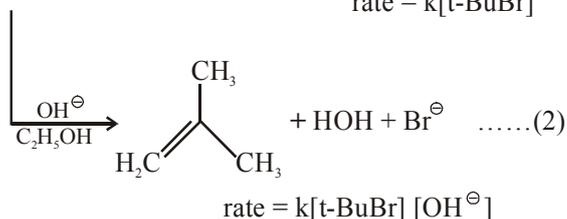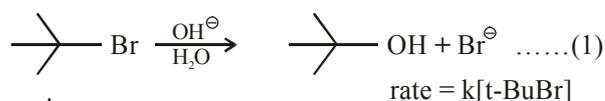
Which of the following statements is true :

(1) Changing the concentration of base will have no effect on reaction (1)

(2) Changing the concentration of base will have no effect on reaction (2)

(3) Changing the base from $OH^\ominus$ to $^\ominus OR$ will have no effect on reaction (2)

(4) Doubling the concentration of base will double the rate of both the reactions.

Official Ans. by NTA (1)

12. The results given in the below table were obtained during kinetic studies of the following reaction:

$$2A + B \longrightarrow C + D$$

| Experiment	$[A]/molL^{-1}$	$[B]/molL^{-1}$	Initial rate/molL^{-1} min^{-1}
I	0.1	0.1	6.00×10^{-3}
II	0.1	0.2	2.40×10^{-2}
III	0.2	0.1	1.20×10^{-2}
IV	X	0.2	7.20×10^{-2}
V	0.3	Y	2.88×10^{-1}

X and Y in the given table are respectively :

(1) 0.3, 0.4

(2) 0.4, 0.3

(3) 0.4, 0.4

(4) 0.3, 0.3

Official Ans. by NTA (1)

13. An organic compound 'A' ($C_9H_{10}O$) when treated with conc. HI undergoes cleavage to yield compounds 'B' and 'C'. 'B' gives yellow precipitate with $AgNO_3$ where as 'C' tautomerizes to 'D'. 'D' gives positive idoform test. 'A' could be :

(1) O—CH=CH—CH₃

(2) —CH₂—O—CH=CH₂

(3) —O—CH₂—CH=CH₂

(4) H₃C— —O—CH=CH₂
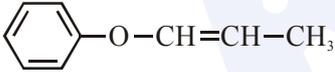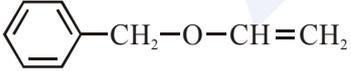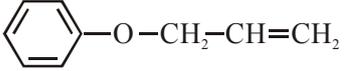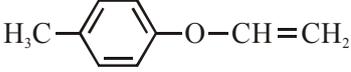
Official Ans. by NTA (2)

14. The size of a raw mango shrinks to a much smaller size when kept in a concentrated salt solution. Which one of the following processes can explain this ?

(1) Diffusion   (2) Dialysis

(3) Osmosis (4) Reverse osmosis

Official Ans. by NTA (3)

15. Two elements A and B have similar chemical properties. They don't form solid hydrogencarbonates, but react with nitrogen to form nitrides. A and B, respectively, are :

(1) Na and C   (2) Li and Mg

(3) Cs and Ba   (4) Na and Rb

Official Ans. by NTA (2)

16. The one that is not expected to show isomerism is :

(1) $[Ni(NH_3)_4(H_2O)_2]^{2+}$

(2) $[Ni(NH_3)_2Cl_2]$

(3) $[Pt(NH_3)_2Cl_2]$

(4) $[Ni(en)_3]^{2+}$

Official Ans. by NTA (2)

17. Amongst the following statements regarding adsorption, those that are valid are :

(a) ΔH becomes less negative as adsorption proceeds.

(b) On a given adsorbent, ammonia is adsorbed more than nitrogen gas.

(c) On adsorption, the residual force acting along the surface of the adsorbent increases.

(d) With increase in temperature, the equilibrium concentration of adsorbate increases.

(1) (b) and (c)   (2) (a) and (b)

(3) (d) and (a)   (4) (c) and (d)

Official Ans. by NTA (2)

18. Match the type of interaction in Column A with the distance dependence of their interaction energy in Column B :
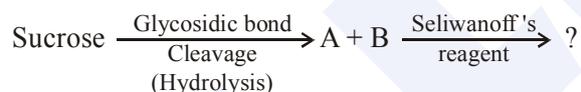
A	B
(I) iron - ion	(a) $\dfrac{1}{r}$
(II) dipole - dipole	(b) $\dfrac{1}{r^2}$
(III) London dispersion	(c) $\dfrac{1}{r^3}$
	(d) $\dfrac{1}{r^6}$

(1) (I)-(a), (II)-(b), (III)-(c)

(2) (I)-(a), (II)-(c), (III)-(d)

(3) (I)-(a), (II)-(b), (III)-(d)

(4) (I)-(b), (II)-(d), (III)-(c)

Official Ans. by NTA (3)

Official Ans. by ALLEN (2)

19. The correct observation in the following reactions is :

$$\text{Sucrose} \xrightarrow[\substack{\text{Cleavage}\\ \text{(Hydrolysis)}}]{\text{Glycosidic bond}} A + B \xrightarrow[\text{reagent}]{\text{Seliwanoff's}} \text{?}$$

(1) Formation of blue colour

(2) Formation of violet colour

(3) Formation of red colour

(4) Gives no colour

Official Ans. by NTA (3)

20. The molecular geometry of SF_6 is octahedral. What is the geometry of SF_4 (including lone pair(s) of electrons, if any) ?

(1) Trigonal bipyramidal
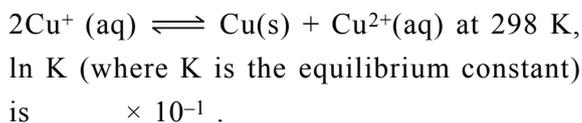
(2) Square planar

(3) Tetrahedral

(4) Pyramidal

Official Ans. by NTA (1)

21. The heat of combustion of ethanol into carbon dioxides and water is −327 kcal at constant pressure. The heat evolved (in cal) at constant volume and 27°C (if all gases behave ideally) is (R = 2 cal mol^{-1} K^{-1})

Official Ans. by NTA (−326400.00)

Official Ans. by ALLEN (326400.00)

22. For the disproportionation reaction

$2Cu^+ (aq) \rightleftharpoons Cu(s) + Cu^{2+}(aq)$ at 298 K, ln K (where K is the equilibrium constant) is _____ $\times 10^{-1}$.

Given

$(E^0_{Cu^{2+}/Cu^+} = 0.16V$

$E^0_{Cu^+/Cu} = 0.52V$

$\dfrac{RT}{F} = 0.025)$

Official Ans. by NTA (144.00)

23. The oxidation states of transition metal atoms in $K_2Cr_2O_7$, $KMnO_4$ and K_2FeO_4, respectively, are x, y and z. The sum of x, y and z is ____.

Official Ans. by NTA (19.00)

24. The ratio of the mass percentages of 'C & H' and 'C & O' of a saturated acyclic organic compound 'X' are 4 : 1 and 3 : 4 respectively. Then, the moles of oxygen gas required for complete combustion of two moles of organic compound 'X' is _____ .

Official Ans. by NTA (5.00)

25. The work function of sodium metal is 4.41×10^{-19} J. If the photons of wavelength 300 nm are incident on the metal, the kinetic energy of the ejected electrons will be (h = 6.63×10^{-34} Js; c = 3×10^8 m/s) _____ $\times 10^{-21}$ J.

Official Ans. by NTA (222.00)